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### EDITORIAL NOTICE

Contributors of perturbed orbital elements are advised that use of the Epoch 1998 July 6.0 TT (rather than 1997 Dec. 18.0 TT) will become effective *after* the 1998 Apr. 11 batch of *MPCs*.

This month's 124 new permanent numberings of minor planets represent a new record, beating the previous record of 115, set in the January 1998 batch of these *Circulars*.

### OBSERVATORY CODES

The following listing is a revision of that on *MPC* 29691–29697. The longitudes  $\lambda$  are measured in degrees eastward from Greenwich, and the parallax constants  $\rho \cos \phi'$  and  $\rho \sin \phi'$  are the product of the geocentric distance (in earth equatorial radii) and the cosine and sine, respectively, of the geocentric latitude. The Minor Planet Center would be pleased to learn of any errors in this list.

| Obs. | $\lambda$ | $\rho \cos \phi'$ | $\rho \sin \phi'$ |                              |                                                                         |
|------|-----------|-------------------|-------------------|------------------------------|-------------------------------------------------------------------------|
| 000  | 0.0000    | 0.62411           | +0.77873          | Greenwich                    | 022 7.7748 0.70790 +0.70409 Pino Torinese                               |
| 001  | 0.15      | 0.629             | +0.774            | Crowborough                  | 023 8.26 0.643 +0.762 Wiesbaden                                         |
| 002  | 0.62      | 0.622             | +0.781            | Rayleigh                     | 024 8.7216 0.65211 +0.75570 Heidelberg-Konigstuhl                       |
| 003  | 3.90      | 0.725             | +0.687            | Montpellier                  | 025 9.1975 0.66019 +0.74865 Stuttgart                                   |
| 004  | 1.4625    | 0.72520           | +0.68627          | Toulouse                     | 026 7.4648 0.68489 +0.72640 Berne-Zimmerwald                            |
| 005  | 2.2313    | 0.65989           | +0.74887          | Meudon                       | 027 9.1912 0.70254 +0.70929 Milan                                       |
| 006  | 2.1258    | 0.75107           | +0.65811          | Fabra Observatory, Barcelona | 028 9.9363 0.64686 +0.76009 Würzburg                                    |
| 007  | 2.3371    | 0.65947           | +0.74922          | Paris                        | 029 10.2406 0.59640 +0.80000 Hamburg-Bergedorf                          |
| 008  | 3.0355    | 0.80172           | +0.59578          | Algiers-Bouzaréah            | 030 11.2554 0.72350 +0.68806 Arcetri Observatory, Florence              |
| 009  | 7.4417    | 0.6838            | +0.7272           | Berne-Uecht                  | 031 11.1925 0.63905 +0.76672 Sonneberg                                  |
| 010  | 6.9267    | 0.72368           | +0.68811          | Caussols                     | 032 11.5842 0.63161 +0.77272 Jena                                       |
| 011  | 8.80      | 0.680             | +0.732            | Wetzikon                     | 033 11.7125 0.63089 +0.77334 Karl Schwarzschild Observatory, Tautenburg |
| 012  | 4.3582    | 0.63333           | +0.77131          | Uccle                        | 034 12.4523 0.74519 +0.66466 Monte Mario Observatory, Rome              |
| 013  | 4.4840    | 0.61481           | +0.78604          | Leiden                       | 035 12.5779 0.56501 +0.82232 Copenhagen                                 |
| 014  | 5.3940    | 0.72888           | +0.68237          | Marseilles                   | 036 12.6514 0.74726 +0.66241 Castel Gandolfo                            |
| 015  | 5.1292    | 0.61576           | +0.78529          | Utrecht                      | 037 13.7333 0.73660 +0.67416 Collurania Observatory, Teramo             |
| 016  | 5.9893    | 0.68006           | +0.73076          | Besançon                     | 038 13.7704 0.70033 +0.71144 Trieste                                    |
| 017  | 6.8496    | 0.64193           | +0.76431          | Hoher List                   | 039 13.1874 0.56485 +0.82243 Lund                                       |
| 018  | 6.7612    | 0.62779           | +0.77578          | Düsseldorf-Bilk              | 040 13.7298 0.63019 +0.77387 Lohrmann Institute, Dresden                |
| 019  | 6.9575    | 0.68331           | +0.72779          | Neuchâtel                    | 041 11.3808 0.67986 +0.73101 Innsbruck                                  |
| 020  | 7.3004    | 0.72391           | +0.68767          | Nice                         | 042 13.0661 0.61169 +0.78847 Potsdam                                    |
| 021  | 8.3855    | 0.65701           | +0.75138          | Karlsruhe                    | 043 11.5286 0.69770 +0.71422 Asiago Astrophysical Observatory, Padua    |
|      |           |                   |                   |                              | 044 14.2559 0.75738 +0.65082 Capodimonte Observatory, Naples            |
|      |           |                   |                   |                              | 045 16.3390 0.66739 +0.74227 Vienna (since 1879)                        |
|      |           |                   |                   |                              | 046 14.2881 0.65922 +0.74965 Kleť Observatory, České Budějovice         |
|      |           |                   |                   |                              | 047 16.8782 0.61146 +0.78864 Poznań                                     |
|      |           |                   |                   |                              | 048 15.83 0.640 +0.765 Hradec Kralove                                   |
|      |           |                   |                   |                              | 049 17.6067 0.5088 +0.8580 Uppsala-Kvistaberg                           |
|      |           |                   |                   |                              | 050 18.0582 0.51118 +0.85660 Stockholm (before 1931)                    |
|      |           |                   |                   |                              | 051 18.4766 0.83055 -0.55508 Cape                                       |
|      |           |                   |                   |                              | 052 18.3083 0.51224 +0.85597 Stockholm-Saltsjöbaden                     |
|      |           |                   |                   |                              | 053 18.9642 0.67688 +0.73373 Konkoly Observatory, Budapest (since 1934) |
|      |           |                   |                   |                              | 054 11.6654 0.56595 +0.82169 Brorfelde                                  |
|      |           |                   |                   |                              | 055 19.9596 0.64321 +0.76316 Cracow                                     |
|      |           |                   |                   |                              | 056 20.2450 0.65501 +0.75346 Skalná Pleso                               |
|      |           |                   |                   |                              | 057 20.5133 0.71074 +0.70116 Belgrade                                   |
|      |           |                   |                   |                              | 058 20.4957 0.57895 +0.81263 Kaliningrad                                |
|      |           |                   |                   |                              | 059 20.2201 0.65500 +0.75364 Lomnický Štít                              |

|     |         |         |          |                                        |     |           |          |           |                                                 |
|-----|---------|---------|----------|----------------------------------------|-----|-----------|----------|-----------|-------------------------------------------------|
| 060 | 21.4200 | 0.61572 | +0.78535 | Warsaw-Ostrowik                        | 113 | 13.0166   | 0.63502  | +0.77001  | Volkssternwarte Drebach, Schoenbrunn            |
| 061 | 22.30   | 0.661   | +0.746   | Uzhgorod                               | 114 | 41.4277   | 0.72489  | +0.68702  | Engelhardt Observatory, Zelenchukskaya Station  |
| 062 | 22.2293 | 0.49440 | +0.86632 | Turku                                  | 115 | 41.4416   | 0.72492  | +0.68699  | Zelenchukskaya                                  |
| 063 | 22.4450 | 0.49496 | +0.86601 | Turku-Tuorla                           | 116 | 11.5958   | 0.66893  | +0.74094  | Giesing                                         |
| 064 | 22.75   | 0.495   | +0.865   | Turku-Kevola                           | 117 | 11.5385   | 0.66897  | +0.74092  | Sendling                                        |
| 065 | 12.63   | 0.673   | +0.739   | Traunstein                             | 118 | 17.2740   | 0.66558  | +0.74394  | Astronomical and Geophysical Observatory, Modra |
| 066 | 23.7169 | 0.78932 | +0.61195 | Athens                                 | 119 | 42.8253   | 0.74729  | +0.66264  | Abastuman                                       |
| 067 | 24.0297 | 0.64632 | +0.76058 | Lvov University Observatory            | 120 | 13.7261   | 0.70489  | +0.70699  | Višňjan                                         |
| 068 | 24.0142 | 0.64627 | +0.76062 | Lvov Polytechnic Institute             | 121 | 36.9369   | 0.64883  | +0.75842  | Kharkov University, Chuguevskaya Station        |
| 069 | 24.41   | 0.549   | +0.833   | Baldone, near Riga                     | 122 | 3.5035    | 0.72017  | +0.69176  | Pises Observatory                               |
| 070 | 25.2865 | 0.57940 | +0.81233 | Vilnius (before 1939)                  | 123 | 44.2917   | 0.76352  | +0.64398  | Byurakan                                        |
| 071 | 24.72   | 0.748   | +0.661   | Smolyan                                | 124 | 2.2550    | 0.72534  | +0.68612  | Castres                                         |
| 072 | 7.17    | 0.629   | +0.774   | Scheuren Observatory                   | 125 | 44.90     | 0.739    | +0.671    | Tbilisi                                         |
| 073 | 26.0967 | 0.71549 | +0.69630 | Bucharest                              | 126 | 9.4758    | 0.71957  | +0.69216  | Monte Viseggi                                   |
| 074 | 26.4058 | 0.87518 | -0.48263 | Boyden Observatory, Bloemfontein       | 127 | 6.9794    | 0.6339   | +0.7709   | Bornheim                                        |
| 075 | 26.7216 | 0.52557 | +0.84791 | Tartu                                  | 128 | 46.10     | 0.626    | +0.779    | Saratov                                         |
| 076 | 27.8768 | 0.90127 | -0.43225 | Johannesburg-Hartbeespoort             | 129 | 45.88     | 0.776    | +0.629    | Ordubad                                         |
| 077 | 28.0292 | 0.89819 | -0.43876 | Yale-Columbia Station, Johannesburg    | 130 | 10.2407   | 0.70013  | +0.71181  | Lumezzane                                       |
| 078 | 28.0750 | 0.89824 | -0.43868 | Johannesburg                           | 131 | 4.725     | 0.7123   | +0.6996   | Observatoire de l'Ardeche                       |
| 079 | 28.2288 | 0.90120 | -0.43251 | Radcliffe Observatory, Pretoria        | 132 | 5.242     | 0.7192   | +0.6926   | Bedoin                                          |
| 080 | 28.9667 | 0.75566 | +0.65278 | Istanbul                               | 133 | 5.0906    | 0.72819  | +0.68309  | Les Tardieux                                    |
| 081 | 27.8768 | 0.90127 | -0.43225 | Leiden Station, Johannesburg           | 134 | 11.4842   | 0.63160  | +0.77277  | Groszschwabhausen                               |
| 082 | 15.63   | 0.668   | +0.741   | St. Pölten                             | 135 | 49.1210   | 0.56353  | +0.82334  | Kasan                                           |
| 083 | 30.50   | 0.640   | +0.767   | Golosseevo-Kiev                        | 136 | 48.8156   | 0.56282  | +0.82383  | Engelhardt Observatory, Kasan                   |
| 084 | 30.3274 | 0.50471 | +0.86041 | Pulkovo                                | 137 | 34.8147   | 0.84821  | +0.52790  | Givatayim Observatory, Raanana                  |
| 085 | 30.5023 | 0.63800 | +0.76749 | Kiev                                   | 138 | 7.5717    | 0.67550  | +0.73494  | Village-Neuf                                    |
| 086 | 30.7582 | 0.68987 | +0.72152 | Odessa                                 | 139 | 7.1108    | 0.72526  | +0.68618  | Antibes                                         |
| 087 | 31.3411 | 0.86799 | +0.49495 | Helwan                                 | 140 | 3.6294    | 0.69945  | +0.71241  | Augerolles                                      |
| 088 | 31.82   | 0.868   | +0.500   | Kottomia                               | 141 | 7.3672    | 0.65646  | +0.75189  | Hottviller                                      |
| 089 | 31.9747 | 0.68359 | +0.72743 | Nikolaev                               | 142 | 7.1874    | 0.62156  | +0.78075  | Sinsen                                          |
| 090 | 8.25    | 0.645   | +0.762   | Mainz                                  | 143 | 9.0250    | 0.6930   | +0.7186   | Gnosca                                          |
| 091 | 4.2092  | 0.70363 | +0.70829 | Observatoire de Nurol, Aurec sur Loire | 144 | 1.6653    | 0.65550  | +0.75267  | Bray et Lu                                      |
| 092 | 18.5546 | 0.60177 | +0.79601 | Torun-Piwnice                          | 168 | 59.50     | 0.546    | +0.835    | Kourovskaya                                     |
| 093 | 20.3647 | 0.3537  | +0.9322  | Skibotn                                | 186 | 66.8821   | 0.77679  | +0.62781  | Kitab                                           |
| 094 | 33.9974 | 0.71565 | +0.69620 | Crimea-Simeis                          | 188 | 66.88     | 0.781    | +0.622    | Shokin Majdanak                                 |
| 095 | 34.02   | 0.711   | +0.701   | Crimea-Nauchnij                        | 190 | 68.68     | 0.783    | +0.619    | Gissar                                          |
| 096 | 9.4283  | 0.69967 | +0.71215 | Merate                                 | 191 | 68.7811   | 0.78306  | +0.62006  | Dushanbe                                        |
| 097 | 34.7625 | 0.86165 | +0.50608 | Wise Observatory, Mitzpeh Ramon        | 192 | 69.2936   | 0.75213  | +0.65692  | Tashkent                                        |
| 098 | 11.5694 | 0.69774 | +0.71395 | Asiago Observatory, Cima Ekar          | 193 | 69.22     | 0.786    | +0.617    | Sanglok                                         |
| 099 | 25.53   | 0.483   | +0.873   | Lahti                                  | 210 | 76.9573   | 0.73042  | +0.68104  | Alma-Ata                                        |
| 100 | 24.13   | 0.462   | +0.884   | Ahtari                                 | 217 | 77.88     | 0.729    | +0.683    | Assah                                           |
| 101 | 36.2322 | 0.64403 | +0.76246 | Kharkov                                | 218 | 78.4541   | 0.95444  | +0.29768  | Hyderabad                                       |
| 102 | 36.59   | 0.565   | +0.823   | Zvenigorod                             | 219 | 78.7283   | 0.95618  | +0.29216  | Japal-Rangapur                                  |
| 103 | 14.47   | 0.694   | +0.715   | Ljubljana                              | 220 | 78.8263   | 0.97627  | +0.21634  | Vainu Bappu Observatory, Kavalur                |
| 104 | 10.8042 | 0.71985 | +0.69202 | San Marcello Pistoiese                 | 223 | 80.2464   | 0.97427  | +0.22465  | Madras                                          |
| 105 | 37.5706 | 0.56403 | +0.82302 | Moscow                                 | 236 | 84.9465   | 0.55370  | +0.82995  | Tomsk                                           |
| 106 | 14.0736 | 0.69661 | +0.71520 | Crni Vrh                               | 248 | 0.0000    | 0.00000  | 0.00000   | Hipparcos                                       |
| 107 | 11.0030 | 0.70998 | +0.70186 | Cavezzo                                | 249 |           |          |           | SOHO                                            |
| 108 | 11.0278 | 0.72367 | +0.68784 | Montelupo                              | 250 |           |          |           | Hubble Space Telescope                          |
| 109 | 3.0705  | 0.80241 | +0.59481 | Algiers-Kouba                          | 251 | 293.24692 | 0.949577 | +0.312734 | Arecibo                                         |
| 110 | 39.15   | 0.544   | +0.835   | Rostov                                 | 252 | 243.20512 | 0.817719 | +0.573979 | Goldstone DSS 13, Fort Irwin                    |
| 111 | 10.9721 | 0.72439 | +0.68710 | Piazzano Observatory, Florence         | 253 | 243.11047 | 0.815913 | +0.576510 | Goldstone DSS 14, Fort Irwin                    |
| 112 | 10.9039 | 0.70232 | +0.70950 | Pleiade Observatory, Verona            | 254 | 288.51128 | 0.736973 | +0.673692 | Haystack, Westford                              |

|     |          |         |          |                                              |     |          |         |          |                                        |
|-----|----------|---------|----------|----------------------------------------------|-----|----------|---------|----------|----------------------------------------|
| 286 | 102.79   | 0.908   | +0.420   | Yunnan Observatory                           | 384 | 138.1792 | 0.8219  | +0.5678  | Shimada                                |
| 292 | 285.1058 | 0.76630 | +0.64033 | Burlington, New Jersey                       | 385 | 138.4680 | 0.82039 | +0.56997 | Nihondaira Observatory                 |
| 293 | 285.5899 | 0.76936 | +0.63668 | Burlington remote site                       | 386 | 138.3217 | 0.81121 | +0.58309 | Yatsugatake-Kobuchizawa                |
| 294 | 285.8467 | 0.76031 | +0.64739 | Astrophysical Obs., College of Staten Island | 387 | 139.1944 | 0.81000 | +0.58469 | Tokyo-Dodaira                          |
| 295 | 283.0000 | 0.7789  | +0.6251  | Catholic University Observatory, Washington  | 388 | 139.5421 | 0.81330 | +0.57991 | Tokyo-Mitaka                           |
| 296 | 286.2515 | 0.7365  | +0.6742  | Dudley Observatory (after 1893)              | 389 | 139.7447 | 0.81347 | +0.57965 | Tokyo (before 1938)                    |
| 297 | 286.83   | 0.720   | +0.692   | Middlebury                                   | 390 | 139.8725 | 0.80425 | +0.59234 | Utsunomiya                             |
| 298 | 287.3408 | 0.74943 | +0.65988 | Van Vleck Observatory                        | 391 | 140.7824 | 0.78621 | +0.61592 | Sendai Observatory, Ayashi Station     |
| 299 | 107.6160 | 0.99316 | -0.11808 | Bosscha Observatory, Lembang                 | 392 | 141.3667 | 0.73355 | +0.67741 | JCPM Sapporo Station                   |
| 301 | 288.8467 | 0.70279 | +0.70926 | Mont Megantic                                | 393 | 140.1292 | 0.8090  | +0.5858  | JCPM Sakura Station                    |
| 302 | 288.88   | 0.990   | +0.150   | University of the Andes station              | 394 | 142.3208 | 0.70692 | +0.70493 | JCPM Hamatonbetsu Station              |
| 303 | 289.1329 | 0.98889 | +0.15190 | Mérida                                       | 395 | 142.3583 | 0.7224  | +0.6891  | Tokyo-Asahikawa                        |
| 304 | 289.2980 | 0.87559 | -0.48217 | Las Campanas Observatory                     | 396 | 142.4208 | 0.7236  | +0.6879  | Asahikawa                              |
| 305 | 109.53   | 0.950   | +0.310   | Purple Mountain, Hainan Island station       | 397 | 141.4761 | 0.73210 | +0.67892 | Sapporo Science Center                 |
| 312 | 112.33   | 0.957   | +0.288   | Tsingtao field station, Xisha Islands        | 398 | 139.1080 | 0.80870 | +0.58630 | Nagatoro                               |
| 323 | 116.1350 | 0.84882 | -0.52703 | Perth Observatory, Bickley                   | 399 | 144.5900 | 0.73158 | +0.67950 | Kushiro                                |
| 324 | 116.3277 | 0.76598 | +0.64072 | Peking Observatory, Shaho Station            | 400 | 143.7827 | 0.72344 | +0.68811 | Kitami                                 |
| 327 | 117.5750 | 0.76278 | +0.64470 | Peking Observatory, Xinglong Station         | 401 | 139.4208 | 0.8088  | +0.5861  | Oosato                                 |
| 330 | 118.8209 | 0.84828 | +0.52788 | Purple Mountain Observatory, Nanking         | 402 | 136.3078 | 0.81800 | +0.57335 | Dynic Astronomical Observatory         |
| 334 | 120.3196 | 0.80925 | +0.58552 | Tsingtao                                     | 403 | 137.0556 | 0.81593 | +0.57625 | Kani                                   |
| 337 | 121.1865 | 0.85708 | +0.51349 | Zô-Sé                                        | 404 | 140.9292 | 0.7909  | +0.6099  | Yamamoto                               |
| 352 | 136.1778 | 0.82061 | +0.56963 | Konan                                        | 405 | 139.3292 | 0.8069  | +0.5887  | Kamihoriguchi                          |
| 353 | 135.0648 | 0.82265 | +0.56669 | Nishi Kobe                                   | 406 | 141.8233 | 0.72946 | +0.68174 | Bibai                                  |
| 354 | 140.0206 | 0.80109 | +0.59674 | Kawachi                                      | 407 | 140.3099 | 0.78426 | +0.61837 | Kahoku                                 |
| 355 | 139.2133 | 0.81618 | +0.57590 | Hadano                                       | 408 | 138.1747 | 0.81121 | +0.58328 | Nyukasa                                |
| 356 | 141.0867 | 0.78319 | +0.61970 | Kogota                                       | 409 | 139.5211 | 0.81234 | +0.58124 | Kiyose and Mizuho                      |
| 357 | 140.0064 | 0.80807 | +0.58712 | Shimotsuma                                   | 410 | 134.8910 | 0.81883 | +0.57222 | Sengamine                              |
| 358 | 140.1586 | 0.78856 | +0.61296 | Nanyou                                       | 411 | 139.4170 | 0.80739 | +0.58805 | Oizumi                                 |
| 359 | 135.1719 | 0.82782 | +0.55912 | Wakayama                                     | 412 | 140.5991 | 0.80011 | +0.59803 | Iwaki                                  |
| 360 | 132.9442 | 0.83314 | +0.55138 | Kuma Kogen                                   | 413 | 149.0661 | 0.85560 | -0.51626 | Siding Spring Observatory              |
| 361 | 134.8956 | 0.82652 | +0.56102 | Sumoto                                       | 414 | 149.0077 | 0.81694 | -0.57499 | Mount Stromlo                          |
| 362 | 140.6550 | 0.73673 | +0.67398 | Ray Observatory                              | 415 | 149.0624 | 0.81613 | -0.57608 | Kambah, near Canberra                  |
| 363 | 130.7703 | 0.83416 | +0.54967 | Yamada                                       | 416 | 149.13   | 0.816   | -0.575   | Barton, near Canberra                  |
| 364 | 130.5747 | 0.85213 | +0.52164 | YCPM Kagoshima Station                       | 417 | 137.1371 | 0.79611 | +0.60317 | Yanagida Astronomical Observatory      |
| 365 | 135.9579 | 0.82597 | +0.56196 | Uto Observatory                              | 418 | 150.94   | 0.858   | -0.511   | Tamworth                               |
| 366 | 138.3003 | 0.81147 | +0.58267 | Miyasaka Observatory                         | 419 | 150.8329 | 0.83370 | -0.55038 | Windsor                                |
| 367 | 133.1670 | 0.81504 | +0.57747 | Yatsuka                                      | 420 | 151.2050 | 0.83126 | -0.55404 | Sydney                                 |
| 368 | 138.8117 | 0.81213 | +0.58191 | Ochiai                                       | 421 | 133.7650 | 0.83244 | +0.55262 | Mt. Kajigamori, Ootoy                  |
| 369 | 139.1500 | 0.8101  | +0.5844  | Chichibu                                     | 422 | 151.0461 | 0.85503 | -0.51709 | Loomberah                              |
| 370 | 133.5273 | 0.83424 | +0.54956 | Kochi                                        | 423 | 151.1236 | 0.83179 | -0.55324 | North Ryde                             |
| 371 | 133.5965 | 0.82433 | +0.56431 | Tokyo-Okayama                                | 424 | 149.0658 | 0.81758 | -0.57405 | Macquarie, near Canberra               |
| 372 | 133.8276 | 0.83450 | +0.54920 | Geisei                                       | 425 | 152.93   | 0.896   | -0.443   | Taylor Range Observatory, Brisbane     |
| 373 | 135.3397 | 0.82866 | +0.55797 | Oishi                                        | 426 | 136.8217 | 0.85618 | -0.51498 | Woomera                                |
| 374 | 134.7196 | 0.81915 | +0.57174 | Minami-Oda Observatory                       | 427 | 138.7283 | 0.82667 | -0.56084 | Stockport                              |
| 375 | 134.8708 | 0.8206  | +0.5697  | Uzurano                                      | 428 | 153.3970 | 0.88271 | -0.46837 | Reedy Creek                            |
| 376 | 139.0392 | 0.81321 | +0.58022 | Uenohara                                     | 468 | 13.3296  | 0.74652 | +0.66349 | Astronomical Observatory, Campo Catino |
| 377 | 135.7933 | 0.82014 | +0.57031 | Kwasan Observatory, Kyoto                    | 469 | 14.6320  | 0.67873 | +0.73205 | Courroux                               |
| 378 | 136.0142 | 0.82437 | +0.56426 | Murou                                        | 470 | 13.3286  | 0.74929 | +0.66006 | Ceccano                                |
| 379 | 137.7708 | 0.8228  | +0.5664  | Hamamatsu                                    | 471 | 8.2389   | 0.56364 | +0.82325 | Houstrup                               |
| 380 | 137.0349 | 0.82190 | +0.56772 | Ishiki                                       | 472 | 6.3203   | 0.71225 | +0.69998 | Merlette                               |
| 381 | 137.6283 | 0.81220 | +0.58173 | Tokyo-Kiso                                   | 473 | 13.3164  | 0.69479 | +0.71682 | Remanzacco                             |
| 382 | 137.5553 | 0.80915 | +0.58639 | Tokyo-Norikura                               | 474 | 170.4650 | 0.72077 | -0.69108 | Mount John Observatory, Lake Tekapo    |
| 383 | 137.8959 | 0.80218 | +0.59526 | Chirorin                                     | 475 | 7.6965   | 0.70747 | +0.70443 | Turin (before 1913)                    |

|     |          |         |          |                                         |
|-----|----------|---------|----------|-----------------------------------------|
| 476 | 7.1414   | 0.70659 | +0.70535 | Grange Observatory, Bussoleno           |
| 477 | 0.4856   | 0.62103 | +0.78117 | Galleywood                              |
| 478 | 3.0896   | 0.72548 | +0.68597 | Lamalou-les-Bains                       |
| 479 | 6.0505   | 0.73020 | +0.68096 | Sollies-Pont                            |
| 480 | 0.77     | 0.615   | +0.786   | Cockfield                               |
| 481 | 7.93     | 0.596   | +0.800   | Moorwarfen                              |
| 482 | 357.1854 | 0.55560 | +0.82866 | St. Andrews                             |
| 483 | 173.80   | 0.748   | −0.661   | Carter Observatory, Black Birch Station |
| 484 | 174.75   | 0.753   | −0.657   | Happy Valley, Wellington                |
| 485 | 174.7654 | 0.75256 | −0.65635 | Carter Observatory, Wellington          |
| 486 | 175.47   | 0.765   | −0.643   | Palmerston North                        |
| 487 | 355.4444 | 0.56858 | +0.81989 | Macnairston Observatory                 |
| 488 | 358.37   | 0.575   | +0.816   | Newcastle-upon-Tyne                     |
| 489 | 359.87   | 0.612   | +0.788   | Hemingford Abbots                       |
| 490 | 358.00   | 0.633   | +0.772   | Wimborne Minster                        |
| 491 | 356.9000 | 0.76131 | +0.64644 | Centro Astronómico de Yebes             |
| 492 | 358.47   | 0.605   | +0.795   | Mickleover                              |
| 493 | 357.4542 | 0.79753 | +0.60182 | Calar Alto                              |
| 494 | 357.8361 | 0.61126 | +0.78879 | Stakenbridge                            |
| 495 | 357.66   | 0.598   | +0.800   | Altrincham                              |
| 496 | 358.6860 | 0.6311  | +0.7731  | Bishopstoke                             |
| 497 | 359.30   | 0.626   | +0.776   | Ascot-Loudwater                         |
| 498 | 359.26   | 0.612   | +0.788   | Northampton                             |
| 499 | 359.79   | 0.626   | +0.776   | Cheam                                   |
| 500 | 0.0000   | 0.00000 | 0.00000  | Geocentric                              |
| 501 | 0.3475   | 0.63237 | +0.77208 | Herstmonceux                            |
| 502 | 0.85     | 0.617   | +0.783   | Colchester                              |
| 503 | 0.0948   | 0.61400 | +0.78667 | Cambridge                               |
| 504 | 4.3944   | 0.68553 | +0.72570 | Le Creusot                              |
| 505 | 4.5639   | 0.6229  | +0.7797  | Simon Stevin                            |
| 506 | 9.96     | 0.598   | +0.797   | Bendestorf                              |
| 507 | 5.22     | 0.617   | +0.783   | Nyenheim                                |
| 508 | 5.29     | 0.617   | +0.783   | Zeist                                   |
| 509 | 5.87     | 0.732   | +0.680   | La Seyne sur Mer                        |
| 510 | 8.0264   | 0.63184 | +0.77258 | Siegen                                  |
| 511 | 5.71     | 0.722   | +0.690   | Haute Provence                          |
| 512 | 4.49     | 0.615   | +0.786   | Leiden (before 1860)                    |
| 513 | 4.7855   | 0.69971 | +0.71209 | Lyons                                   |
| 514 | 8.43     | 0.652   | +0.755   | Mundenheim (1907–1913)                  |
| 515 | 7.48     | 0.650   | +0.758   | Volkssternwarte Dhaun, near Kirn        |
| 516 | 9.9733   | 0.59539 | +0.80075 | Hamburg (before 1909)                   |
| 517 | 6.1525   | 0.69340 | +0.71823 | Geneva                                  |
| 518 | 9.9727   | 0.59545 | +0.80071 | Marine Observatory, Hamburg             |
| 519 | 8.29     | 0.626   | +0.776   | Meschede                                |
| 520 | 7.0966   | 0.63427 | +0.77053 | Bonn                                    |
| 521 | 10.8899  | 0.64562 | +0.76116 | Bamberg                                 |
| 522 | 7.7677   | 0.66279 | +0.74633 | Strasbourg                              |
| 523 | 8.65     | 0.643   | +0.765   | Frankfurt                               |
| 524 | 8.4605   | 0.6509  | +0.7566  | Mannheim                                |
| 525 | 8.7708   | 0.6331  | +0.7715  | Marburg                                 |
| 526 | 10.1477  | 0.58426 | +0.80886 | Kiel                                    |
| 527 | 9.9431   | 0.5955  | +0.8007  | Altona                                  |
| 528 | 9.9426   | 0.62340 | +0.77931 | Göttingen                               |

|     |          |         |          |                                      |
|-----|----------|---------|----------|--------------------------------------|
| 529 | 10.7229  | 0.50259 | +0.86163 | Christiania                          |
| 530 | 10.6898  | 0.5911  | +0.8039  | Lübeck                               |
| 531 | 12.4797  | 0.74545 | +0.66434 | Collegio Romano, Rome                |
| 532 | 11.6084  | 0.66853 | +0.74130 | Munich                               |
| 533 | 11.8715  | 0.70335 | +0.70847 | Padua                                |
| 534 | 12.3913  | 0.62606 | +0.77719 | Leipzig (since 1861)                 |
| 535 | 13.3578  | 0.78782 | +0.61386 | Palermo                              |
| 536 | 13.1062  | 0.61135 | +0.78873 | Berlin-Babelsberg                    |
| 537 | 13.3642  | 0.6097  | +0.7900  | Urania Observatory, Berlin           |
| 538 | 13.8461  | 0.70998 | +0.70187 | Pola                                 |
| 539 | 14.1316  | 0.66968 | +0.74024 | Kremsmünster                         |
| 540 | 14.2753  | 0.66470 | +0.74477 | Linz                                 |
| 541 | 14.3953  | 0.64306 | +0.76331 | Prague                               |
| 542 | 13.04    | 0.607   | +0.790   | Falkensee                            |
| 543 | 12.3688  | 0.6260  | +0.7772  | Leipzig (before 1861)                |
| 544 | 13.4250  | 0.61040 | +0.78945 | Wilhelm Foerster Observatory, Berlin |
| 545 | 16.3817  | 0.66767 | +0.74200 | Vienna (before 1879)                 |
| 546 | 16.3549  | 0.66760 | +0.74207 | Oppolzer Observatory, Vienna         |
| 547 | 17.0363  | 0.62904 | +0.77479 | Breslau                              |
| 548 | 13.3950  | 0.60999 | +0.78976 | Berlin (1835–1913)                   |
| 549 | 17.6257  | 0.50341 | +0.86116 | Uppsala                              |
| 550 | 11.4196  | 0.5943  | +0.8015  | Schwerin                             |
| 551 | 18.1895  | 0.67201 | +0.73808 | Hurbanovo, formerly O'Gyalla         |
| 552 | 11.3418  | 0.71485 | +0.69700 | Osservatorio S. Vittore, Bologna     |
| 553 | 18.9938  | 0.64002 | +0.76574 | Chorzów                              |
| 554 | 8.40     | 0.638   | +0.769   | Burgsolms Observatory, Wetzlar       |
| 555 | 19.83    | 0.643   | +0.762   | Cracow-Fort Skala                    |
| 556 | 11.26    | 0.675   | +0.734   | Reintal, near Munich                 |
| 557 | 14.7837  | 0.64530 | +0.76148 | Ondřejov                             |
| 558 | 21.0303  | 0.61396 | +0.78672 | Warsaw                               |
| 559 | 14.98    | 0.793   | +0.607   | Serra La Nave                        |
| 560 | 10.93    | 0.704   | +0.708   | Madonna di Dossobuono                |
| 561 | 20.02    | 0.671   | +0.739   | Piszkéstető                          |
| 562 | 15.92    | 0.668   | +0.741   | Figl Observatory, Vienna             |
| 563 | 13.60    | 0.671   | +0.739   | Seewalchen                           |
| 564 | 11.19    | 0.671   | +0.741   | Herrsching                           |
| 565 | 10.14    | 0.704   | +0.708   | Bassano Bresciano                    |
| 566 | 203.7424 | 0.93623 | +0.35156 | Haleakala-NEAT/GEODSS                |
| 567 | 12.71    | 0.699   | +0.715   | Chions                               |
| 568 | 204.5278 | 0.94171 | +0.33725 | Mauna Kea                            |
| 569 | 24.9587  | 0.49891 | +0.86375 | Helsinki                             |
| 570 | 25.2990  | 0.5794  | +0.8123  | Vilnius (since 1939)                 |
| 571 | 10.63    | 0.704   | +0.708   | Cavriana                             |
| 572 | 6.89     | 0.631   | +0.772   | Cologne                              |
| 573 | 9.6612   | 0.6145  | +0.7862  | Eldagsen                             |
| 574 | 10.27    | 0.704   | +0.708   | Gottolengo                           |
| 575 | 6.808    | 0.68219 | +0.72894 | La Chaux de Fonds                    |
| 576 | 0.38     | 0.631   | +0.774   | Burwash                              |
| 577 | 7.50     | 0.678   | +0.734   | Metzerlen Observatory                |
| 578 | 27.99    | 0.898   | −0.439   | Linden Observatory                   |
| 579 | 8.85     | 0.711   | +0.701   | Novi Ligure                          |
| 580 | 15.4936  | 0.68242 | +0.72862 | Graz                                 |
| 581 | 22.80    | 0.830   | −0.556   | Sedgfield                            |

|     |          |         |          |                                            |     |           |          |           |                                              |
|-----|----------|---------|----------|--------------------------------------------|-----|-----------|----------|-----------|----------------------------------------------|
| 582 | 1.22     | 0.617   | +0.783   | Orwell Park                                | 656 | 236.3921  | 0.66580  | +0.74367  | Victoria                                     |
| 583 | 30.27    | 0.692   | +0.720   | Odessa-Mayaki                              | 657 | 236.6903  | 0.66437  | +0.74491  | Climenhaga Observatory, Victoria             |
| 584 | 30.2946  | 0.50213 | +0.86189 | Leningrad                                  | 658 | 236.5830  | 0.66363  | +0.74560  | Dominion Astrophysical Observatory, Victoria |
| 585 | 30.53    | 0.638   | +0.767   | Kiev comet station                         | 660 | 237.7379  | 0.79038  | +0.61059  | Leuschner Observatory, Berkeley              |
| 586 | 0.1423   | 0.73358 | +0.67799 | Pic du Midi                                | 662 | 238.3545  | 0.79619  | +0.60335  | Lick Observatory, Mount Hamilton             |
| 587 | 9.2302   | 0.69744 | +0.71448 | Sormano                                    | 664 | 239.2775  | 0.6840   | +0.7273   | Manastash Ridge Observatory                  |
| 588 | 11.25    | 0.715   | +0.697   | Eremo di Tizzano                           | 665 | 240.9903  | 0.82215  | +0.56781  | Wallis Observatory                           |
| 589 | 12.64    | 0.739   | +0.673   | Santa Lucia Stroncone                      | 666 | 241.1692  | 0.8270   | +0.5604   | Moorpark College Observatory                 |
| 590 | 7.46     | 0.678   | +0.734   | Metzerlen                                  | 667 | 240.0092  | 0.68448  | +0.72663  | Wanapum Dam                                  |
| 591 | 9.6258   | 0.6099  | +0.7898  | Resse Observatory                          | 668 | 240.82    | 0.821    | +0.568    | San Emigdio Peak                             |
| 592 | 7.01     | 0.629   | +0.774   | Solingen                                   | 669 | 240.82    | 0.826    | +0.563    | Ojai                                         |
| 593 | 11.17    | 0.739   | +0.671   | Monte Argentario                           | 670 | 240.9558  | 0.82775  | +0.55922  | Camarillo                                    |
| 594 | 13.2033  | 0.74497 | +0.66529 | Monte Autore                               | 671 | 242.00    | 0.828    | +0.561    | Stony Ridge                                  |
| 595 | 13.53    | 0.697   | +0.715   | Farra d'Isonzo                             | 672 | 241.9403  | 0.82802  | +0.55930  | Mount Wilson                                 |
| 596 | 12.6183  | 0.74446 | +0.66545 | Colleverde di Guidonia                     | 673 | 242.3191  | 0.82647  | +0.56172  | Table Mountain Observatory, Wrightwood       |
| 597 | 9.6630   | 0.6146  | +0.7862  | Springe                                    | 674 | 242.39    | 0.826    | +0.563    | Ford Observatory, Wrightwood                 |
| 598 | 11.3333  | 0.71748 | +0.69442 | Loiano                                     | 675 | 243.1360  | 0.83634  | +0.54686  | Palomar Mountain                             |
| 599 | 13.561   | 0.7392  | +0.6713  | Astronomical Observatory, Campo Imperatore | 676 | 242.4661  | 0.83552  | +0.54762  | San Clemente                                 |
| 600 | 11.4708  | 0.71618 | +0.69564 | TLC Observatory, Bologna                   | 679 | 244.5367  | 0.85792  | +0.51292  | San Pedro Martir                             |
| 601 | 13.7275  | 0.63009 | +0.77395 | Engelhardt Observatory, Dresden            | 680 | 244.78    | 0.833    | +0.554    | Los Angeles                                  |
| 602 | 16.3854  | 0.66764 | +0.74203 | Urania Observatory, Vienna                 | 681 | 245.8858  | 0.62954  | +0.77459  | Calgary                                      |
| 603 | 10.1300  | 0.58622 | +0.80745 | Bothkamp                                   | 683 | 248.9182  | 0.84751  | +0.52922  | Goodricke-Pigott Observatory, Tucson         |
| 604 | 13.4777  | 0.59631 | +0.80007 | Archenhold Sternwarte, Berlin-Treptow      | 684 | 247.5100  | 0.82512  | +0.56356  | Prescott                                     |
| 605 | 7.1130   | 0.62142 | +0.78086 | Marl                                       | 685 | 247.84    | 0.816    | +0.575    | Williams, AZ                                 |
| 606 | 9.9956   | 0.59353 | +0.80212 | Norderstedt                                | 686 | 249.2092  | 0.84512  | +0.53359  | U. of Minn. Infrared Obs., Mt. Lemmon        |
| 607 | 8.0000   | 0.6277  | +0.7760  | Hagen Observatory, Ronkhausen              | 687 | 248.3473  | 0.81848  | +0.57318  | Northern Arizona University, Flagstaff       |
| 608 | 203.7420 | 0.93623 | +0.35156 | Haleakala-AMOS                             | 688 | 248.4645  | 0.81938  | +0.57193  | Lowell Observatory, Mesa Station             |
| 609 | 12.8533  | 0.73772 | +0.67314 | Osservatorio Polino                        | 689 | 248.2601  | 0.81851  | +0.57319  | U.S. Naval Observatory, Flagstaff            |
| 610 | 11.3431  | 0.71577 | +0.69604 | Pianoro                                    | 690 | 248.3367  | 0.81832  | +0.57344  | Lowell Observatory, Flagstaff                |
| 611 | 8.6531   | 0.64877 | +0.75848 | Starkenburg Sternwarte, Heppenheim         | 691 | 248.4006  | 0.84946  | +0.52649  | Steward Observatory, Kitt Peak               |
| 612 | 7.10     | 0.625   | +0.778   | Lenkerbeck                                 | 692 | 249.0513  | 0.84679  | +0.53036  | Steward Observatory, Tucson                  |
| 613 | 7.0709   | 0.62504 | +0.77800 | Heisingen                                  | 693 | 249.2680  | 0.84532  | +0.53321  | Catalina Station, Tucson                     |
| 614 | 2.467    | 0.6621  | +0.7469  | Soisy-sur-Seine                            | 694 | 248.9943  | 0.84700  | +0.53009  | Tumamoc Hill, Tucson                         |
| 615 | 6.9067   | 0.71233 | +0.70014 | St. Veran                                  | 695 | 248.4053  | 0.84950  | +0.52643  | Kitt Peak                                    |
| 616 | 16.5883  | 0.65465 | +0.75346 | Brno                                       | 696 | 249.1154  | 0.85205  | +0.52249  | Whipple Observatory, Mt. Hopkins             |
| 617 | 2.5725   | 0.66496 | +0.74437 | Arbonne la Forêt                           | 697 | 248.3842  | 0.84956  | +0.52629  | Kitt Peak, McGraw-Hill                       |
| 618 | 5.0077   | 0.72750 | +0.68382 | Martigues                                  | 698 | 249.28    | 0.844    | +0.532    | Mt. Bigelow                                  |
| 619 | 2.0912   | 0.74950 | +0.65984 | Sabadell                                   | 699 | 248.46331 | 0.819380 | +0.571930 | Lowell Observatory-LONEOS                    |
| 620 | 2.9517   | 0.77110 | +0.63463 | Observatorio Astronómico de Mallorca       | 700 | 250.3817  | 0.80656  | +0.58960  | Chinle                                       |
| 621 | 7.4858   | 0.62944 | +0.77451 | Bergisch Gladbach                          | 702 | 252.8117  | 0.8305   | +0.5561   | Joint Obs. for cometary research, Socorro    |
| 622 | 7.5680   | 0.68778 | +0.72358 | Oberwichtach                               | 704 | 253.3409  | 0.83186  | +0.55354  | Lincoln Laboratory ETS, New Mexico           |
| 623 | 5.5643   | 0.63577 | +0.76932 | Liège                                      | 706 | 253.9366  | 0.78294  | +0.62043  | Salida                                       |
| 624 | 9.6167   | 0.64723 | +0.75977 | Dertingen                                  | 707 | 254.56    | 0.774    | +0.633    | Chamberlin field station                     |
| 625 | 203.5683 | 0.93557 | +0.35201 | Kihei-AMOS Remote Maui Experimental Site   | 708 | 255.0475  | 0.77092  | +0.63520  | Chamberlin Observatory, Denver               |
| 626 | 4.9864   | 0.62847 | +0.77524 | Geel                                       | 709 | 254.2288  | 0.84025  | +0.54110  | W & B Observatory, Cloudcroft                |
| 627 | 5.2146   | 0.72002 | +0.69168 | Blauvac                                    | 710 | 254.7336  | 0.77980  | +0.62458  | Florissant                                   |
| 628 | 6.4286   | 0.62479 | +0.77818 | Mülheim-Ruhr                               | 711 | 255.9785  | 0.86114  | +0.50731  | McDonald Observatory, Fort Davis             |
| 629 | 20.1511  | 0.69273 | +0.71880 | JATE Observatory, Szeged                   | 712 | 255.1189  | 0.77837  | +0.62625  | USAF Academy Observatory, Colorado Springs   |
| 630 | 7.2367   | 0.67051 | +0.73951 | Osenbach                                   | 713 | 254.9897  | 0.76865  | +0.63793  | Thornton                                     |
| 631 | 10.02    | 0.596   | +0.800   | Hamburg-Georgswerder                       | 721 | 259.7312  | 0.76271  | +0.64476  | Lime Creek                                   |
| 632 | 11.1739  | 0.72380 | +0.68773 | San Polo A Mosciano                        | 724 | 260.8053  | 0.94388  | +0.33026  | National Observatory, Tacubaya               |
| 633 | 9.9339   | 0.71930 | +0.69238 | Romito                                     | 725 | 261.3450  | 0.8688   | +0.4936   | Fair Oaks Ranch                              |
| 655 | 236.383  | 0.6656  | +0.7438  | Sooke                                      | 727 | 262.5389  | 0.81394  | +0.57910  | Zeno Observatory, Edmond                     |

|     |          |         |          |                                                |     |          |         |          |                                            |
|-----|----------|---------|----------|------------------------------------------------|-----|----------|---------|----------|--------------------------------------------|
| 728 | 262.6084 | 0.88610 | +0.46194 | Corpus Christi                                 | 792 | 288.30   | 0.753   | +0.657   | U. of Rhode Island, Quonochontaug          |
| 729 | 262.8792 | 0.64880 | +0.75845 | Glenlea Astronomical Observatory, Winnipeg     | 793 | 286.2200 | 0.73660 | +0.67407 | Dudley Observatory, Albany (before 1893)   |
| 730 | 262.9156 | 0.67148 | +0.73860 | University of North Dakota, Grand Forks        | 794 | 278.90   | 0.748   | +0.661   | Vassar College Observatory, Poughkeepsie   |
| 732 | 263.2300 | 0.95591 | +0.29359 | Oaxaca                                         | 795 | 286.0123 | 0.7589  | +0.6491  | Rutherford                                 |
| 733 | 263.3546 | 0.83802 | +0.54387 | Allen, Texas                                   | 796 | 286.45   | 0.755   | +0.654   | Stamford                                   |
| 734 | 263.9986 | 0.77943 | +0.62449 | Farpoint Observatory, Eskridge                 | 797 | 287.0751 | 0.75218 | +0.65676 | Yale Observatory, New Haven                |
| 735 | 264.4064 | 0.87213 | +0.48763 | George Observatory, Needville                  | 798 | 287.0154 | 0.75093 | +0.65822 | Yale Observatory, Bethany                  |
| 736 | 263.3357 | 0.87006 | +0.49132 | Houston                                        | 799 | 288.8650 | 0.73896 | +0.67150 | Winchester                                 |
| 741 | 266.8503 | 0.71493 | +0.69692 | Goodsell Observatory, Northfield               | 800 | 288.4511 | 0.96006 | −0.28021 | Harvard Observatory, Arequipa              |
| 742 | 266.3138 | 0.74900 | +0.66041 | Drake University, Des Moines                   | 801 | 288.4408 | 0.73838 | +0.67216 | Oak Ridge Observatory                      |
| 743 | 266.7633 | 0.70857 | +0.70328 | University of Minnesota, Minneapolis           | 802 | 288.8706 | 0.73982 | +0.67055 | Harvard Observatory, Cambridge             |
| 745 | 267.1751 | 0.7757  | +0.6290  | Glasgow, Missouri                              | 803 | 288.9167 | 0.74543 | +0.66436 | Taunton                                    |
| 748 | 268.4680 | 0.75014 | +0.65912 | Van Allen Observatory, Iowa City               | 804 | 289.3121 | 0.83421 | −0.54976 | Santiago-San Bernardo                      |
| 750 | 268.7282 | 0.71059 | +0.70131 | Hobbs Observatory, Fall Creek                  | 805 | 288.97   | 0.840   | −0.542   | Santiago-Cerro El Roble                    |
| 751 | 269.2439 | 0.78038 | +0.62324 | Lake Saint Louis                               | 806 | 289.4513 | 0.83584 | −0.54738 | Santiago-Cerro Calán                       |
| 753 | 270.5921 | 0.73161 | +0.67950 | Washburn Observatory, Madison                  | 807 | 289.1941 | 0.86560 | −0.49980 | Cerro Tololo Observatory, La Serena        |
| 754 | 271.4432 | 0.73762 | +0.67303 | Yerkes Observatory, Williams Bay               | 808 | 290.6708 | 0.85098 | −0.52414 | El Leoncito                                |
| 756 | 272.3257 | 0.74361 | +0.66641 | Dearborn Observatory, Evanston                 | 809 | 289.2704 | 0.87346 | −0.48603 | European Southern Observatory, La Silla    |
| 757 | 280.0050 | 0.8096  | +0.5851  | High Point                                     | 810 | 288.5154 | 0.73712 | +0.67352 | Wallace Observatory, Westford              |
| 758 | 279.2379 | 0.88044 | +0.47257 | BCC Observatory, Cocoa                         | 811 | 289.8952 | 0.75259 | +0.65629 | Maria Mitchell Observatory, Nantucket      |
| 759 | 273.1947 | 0.80946 | +0.58530 | Nashville                                      | 812 | 288.42   | 0.840   | −0.542   | Viña del Mar                               |
| 760 | 273.6048 | 0.77216 | +0.63337 | Goethe Link Observatory, Brooklyn              | 813 | 289.3083 | 0.83533 | −0.54805 | Santiago-Quinta Normal (1862–1920)         |
| 761 | 277.6456 | 0.88138 | +0.47083 | Zephyrhills                                    | 814 | 288.42   | 0.746   | +0.664   | North Scituate                             |
| 762 | 274.2008 | 0.70885 | +0.70304 | Four Winds Observatory, Lake Leelanau          | 815 | 289.3479 | 0.83539 | −0.54799 | Santiago-Santa Lucia (1849–1861)           |
| 763 | 280.4658 | 0.72157 | +0.69009 | King City                                      | 816 | 285.7583 | 0.71645 | +0.69542 | Rand Observatory                           |
| 764 | 275.1439 | 0.83264 | +0.55205 | Puckett Observatory, Stone Mountain            | 817 | 288.6104 | 0.74018 | +0.67017 | Sudbury                                    |
| 765 | 275.5775 | 0.77669 | +0.62784 | Cincinnati                                     | 818 | 286.4167 | 0.7040  | +0.7079  | Gemeaux Observatory, Laval                 |
| 766 | 275.5167 | 0.73600 | +0.67477 | Michigan State University Obs., East Lansing   | 819 | 284.3850 | 0.69720 | +0.71451 | Val-des-Bois                               |
| 767 | 276.2697 | 0.74102 | +0.66930 | Ann Arbor                                      | 820 | 295.37   | 0.931   | −0.366   | Tarija                                     |
| 768 | 277.08   | 0.734   | +0.675   | Dearborn                                       | 821 | 295.4533 | 0.85270 | −0.52103 | Córdoba-Bosque Alegre                      |
| 769 | 276.9892 | 0.76716 | +0.63936 | McMillin Observatory, Columbus                 | 822 | 295.8035 | 0.85419 | −0.51834 | Córdoba                                    |
| 770 | 274.0786 | 0.77573 | +0.62900 | Crescent Moon Observatory, Columbus            | 823 | 288.1691 | 0.73715 | +0.67354 | Fitchburg                                  |
| 771 | 277.57   | 0.922   | +0.389   | Boyerros Observatory, Havana                   | 824 | 285.7583 | 0.71645 | +0.69542 | Lake Clear                                 |
| 772 | 284.0865 | 0.70517 | +0.70669 | Boltwood Observatory, Stittsville              | 825 | 288.2595 | 0.74033 | +0.67003 | Granville                                  |
| 773 | 278.4318 | 0.74966 | +0.65966 | Warner and Swasey Observatory, Cleveland       | 826 | 288.2282 | 0.69312 | +0.71843 | Plessisville                               |
| 774 | 278.9250 | 0.74905 | +0.66039 | Warner and Swasey Nassau Station, Chardon      | 827 | 287.5393 | 0.66190 | +0.74710 | Saint-Félicien                             |
| 775 | 284.6168 | 0.76029 | +0.64743 | Sayre Observatory, South Bethlehem             | 828 | 288.9758 | 0.74656 | +0.66310 | Assonet                                    |
| 776 | 284.4669 | 0.73472 | +0.67619 | Foggy Bottom, Hamilton                         | 829 | 290.6979 | 0.85102 | −0.52411 | Complejo Astronómico El Leoncito           |
| 777 | 280.6017 | 0.72454 | +0.68695 | Toronto                                        | 830 | 288.5697 | 0.73491 | +0.67590 | Hudson                                     |
| 778 | 279.9778 | 0.76172 | +0.64582 | Allegheny Observatory, Pittsburgh              | 833 | 301.4633 | 0.82373 | −0.56508 | Obs. Astronómico de Mercedes, Buenos Aires |
| 779 | 280.5779 | 0.72219 | +0.68943 | David Dunlap Observatory, Richmond Hill        | 834 | 301.5654 | 0.82398 | −0.56473 | Buenos Aires-AAAA                          |
| 780 | 281.4778 | 0.78868 | +0.61280 | Leander McCormick Observatory, Charlottesville | 839 | 302.0678 | 0.82097 | −0.56906 | La Plata                                   |
| 781 | 281.5075 | 1.00045 | −0.00405 | Quito                                          | 844 | 303.8102 | 0.82159 | −0.56906 | Los Molinos                                |
| 782 | 281.65   | 0.999   | +0.000   | Quito, comet astrograph station                | 861 | 312.9204 | 0.92253 | −0.38487 | Barão Geraldo                              |
| 783 | 282.02   | 0.783   | +0.622   | Rixeyville                                     | 862 | 138.5262 | 0.80861 | +0.58658 | Saku                                       |
| 784 | 282.2148 | 0.74140 | +0.66895 | Stull Observatory, Alfred University           | 863 | 137.18   | 0.807   | +0.588   | Furukawa                                   |
| 785 | 285.3433 | 0.76319 | +0.64402 | Princeton                                      | 864 | 130.7533 | 0.84257 | +0.53680 | Kumamoto                                   |
| 786 | 282.9345 | 0.77906 | +0.62487 | U.S. Naval Obs., Washington (since 1893)       | 867 | 134.1222 | 0.81671 | +0.57522 | Saji Observatory                           |
| 787 | 282.9494 | 0.77934 | +0.62451 | U.S. Naval Obs., Washington (before 1893)      | 868 | 135.1359 | 0.83066 | +0.55492 | Hidaka Observatory                         |
| 788 | 284.3667 | 0.76953 | +0.63650 | Mount Cuba Observatory, Wilmington             | 869 | 133.4298 | 0.83480 | +0.54870 | Tosa                                       |
| 789 | 284.5940 | 0.73188 | +0.67922 | Litchfield Observatory, Clinton                | 870 | 313.17   | 0.934   | −0.359   | Campiñas                                   |
| 790 | 284.2835 | 0.70343 | +0.70840 | Dominion Observatory, Ottawa                   | 871 | 134.3925 | 0.82256 | +0.56678 | Akou                                       |
| 791 | 284.5236 | 0.76713 | +0.63937 | Flower and Cook Observatory, Philadelphia      | 872 | 134.2411 | 0.82904 | +0.55734 | Tokushima                                  |

|     |          |         |          |                                      |
|-----|----------|---------|----------|--------------------------------------|
| 873 | 133.7708 | 0.8235  | +0.5654  | Kurashiki Observatory                |
| 874 | 314.42   | 0.924   | -0.380   | Itajuba                              |
| 875 | 139.2353 | 0.80896 | +0.58593 | Yorii                                |
| 876 | 139.2467 | 0.80762 | +0.58774 | Honjo                                |
| 877 | 139.0828 | 0.81194 | +0.58196 | Okutama                              |
| 878 | 136.9142 | 0.82019 | +0.57019 | Kagiya                               |
| 879 | 137.3535 | 0.81970 | +0.57099 | Tokai                                |
| 880 | 316.7771 | 0.92169 | -0.38664 | Rio de Janeiro                       |
| 881 | 137.2571 | 0.81872 | +0.57230 | Toyota                               |
| 882 | 137.3558 | 0.81842 | +0.57281 | JCPM Oi Station                      |
| 883 | 138.4215 | 0.81986 | +0.57065 | Shizuoka                             |
| 884 | 138.0792 | 0.8187  | +0.5724  | Kawane                               |
| 885 | 138.4667 | 0.82049 | +0.56975 | JCPM Yakiimo Station                 |
| 886 | 138.9367 | 0.81836 | +0.57280 | Mishima                              |
| 887 | 139.3367 | 0.80745 | +0.58798 | Ojima                                |
| 888 | 138.9952 | 0.81885 | +0.57217 | Gekko                                |
| 889 | 140.1427 | 0.80322 | +0.59372 | Karasuyama                           |
| 890 | 140.2500 | 0.8108  | +0.5834  | JCPM Tone Station                    |
| 891 | 140.8633 | 0.78606 | +0.61609 | JCPM Kimachi Station                 |
| 892 | 139.4753 | 0.80852 | +0.58650 | YGCO Hoshikawa and Nagano Stations   |
| 893 | 140.8657 | 0.78626 | +0.61583 | Sendai Municipal Observatory         |
| 894 | 138.4476 | 0.81113 | +0.58321 | Kiyosato                             |
| 895 | 140.7203 | 0.78573 | +0.61658 | Hatamae                              |
| 896 | 138.3678 | 0.81132 | +0.58292 | Yatsugatake South Base Observatory   |
| 897 | 139.4929 | 0.80797 | +0.58725 | YGCO Chiyoda Station                 |
| 898 | 138.1883 | 0.82107 | +0.56899 | Fujieda                              |
| 899 | 142.5500 | 0.7224  | +0.6891  | Toma                                 |
| 900 | 135.9929 | 0.81961 | +0.57104 | Moriyama                             |
| 901 | 137.0877 | 0.81664 | +0.57525 | Tajimi                               |
| 902 | 132.2208 | 0.82775 | +0.55922 | Ootake                               |
| 903 | 134.6610 | 0.81507 | +0.57752 | Kannabe Observatory, Albireo Station |
| 904 | 135.12   | 0.824   | +0.565   | Go-Chome and Kobe-Suma               |
| 905 | 135.9246 | 0.83368 | +0.55040 | Nachi-Katsuura Observatory           |
| 906 | 145.667  | 0.8113  | -0.5837  | Cobram                               |
| 907 | 144.9758 | 0.79082 | -0.61001 | Melbourne                            |
| 908 | 137.2467 | 0.80352 | +0.59330 | Tsukioka, Toyama                     |
| 910 | 6.9267   | 0.72368 | +0.68811 | Caussols-ODAS                        |
| 947 | 2.1244   | 0.65268 | +0.75511 | Saint-Sulpice                        |
| 948 | 0.2189   | 0.61048 | +0.78937 | Pymoor                               |
| 949 | 359.8169 | 0.67454 | +0.73577 | Durtal                               |
| 950 | 342.1176 | 0.87764 | +0.47847 | La Palma                             |
| 951 | 358.2983 | 0.62194 | +0.78046 | Highworth                            |
| 952 | 359.7583 | 0.7787  | +0.6253  | Marxuquera                           |
| 953 | 2.1339   | 0.74602 | +0.66393 | Montjoia                             |
| 954 | 343.5033 | 0.8815  | +0.4713  | Teide Observatory                    |
| 955 | 350.6739 | 0.78146 | +0.62188 | Sassoeiros                           |
| 956 | 356.1908 | 0.76224 | +0.64530 | Observatorio Pozuelo                 |
| 957 | 359.3506 | 0.71047 | +0.70137 | Merignac                             |
| 958 | 358.9717 | 0.72421 | +0.68727 | Observatoire de Dax                  |
| 959 | 1.4653   | 0.72596 | +0.68548 | Ramonville Saint Agne                |
| 960 | 0.6108   | 0.63016 | +0.77387 | Rolvenden                            |
| 961 | 356.8206 | 0.56112 | +0.82498 | City Observatory, Edinburgh          |
| 962 | 359.8188 | 0.77845 | +0.62561 | Gandia                               |

|     |          |         |          |                                             |
|-----|----------|---------|----------|---------------------------------------------|
| 963 | 359.7333 | 0.6084  | +0.7909  | Werrington                                  |
| 964 | 358.8433 | 0.62471 | +0.77826 | Southend Bradfield                          |
| 965 | 351.4008 | 0.79761 | +0.60118 | Observação Astronomica no Algarve, Portimão |
| 966 | 357.2058 | 0.60960 | +0.79009 | Church Stretton                             |
| 967 | 358.9778 | 0.61508 | +0.78585 | Greens Norton                               |
| 968 | 0.4250   | 0.6158  | +0.7853  | Haverhill                                   |
| 969 | 359.8454 | 0.6235  | +0.7792  | London-Regents Park                         |
| 970 | 0.4954   | 0.62045 | +0.78162 | Chelmsford                                  |
| 971 | 350.8140 | 0.78134 | +0.62204 | Lisbon                                      |
| 972 | 357.5833 | 0.54359 | +0.83656 | Dun Echt                                    |
| 973 | 359.67   | 0.622   | +0.779   | Harrow                                      |
| 974 | 8.9220   | 0.71542 | +0.69637 | Genoa                                       |
| 975 | 359.6333 | 0.77292 | +0.63239 | Valencia                                    |
| 976 | 358.48   | 0.612   | +0.788   | Leamington Spa                              |
| 977 | 351.5483 | 0.58660 | +0.80717 | Markree                                     |
| 978 | 357.2454 | 0.58868 | +0.80567 | Conder Brow                                 |
| 979 | 358.6697 | 0.62896 | +0.77485 | South Wonston                               |
| 980 | 357.2200 | 0.58864 | +0.80570 | Lancaster                                   |
| 981 | 353.3522 | 0.58409 | +0.80898 | Armagh                                      |
| 982 | 353.6621 | 0.59771 | +0.79904 | Dunsink Observatory, Dublin                 |
| 983 | 353.7946 | 0.80521 | +0.59101 | San Fernando                                |
| 984 | 357.26   | 0.631   | +0.774   | Eastfield                                   |
| 985 | 357.53   | 0.607   | +0.790   | Telford                                     |
| 986 | 358.75   | 0.624   | +0.779   | Ascot                                       |
| 987 | 355.37   | 0.586   | +0.807   | Archallagan Observatory                     |
| 988 | 355.7060 | 0.56225 | +0.82421 | Glasgow                                     |
| 989 | 357.69   | 0.600   | +0.797   | Wilfred Hall Observatory, Preston           |
| 990 | 356.3121 | 0.76260 | +0.64487 | Madrid                                      |
| 991 | 356.9278 | 0.59750 | +0.79919 | Liverpool (since 1867)                      |
| 992 | 356.9995 | 0.5973  | +0.7993  | Liverpool (before 1867)                     |
| 993 | 357.50   | 0.631   | +0.774   | Woolston Observatory                        |
| 994 | 359.39   | 0.629   | +0.776   | Godalming                                   |
| 995 | 358.4177 | 0.57819 | +0.81319 | Durham                                      |
| 996 | 358.7483 | 0.62025 | +0.78179 | Oxford                                      |
| 997 | 359.15   | 0.619   | +0.783   | Hartwell                                    |
| 998 | 359.7593 | 0.62226 | +0.78020 | London-Mill Hill                            |
| 999 | 359.4725 | 0.71033 | +0.70153 | Bordeaux-Flourac                            |

## NEW OBSERVATORY CODES

The following listing is a continuation to the main listing above. The longitudes  $\lambda$  are measured in degrees eastward from Greenwich, and the parallax constants  $\rho \cos \phi'$  and  $\rho \sin \phi'$  are the product of the geocentric distance (in earth equatorial radii) and the cosine and sine, respectively, of the geocentric latitude.

| Obs. | $\lambda$ | $\rho \cos \phi'$ | $\rho \sin \phi'$ |                   |
|------|-----------|-------------------|-------------------|-------------------|
| 145  | 4.5597    | 0.62734           | +0.77614          | 's-Gravenwezel    |
| 634  | 5.1456    | 0.70182           | +0.71007          | Crolles           |
| 755  | 274.6478  | 0.73353           | +0.67743          | Optec Observatory |

## CORRECTED OBSERVATIONS

The following observations correct those previously published.

| Object                | Date               | UT | $\alpha_{2000}$ | $\delta_{2000}$ | Reference  | Mag.     | Obs. |
|-----------------------|--------------------|----|-----------------|-----------------|------------|----------|------|
| 1998 AA               | 1997 12 07.19896   |    | 04 50 40.95     | +16 51 49.3     | <i>MPS</i> | 354 16.6 | 292  |
| 1998 AA               | 1997 12 07.22118   |    | 04 50 39.30     | +16 51 32.8     | <i>MPS</i> | 354 16.5 | 292  |
| 1998 BC <sub>26</sub> | * 1998 01 29.74272 |    | 10 28 13.52     | +24 03 40.4     | <i>MPS</i> | 463 16.5 | 411  |
| 1998 BC <sub>26</sub> | 1998 01 29.75620   |    | 10 28 12.80     | +24 03 46.3     | <i>MPS</i> | 463      | 411  |
| 1998 BC <sub>26</sub> | 1998 01 30.58679   |    | 10 27 30.78     | +24 10 05.6     | <i>MPS</i> | 463      | 411  |
| 1998 BC <sub>26</sub> | 1998 01 30.59701   |    | 10 27 30.25     | +24 10 09.9     | <i>MPS</i> | 463      | 411  |

## DELETED OBSERVATIONS

The following observations are to be deleted.

| Object                | Date               | UT | $\alpha_{2000}$ | $\delta_{2000}$ | Reference        | Obs. |
|-----------------------|--------------------|----|-----------------|-----------------|------------------|------|
| 1966 RC               | 1966 09 16.86150   |    | 21 29 16.60     | -03 13 42.5     | <i>MPC</i> 2714  | 095  |
| 1996 LO <sub>1</sub>  | 1996 06 16.52318   |    | 16 30 05.68     | -17 42 52.9     | <i>MPC</i> 27377 | 566  |
| 1996 LO <sub>1</sub>  | 1996 06 16.54162   |    | 16 30 04.48     | -17 42 29.1     | <i>MPC</i> 27377 | 566  |
| 1996 LO <sub>1</sub>  | 1996 06 16.55971   |    | 16 30 03.32     | -17 42 04.9     | <i>MPC</i> 27377 | 566  |
| 1998 BA <sub>11</sub> | * 1998 01 23.23163 |    | 08 07 44.32     | +23 45 58.5     | <i>MPS</i> 448   | 704  |
| 1998 BA <sub>11</sub> | 1998 01 23.25320   |    | 08 07 42.78     | +23 46 05.4     | <i>MPS</i> 448   | 704  |
| 1998 BA <sub>11</sub> | 1998 01 23.27461   |    | 08 07 41.27     | +23 46 13.2     | <i>MPS</i> 448   | 704  |
| 1998 BA <sub>11</sub> | 1998 01 23.31851   |    | 08 07 38.12     | +23 46 28.4     | <i>MPS</i> 448   | 704  |
| 1998 BA <sub>11</sub> | 1998 01 24.21080   |    | 08 06 37.83     | +23 51 40.0     | <i>MPS</i> 448   | 704  |
| 1998 BA <sub>11</sub> | 1998 01 24.23217   |    | 08 06 36.31     | +23 51 48.3     | <i>MPS</i> 448   | 704  |
| 1998 BA <sub>11</sub> | 1998 01 24.27534   |    | 08 06 33.33     | +23 52 02.8     | <i>MPS</i> 448   | 704  |
| 1998 BA <sub>11</sub> | 1998 01 24.29736   |    | 08 06 31.73     | +23 52 10.5     | <i>MPS</i> 448   | 704  |
| 1998 BA <sub>11</sub> | 1998 01 25.25563   |    | 08 05 26.94     | +23 57 40.2     | <i>MPS</i> 448   | 704  |
| 1998 BA <sub>11</sub> | 1998 01 25.27781   |    | 08 05 25.40     | +23 57 48.0     | <i>MPS</i> 448   | 704  |
| 1998 BA <sub>11</sub> | 1998 01 25.29972   |    | 08 05 23.85     | +23 57 55.3     | <i>MPS</i> 448   | 704  |
| 1998 BA <sub>11</sub> | 1998 01 25.32138   |    | 08 05 22.25     | +23 58 01.3     | <i>MPS</i> 448   | 704  |
| 1998 BA <sub>11</sub> | 1998 01 25.34292   |    | 08 05 20.76     | +23 58 09.3     | <i>MPS</i> 448   | 704  |
| 1998 BO <sub>11</sub> | * 1998 01 23.23670 |    | 08 00 33.44     | +23 39 02.9     | <i>MPS</i> 449   | 704  |
| 1998 BO <sub>11</sub> | 1998 01 23.25827   |    | 08 00 32.28     | +23 39 11.5     | <i>MPS</i> 449   | 704  |
| 1998 BO <sub>11</sub> | 1998 01 23.27991   |    | 08 00 31.14     | +23 39 20.3     | <i>MPS</i> 449   | 704  |
| 1998 BO <sub>11</sub> | 1998 01 23.30214   |    | 08 00 29.97     | +23 39 28.6     | <i>MPS</i> 449   | 704  |
| 1998 BO <sub>11</sub> | 1998 01 23.32358   |    | 08 00 28.80     | +23 39 36.9     | <i>MPS</i> 449   | 704  |
| 1998 BO <sub>11</sub> | 1998 01 24.21041   |    | 07 59 43.55     | +23 45 22.6     | <i>MPS</i> 449   | 704  |
| 1998 BO <sub>11</sub> | 1998 01 24.21579   |    | 07 59 43.27     | +23 45 24.9     | <i>MPS</i> 449   | 704  |
| 1998 BO <sub>11</sub> | 1998 01 24.23178   |    | 07 59 42.43     | +23 45 30.5     | <i>MPS</i> 449   | 704  |
| 1998 BO <sub>11</sub> | 1998 01 24.23718   |    | 07 59 42.16     | +23 45 33.4     | <i>MPS</i> 449   | 704  |
| 1998 BO <sub>11</sub> | 1998 01 24.25899   |    | 07 59 41.00     | +23 45 41.4     | <i>MPS</i> 449   | 704  |
| 1998 BO <sub>11</sub> | 1998 01 24.27496   |    | 07 59 40.13     | +23 45 47.5     | <i>MPS</i> 449   | 704  |
| 1998 BO <sub>11</sub> | 1998 01 24.28092   |    | 07 59 39.83     | +23 45 50.4     | <i>MPS</i> 449   | 704  |
| 1998 BO <sub>11</sub> | 1998 01 24.29697   |    | 07 59 38.96     | +23 45 56.4     | <i>MPS</i> 449   | 704  |
| 1998 BO <sub>11</sub> | 1998 01 24.30230   |    | 07 59 38.70     | +23 45 58.6     | <i>MPS</i> 449   | 704  |
| 1998 BO <sub>11</sub> | 1998 01 25.25537   |    | 07 58 50.18     | +23 52 05.1     | <i>MPS</i> 449   | 704  |
| 1998 BO <sub>11</sub> | 1998 01 25.27755   |    | 07 58 49.05     | +23 52 13.8     | <i>MPS</i> 449   | 704  |
| 1998 BO <sub>11</sub> | 1998 01 25.29946   |    | 07 58 47.87     | +23 52 22.1     | <i>MPS</i> 449   | 704  |
| 1998 BO <sub>11</sub> | 1998 01 25.32113   |    | 07 58 46.74     | +23 52 30.0     | <i>MPS</i> 449   | 704  |
| 1998 BO <sub>11</sub> | 1998 01 25.34266   |    | 07 58 45.62     | +23 52 38.9     | <i>MPS</i> 449   | 704  |
| 1998 BU <sub>11</sub> | * 1998 01 23.23760 |    | 08 20 31.53     | +23 15 58.9     | <i>MPS</i> 449   | 704  |

|                       |                  |             |             |            |      |     |
|-----------------------|------------------|-------------|-------------|------------|------|-----|
| 1998 BU <sub>11</sub> | 1998 01 23.25917 | 08 20 30.04 | +23 16 08.7 | <i>MPS</i> | 449  | 704 |
| 1998 BU <sub>11</sub> | 1998 01 23.28081 | 08 20 28.59 | +23 16 18.1 | <i>MPS</i> | 449  | 704 |
| 1998 BU <sub>11</sub> | 1998 01 23.30304 | 08 20 27.08 | +23 16 26.9 | <i>MPS</i> | 449  | 704 |
| 1998 BU <sub>11</sub> | 1998 01 23.32448 | 08 20 25.65 | +23 16 36.6 | <i>MPS</i> | 449  | 704 |
| 1998 BU <sub>11</sub> | 1998 01 24.21682 | 08 19 27.62 | +23 23 00.0 | <i>MPS</i> | 449  | 704 |
| 1998 BU <sub>11</sub> | 1998 01 24.23821 | 08 19 26.18 | +23 23 09.3 | <i>MPS</i> | 449  | 704 |
| 1998 BU <sub>11</sub> | 1998 01 24.26002 | 08 19 24.73 | +23 23 18.8 | <i>MPS</i> | 449  | 704 |
| 1998 BU <sub>11</sub> | 1998 01 24.28195 | 08 19 23.22 | +23 23 28.2 | <i>MPS</i> | 449  | 704 |
| 1998 BU <sub>11</sub> | 1998 01 24.30333 | 08 19 21.75 | +23 23 37.5 | <i>MPS</i> | 449  | 704 |
| 1998 BU <sub>11</sub> | 1998 01 25.26247 | 08 18 19.10 | +23 30 24.4 | <i>MPS</i> | 449  | 704 |
| 1998 BU <sub>11</sub> | 1998 01 25.28427 | 08 18 17.59 | +23 30 34.4 | <i>MPS</i> | 449  | 704 |
| 1998 BU <sub>11</sub> | 1998 01 25.30603 | 08 18 16.10 | +23 30 43.6 | <i>MPS</i> | 449  | 704 |
| 1998 BU <sub>11</sub> | 1998 01 25.32758 | 08 18 14.67 | +23 30 51.9 | <i>MPS</i> | 449  | 704 |
| 1998 BU <sub>11</sub> | 1998 01 25.34890 | 08 18 13.20 | +23 31 02.3 | <i>MPS</i> | 449  | 704 |
| (496)                 | 1967 11 07.94426 | 00 35 20.41 | +04 06 17.4 | <i>MPC</i> | 2912 | 012 |
| (496)                 | 1967 11 07.97196 | 00 35 19.96 | +04 06 07.5 | <i>MPC</i> | 2912 | 012 |

## IDENTIFICATION CHANGES

Continuation to *MPC* 31178.

| Object                | Date               | UT | $\alpha_{2000}$ | $\delta_{2000}$ | Originally           | Mag.   | Obs. |
|-----------------------|--------------------|----|-----------------|-----------------|----------------------|--------|------|
| 1953 GH <sub>2</sub>  | * 1953 04 05.08476 |    | 10 46 26.85     | +01 24 26.3     | 1953 GX              |        | 760  |
| 1953 GH <sub>2</sub>  | 1953 04 05.12642   |    | 10 46 25.23     | +01 24 34.8     | 1953 GX              | 17.5   | 760  |
| 1983 RR <sub>9</sub>  | * 1983 09 13.98314 |    | 00 06 00.85     | +02 54 50.1     | 1983 RJ <sub>7</sub> | 16.5   | 095  |
| 1996 FW <sub>23</sub> | * 1996 03 24.45133 |    | 09 57 25.04     | +14 33 36.0     | 1996 FU <sub>3</sub> | 18.1 R | 608  |
| 1996 FW <sub>23</sub> | 1996 03 24.48234   |    | 09 57 24.28     | +14 33 37.9     | 1996 FU <sub>3</sub> |        | 608  |
| 1996 HW <sub>26</sub> | * 1996 04 22.51963 |    | 13 28 40.25     | -07 28 22.3     | 1996 GY <sub>2</sub> | 18.4 V | 400  |
| 1996 HW <sub>26</sub> | 1996 04 22.53759   |    | 13 28 39.13     | -07 28 19.2     | 1996 GY <sub>2</sub> |        | 400  |

## OBSERVATIONS OF COMETS

Observations are published here for the following observatory codes:

|     |                                                                                                                                     |
|-----|-------------------------------------------------------------------------------------------------------------------------------------|
| 046 | Kleť. 0.57-m <i>f</i> /5.2 reflector + CCD. Observers J. Tichá, M. Tichý and Z. Moravec.                                            |
| 107 | Cavezzo. 0.40-m <i>f</i> /5.5 reflector + CCD. Observers M. Nicolini, P. Negrelli, M. Fusari and P. Lugli. Measured by M. Nicolini. |
| 118 | Modra. 0.6-m <i>f</i> /5.5 reflector + CCD. Observers A. Galád, P. Kolény, L. Kornoš and A. Pravda.                                 |
| 120 | Višňan. 0.41-m <i>f</i> /4.3 reflector + CCD. Observers K. Korlević, V. Jelic, I. Turcin and A. Vukorepa. Measured by V. Jelic.     |
| 145 | 's-Gravenwezel. 0.20-m <i>f</i> /2 reflector + CCD. Observer T. Alderweireldt.                                                      |
| 249 | SOHO. SOHO-LASCO coronagraph C3. Observers D. A. Biesecker and C. St. Cyr. Reduction by G. V. Williams.                             |
| 360 | Kuma Kogen. 0.60-m <i>f</i> /6.0 Ritchey-Chrétien + CCD. Observer A. Nakamura.                                                      |
| 372 | Geisei. 0.60-m <i>f</i> /3.5 reflector. Observer T. Seki. In part from <i>Orient. Astron. Assoc. Comet Bull.</i>                    |
| 402 | Dynic Astronomical Observatory. 0.60-m <i>f</i> /4.0 reflector + CCD. Observer A. Sugie.                                            |
| 403 | Kani. 0.28-m <i>f</i> /6.3 Schmidt-Cassegrain + CCD. Observer Y. Mizuno.                                                            |
| 422 | Loomberah. 0.25-m <i>f</i> /4.1 reflector + CCD. Observer G. J. Garradd.                                                            |

| 426                          | Woomera. 0.30-m $f/3.3$ Schmidt-Cassegrain + CCD. Observer F. B. Zoltowski.                                                     |             |                 |                 |      |        |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------|-------------|-----------------|-----------------|------|--------|
| 470                          | Ceccano. 0.15-m $f/5$ reflector + CCD. Observer G. Masi.                                                                        |             |                 |                 |      |        |
| 504                          | Le Creusot. 0.40-m $f/5$ reflector + CCD. Observer J. C. Merlin.                                                                |             |                 |                 |      |        |
| 568                          | Mauna Kea. 3.6-m Canada-France-Hawaii Telescope + CCD. Observer C. Veillet.                                                     |             |                 |                 |      |        |
| 587                          | Sormano. 0.5-m reflector + CCD. Observer M. Cavagna.                                                                            |             |                 |                 |      |        |
| 610                          | Pianoro. 0.25-m $f/4$ Schmidt-Cassegrain. Observer V. Goretti.                                                                  |             |                 |                 |      |        |
| 619                          | Sabadell. 0.51-m $f/3.9$ reflector + CCD. Observers F. Cassarramona, E. Vigil, A. Ruiz, J. Presa, J. Camarasa and M. Guillen.   |             |                 |                 |      |        |
| 688                          | Lowell Observatory, Anderson Mesa Station. 1.8-m reflector + CCD. Observers R. Millis and L. H. Wasserman. Measured by M. Buie. |             |                 |                 |      |        |
| 691                          | Kitt Peak. 0.91-m Spacewatch telescope. Observers T. Gehrels, J. Larsen, J. Montani and J. V. Scotti.                           |             |                 |                 |      |        |
| 758                          | Cocoa. 0.3-m reflector + CCD. Observer I. Griffin.                                                                              |             |                 |                 |      |        |
| 844                          | Los Molinos. 0.35-m $f/6.4$ reflector + CCD. Observers O. Mendez and J. Scheck.                                                 |             |                 |                 |      |        |
| 861                          | Barão Geraldo. 0.20-m $f/6.3$ Schmidt-Cassegrain + CCD. Observer P. R. Holvorcem.                                               |             |                 |                 |      |        |
| 867                          | Saji Observatory. 1.03-m $f/4.8$ reflector + CCD. Observers M. Yamanishi, A. Miyamoto, M. Aimoto and T. Oribe.                  |             |                 |                 |      |        |
| 900                          | Moriyama. 0.25-m $f/6.3$ reflector + CCD. Observer Y. Ikari.                                                                    |             |                 |                 |      |        |
| 954                          | Teide Observatory. 0.82-m $f/11.3$ reflector + CCD. Observers R. Casas and J. Licandro. Measured by R. Casas.                   |             |                 |                 |      |        |
| 970                          | Chelmsford. 0.30-m $f/5.25$ reflector + CCD. Observer N. D. James.                                                              |             |                 |                 |      |        |
| Object                       | Date                                                                                                                            | UT          | $\alpha_{2000}$ | $\delta_{2000}$ | Mag. | N Obs. |
| <b>C/1995 O1 (Hale-Bopp)</b> |                                                                                                                                 |             |                 |                 |      |        |
| C/1995 O1                    | 1998 02 06.16753                                                                                                                | 05 07 46.70 | -61 17 21.5     | 10.1 T          |      | 844    |
| C/1995 O1                    | 1998 02 06.19228                                                                                                                | 05 07 45.17 | -61 17 07.6     | 10.1 T          |      | 844    |
| C/1995 O1                    | 1998 02 13.06047                                                                                                                | 05 01 47.17 | -60 13 16.7     | 10.0 T          |      | 844    |
| C/1995 O1                    | 1998 02 13.08172                                                                                                                | 05 01 46.14 | -60 13 03.5     | 10.3 T          |      | 844    |
| C/1995 O1                    | 1998 02 14.44484                                                                                                                | 05 00 48.99 | -60 00 02.7     | 13.1 N          |      | 422    |
| C/1995 O1                    | 1998 02 14.44560                                                                                                                | 05 00 48.93 | -60 00 02.2     | 13.0 N          |      | 422    |
| C/1995 O1                    | 1998 02 14.44637                                                                                                                | 05 00 48.91 | -60 00 01.7     | 13.1 N          |      | 422    |
| C/1995 O1                    | 1998 02 17.45741                                                                                                                | 04 58 58.90 | -59 31 01.7     | 13.5 N          |      | 422    |
| C/1995 O1                    | 1998 02 17.45843                                                                                                                | 04 58 58.85 | -59 31 01.2     | 13.6 N          |      | 422    |
| C/1995 O1                    | 1998 02 17.45946                                                                                                                | 04 58 58.81 | -59 31 00.6     | 13.6 N          |      | 422    |
| C/1995 O1                    | 1998 02 19.44016                                                                                                                | 04 57 57.83 | -59 11 48.3     |                 |      | 426    |
| C/1995 O1                    | 1998 02 19.44484                                                                                                                | 04 57 57.68 | -59 11 45.7     |                 |      | 426    |
| C/1995 O1                    | 1998 02 19.44973                                                                                                                | 04 57 57.53 | -59 11 42.9     | 12.3 N          |      | 426    |
| C/1995 O1                    | 1998 02 20.42722                                                                                                                | 04 57 30.55 | -59 02 12.8     | 12.9 N          |      | 422    |
| C/1995 O1                    | 1998 02 20.42973                                                                                                                | 04 57 30.48 | -59 02 11.0     | 13.0 N          |      | 422    |
| C/1995 O1                    | 1998 02 20.43068                                                                                                                | 04 57 30.47 | -59 02 10.5     | 13.1 N          |      | 422    |
| C/1995 O1                    | 1998 02 20.43163                                                                                                                | 04 57 30.43 | -59 02 10.1     | 13.1 N          |      | 422    |
| C/1995 O1                    | 1998 02 20.43258                                                                                                                | 04 57 30.42 | -59 02 09.3     | 13.1 N          |      | 422    |
| C/1995 O1                    | 1998 02 20.43354                                                                                                                | 04 57 30.38 | -59 02 08.9     | 13.1 N          |      | 422    |
| C/1995 O1                    | 1998 02 21.43202                                                                                                                | 04 57 05.04 | -58 52 26.8     | 13.7 N          |      | 422    |
| C/1995 O1                    | 1998 02 21.43306                                                                                                                | 04 57 05.02 | -58 52 26.3     | 13.6 N          |      | 422    |
| C/1995 O1                    | 1998 02 21.43408                                                                                                                | 04 57 05.00 | -58 52 25.6     | 13.7 N          |      | 422    |
| C/1995 O1                    | 1998 02 21.43511                                                                                                                | 04 57 04.96 | -58 52 25.1     | 13.7 N          |      | 422    |
| C/1995 O1                    | 1998 02 28.10735                                                                                                                | 04 55 08.34 | -57 47 46.7     |                 |      | 844    |
| C/1995 O1                    | 1998 02 28.15031                                                                                                                | 04 55 07.92 | -57 47 21.1     |                 |      | 844    |

|                                           |                  |             |             |        |  |       |
|-------------------------------------------|------------------|-------------|-------------|--------|--|-------|
| C/1995 O1                                 | 1998 02 28.17025 | 04 55 07.68 | -57 47 09.5 |        |  | 844   |
| C/1995 O1                                 | 1998 02 28.50450 | 04 55 04.13 | -57 43 57.9 |        |  | 426   |
| C/1995 O1                                 | 1998 02 28.50957 | 04 55 04.11 | -57 43 54.7 |        |  | 426   |
| C/1995 O1                                 | 1998 02 28.51517 | 04 55 04.06 | -57 43 51.2 | 12.4 N |  | 426   |
| <b>C/1996 J1 (Evans-Drinkwater)</b>       |                  |             |             |        |  |       |
| C/1996 J1-B                               | 1997 10 04.25380 | 02 59 41.81 | +41 27 14.7 | 15.3 T |  | 861   |
| C/1996 J1-B                               | 1997 10 04.25904 | 02 59 41.61 | +41 27 14.4 | 15.4 T |  | 861   |
| C/1996 J1-B                               | 1997 10 04.26380 | 02 59 41.31 | +41 27 15.0 | 15.2 T |  | 861   |
| C/1996 J1-B                               | 1997 12 18.46701 | 02 06 16.19 | +34 23 29.0 | 16 T   |  | 372   |
| C/1996 J1-B                               | 1998 01 16.42691 | 02 08 26.59 | +31 49 25.1 | 17 T   |  | 372   |
| C/1996 J1-B                               | 1998 02 07.86257 | 02 18 04.80 | +30 46 58.0 |        |  | 1 118 |
| C/1996 J1-B                               | 1998 02 07.86865 | 02 18 04.99 | +30 46 57.2 | 16.0 T |  | 1 118 |
| C/1996 J1-B                               | 1998 02 08.85624 | 02 18 37.64 | +30 45 16.0 |        |  | 2 118 |
| C/1996 J1-B                               | 1998 02 08.86703 | 02 18 38.01 | +30 45 14.6 | 16.5 T |  | 2 118 |
| C/1996 J1-B                               | 1998 02 11.73643 | 02 20 15.88 | +30 40 47.2 | 17.1 T |  | 118   |
| C/1996 J1-B                               | 1998 02 11.74025 | 02 20 16.00 | +30 40 46.7 |        |  | 118   |
| C/1996 J1-B                               | 1998 02 19.82280 | 02 25 12.65 | +30 31 40.4 |        |  | 3 118 |
| C/1996 J1-B                               | 1998 02 19.82932 | 02 25 12.89 | +30 31 40.0 | 17.0 T |  | 118   |
| C/1996 J1-B                               | 1998 03 02.43785 | 02 32 24.12 | +30 26 40.4 | 16.5 T |  | 360   |
| C/1996 J1-B                               | 1998 03 02.44253 | 02 32 24.34 | +30 26 40.8 |        |  | 360   |
| <b>C/1997 BA<sub>6</sub> (Spacewatch)</b> |                  |             |             |        |  |       |
| C/1997 BA <sub>6</sub>                    | 1998 02 06.01406 | 09 20 11.79 | -05 42 34.0 |        |  | 2 118 |
| C/1997 BA <sub>6</sub>                    | 1998 02 06.01963 | 09 20 11.57 | -05 42 34.7 | 17.4 T |  | 2 118 |
| C/1997 BA <sub>6</sub>                    | 1998 02 07.04426 | 09 19 30.04 | -05 43 59.3 |        |  | 118   |
| C/1997 BA <sub>6</sub>                    | 1998 02 07.04700 | 09 19 29.92 | -05 43 59.8 |        |  | 118   |
| C/1997 BA <sub>6</sub>                    | 1998 02 07.05265 | 09 19 29.69 | -05 44 00.1 | 17.0 T |  | 118   |
| C/1997 BA <sub>6</sub>                    | 1998 02 07.98284 | 09 18 51.98 | -05 45 12.9 |        |  | 118   |
| C/1997 BA <sub>6</sub>                    | 1998 02 07.99895 | 09 18 51.28 | -05 45 13.9 | 17.4 T |  | 118   |
| C/1997 BA <sub>6</sub>                    | 1998 02 09.02872 | 09 18 09.32 | -05 46 31.0 |        |  | 2 118 |
| C/1997 BA <sub>6</sub>                    | 1998 02 09.03565 | 09 18 09.03 | -05 46 31.5 |        |  | 2 118 |
| C/1997 BA <sub>6</sub>                    | 1998 02 09.03789 | 09 18 08.92 | -05 46 31.6 | 17.2 T |  | 2 118 |
| C/1997 BA <sub>6</sub>                    | 1998 02 18.65280 | 09 11 36.58 | -05 55 16.8 | 17.4 T |  | 867   |
| C/1997 BA <sub>6</sub>                    | 1998 02 18.66079 | 09 11 36.26 | -05 55 16.9 |        |  | 867   |
| C/1997 BA <sub>6</sub>                    | 1998 02 21.64097 | 09 09 35.92 | -05 56 54.2 | 16.9 T |  | 360   |
| C/1997 BA <sub>6</sub>                    | 1998 02 21.64549 | 09 09 35.74 | -05 56 54.1 |        |  | 360   |
| C/1997 BA <sub>6</sub>                    | 1998 03 02.56896 | 09 03 46.25 | -05 58 56.5 | 17.7 T |  | 402   |
| C/1997 BA <sub>6</sub>                    | 1998 03 02.57174 | 09 03 46.15 | -05 58 56.6 |        |  | 402   |
| C/1997 BA <sub>6</sub>                    | 1998 03 02.57451 | 09 03 46.05 | -05 58 57.1 |        |  | 402   |
| <b>C/1997 D1 (Mueller)</b>                |                  |             |             |        |  |       |
| C/1997 D1                                 | 1997 12 24.61424 | 04 02 05.44 | -10 59 54.4 | 15 T   |  | 372   |
| C/1997 D1                                 | 1997 12 28.58715 | 03 48 22.32 | -11 45 51.1 |        |  | 372   |
| C/1997 D1                                 | 1998 01 01.52500 | 03 36 14.57 | -12 20 45.4 | 14.5 T |  | 372   |
| C/1997 D1                                 | 1998 01 26.53299 | 02 48 36.95 | -13 26 51.4 | 15 T   |  | 372   |
| C/1997 D1                                 | 1998 01 27.46250 | 02 47 37.25 | -13 26 18.4 | 15 T   |  | 372   |
| C/1997 D1                                 | 1998 02 11.74932 | 02 36 32.59 | -13 05 23.8 | 15.9 T |  | 118   |
| C/1997 D1                                 | 1998 02 11.75440 | 02 36 32.48 | -13 05 22.9 |        |  | 118   |
| <b>P/1997 G1 (Montani)</b>                |                  |             |             |        |  |       |
| P/1997 G1                                 | 1998 02 22.43164 | 10 58 06.45 | +01 17 34.4 | 20.0 T |  | 691   |
| P/1997 G1                                 | 1998 02 22.43750 | 10 58 06.34 | +01 17 35.3 | 20.0 T |  | 691   |
| P/1997 G1                                 | 1998 02 22.44357 | 10 58 06.13 | +01 17 37.0 | 20.0 T |  | 691   |
| P/1997 G1                                 | 1998 03 02.63426 | 10 54 08.81 | +01 39 39.8 | 18.6 T |  | 402   |

|                                   |                  |             |             |        |       |
|-----------------------------------|------------------|-------------|-------------|--------|-------|
| P/1997 G1                         | 1998 03 02.63704 | 10 54 08.73 | +01 39 39.5 |        | 402   |
| P/1997 G1                         | 1998 03 02.63981 | 10 54 08.70 | +01 39 40.5 |        | 402   |
| P/1997 G1                         | 1998 03 02.66563 | 10 54 07.89 | +01 39 45.6 | 18.9 T | 360   |
| P/1997 G1                         | 1998 03 02.67622 | 10 54 07.55 | +01 39 47.7 |        | 360   |
| <b>C/1997 G2 (Montani)</b>        |                  |             |             |        |       |
| C/1997 G2                         | 1998 02 13.31410 | 18 19 59.78 | -58 58 55.8 |        | 844   |
| C/1997 G2                         | 1998 02 13.32855 | 18 20 01.91 | -58 59 11.1 |        | 844   |
| C/1997 G2                         | 1998 02 27.29961 | 18 59 59.45 | -62 57 31.7 |        | 844   |
| C/1997 G2                         | 1998 02 27.31522 | 19 00 02.58 | -62 57 49.4 |        | 844   |
| <b>C/1997 J1 (Mueller)</b>        |                  |             |             |        |       |
| C/1997 J1                         | 1998 02 08.93683 | 05 45 56.30 | +26 50 49.7 |        | 118   |
| C/1997 J1                         | 1998 02 08.95012 | 05 45 55.39 | +26 50 41.1 | 17.0 T | 118   |
| C/1997 J1                         | 1998 02 15.51589 | 05 39 14.80 | +25 44 27.7 | 16.8 T | 403   |
| C/1997 J1                         | 1998 02 15.52594 | 05 39 14.24 | +25 44 21.6 | 16.9 T | 403   |
| C/1997 J1                         | 1998 02 17.91784 | 05 37 11.93 | +25 21 30.4 |        | 118   |
| C/1997 J1                         | 1998 02 17.92024 | 05 37 11.81 | +25 21 29.0 |        | 118   |
| C/1997 J1                         | 1998 02 17.92780 | 05 37 11.43 | +25 21 24.4 | 16.0 T | 118   |
| C/1997 J1                         | 1998 02 19.91198 | 05 35 38.98 | +25 03 02.9 | 4 118  |       |
| C/1997 J1                         | 1998 02 19.92294 | 05 35 38.47 | +25 02 57.0 | 15.5 T | 4 118 |
| C/1997 J1                         | 1998 02 20.95766 | 05 34 53.49 | +24 53 33.6 |        | 118   |
| C/1997 J1                         | 1998 02 20.96529 | 05 34 53.13 | +24 53 29.7 | 16.3 T | 118   |
| C/1997 J1                         | 1998 02 22.48054 | 05 33 50.94 | +24 40 01.7 |        | 900   |
| C/1997 J1                         | 1998 02 22.48815 | 05 33 50.60 | +24 39 56.9 | 16.7 T | 900   |
| C/1997 J1                         | 1998 03 02.51649 | 05 29 31.07 | +23 33 20.1 | 16.4 T | 360   |
| C/1997 J1                         | 1998 03 02.52465 | 05 29 30.84 | +23 33 16.3 |        | 360   |
| <b>C/1997 J2 (Meunier-Dupouy)</b> |                  |             |             |        |       |
| C/1997 J2                         | 1998 02 02.85608 | 20 29 28.87 | +35 34 35.4 | 14 T   | 372   |
| C/1997 J2                         | 1998 02 05.84931 | 20 34 51.98 | +35 12 58.0 | 14 T   | 372   |
| C/1997 J2                         | 1998 02 05.85278 | 20 34 52.42 | +35 12 56.6 |        | 372   |
| C/1997 J2                         | 1998 02 06.17716 | 20 35 26.98 | +35 10 39.8 | 1 118  |       |
| C/1997 J2                         | 1998 02 06.18458 | 20 35 27.79 | +35 10 36.7 | 12.5 T | 1 118 |
| <b>C/1997 O1 (Tilbrook)</b>       |                  |             |             |        |       |
| C/1997 O1                         | 1998 02 09.16638 | 16 09 39.11 | +51 55 19.7 |        | 118   |
| C/1997 O1                         | 1998 02 09.17019 | 16 09 39.16 | +51 55 27.0 | 16.9 T | 118   |
| C/1997 O1                         | 1998 02 18.16362 | 16 11 18.63 | +56 38 55.2 | 2 118  |       |
| C/1997 O1                         | 1998 02 18.16935 | 16 11 18.64 | +56 39 05.4 | 17.0 T | 2 118 |
| <b>C/1997 T1 (Utsunomiya)</b>     |                  |             |             |        |       |
| C/1997 T1                         | 1998 01 28.86354 | 18 49 49.08 | -01 06 16.2 | 12 T   | 372   |
| C/1997 T1                         | 1998 01 28.86788 | 18 49 49.05 | -01 06 18.7 |        | 372   |
| C/1997 T1                         | 1998 01 28.86955 | 18 49 49.09 | -01 06 19.7 |        | 372   |
| C/1997 T1                         | 1998 02 05.85885 | 18 49 05.61 | -02 21 02.5 | 12 T   | 372   |
| C/1997 T1                         | 1998 02 05.86285 | 18 49 05.60 | -02 21 04.5 |        | 372   |
| C/1997 T1                         | 1998 02 05.86458 | 18 49 05.60 | -02 21 05.2 |        | 372   |
| <b>C/1997 U1 (SOHO)</b>           |                  |             |             |        |       |
| C/1997 U1                         | 1997 10 28.13356 | 13 53 34.9  | -16 23 46   |        | 249   |
| Geocentric position (AU)          | -0.00599392      | -0.00804467 | -0.00400052 |        |       |
| C/1997 U1                         | 1997 10 28.16824 | 13 54 16.0  | -16 20 03   |        | 249   |
| Geocentric position (AU)          | -0.00599129      | -0.00804705 | -0.00400244 |        |       |
| C/1997 U1                         | 1997 10 28.19683 | 13 54 52.8  | -16 17 20   |        | 249   |
| Geocentric position (AU)          | -0.00598913      | -0.00804902 | -0.00400403 |        |       |

|                          |                  |             |             |  |     |
|--------------------------|------------------|-------------|-------------|--|-----|
| C/1997 U1                | 1997 10 28.21574 | 13 55 12.8  | -16 14 53   |  | 249 |
| Geocentric position (AU) | -0.00598770      | -0.00805032 | -0.00400507 |  |     |
| C/1997 U1                | 1997 10 28.25017 | 13 55 56.9  | -16 10 42   |  | 249 |
| Geocentric position (AU) | -0.00598509      | -0.00805268 | -0.00400698 |  |     |
| C/1997 U1                | 1997 10 28.28699 | 13 56 40.2  | -16 05 58   |  | 249 |
| Geocentric position (AU) | -0.00598231      | -0.00805520 | -0.00400901 |  |     |
| C/1997 U1                | 1997 10 28.32380 | 13 57 27.5  | -16 01 58   |  | 249 |
| Geocentric position (AU) | -0.00597952      | -0.00805772 | -0.00401104 |  |     |
| C/1997 U1                | 1997 10 28.36476 | 13 58 18.1  | -15 57 09   |  | 249 |
| Geocentric position (AU) | -0.00597642      | -0.00806051 | -0.00401330 |  |     |
| C/1997 U1                | 1997 10 28.40645 | 13 59 08.8  | -15 52 32   |  | 249 |
| Geocentric position (AU) | -0.00597327      | -0.00806335 | -0.00401559 |  |     |
| C/1997 U1                | 1997 10 28.44404 | 13 59 59.4  | -15 46 36   |  | 249 |
| Geocentric position (AU) | -0.00597042      | -0.00806590 | -0.00401766 |  |     |
| C/1997 U1                | 1997 10 28.49322 | 14 01 03.7  | -15 40 13   |  | 249 |
| Geocentric position (AU) | -0.00596670      | -0.00806923 | -0.00402035 |  |     |
| C/1997 U1                | 1997 10 28.52921 | 14 01 53.5  | -15 35 20   |  | 249 |
| Geocentric position (AU) | -0.00596397      | -0.00807167 | -0.00402233 |  |     |
| C/1997 U1                | 1997 10 28.57377 | 14 02 47.6  | -15 28 51   |  | 249 |
| Geocentric position (AU) | -0.00596060      | -0.00807468 | -0.00402476 |  |     |
| C/1997 U1                | 1997 10 28.61130 | 14 03 39.5  | -15 23 05   |  | 249 |
| Geocentric position (AU) | -0.00595776      | -0.00807720 | -0.00402681 |  |     |
| C/1997 U1                | 1997 10 28.65641 | 14 04 44.4  | -15 15 43   |  | 249 |
| Geocentric position (AU) | -0.00595435      | -0.00808024 | -0.00402927 |  |     |
| C/1997 U1                | 1997 10 28.68073 | 14 05 19.2  | -15 12 19   |  | 249 |
| Geocentric position (AU) | -0.00595251      | -0.00808187 | -0.00403059 |  |     |
| C/1997 U1                | 1997 10 28.71545 | 14 06 06.2  | -15 05 55   |  | 249 |
| Geocentric position (AU) | -0.00594988      | -0.00808419 | -0.00403248 |  |     |
| C/1997 U1                | 1997 10 28.73976 | 14 06 39.4  | -15 01 17   |  | 249 |
| Geocentric position (AU) | -0.00594804      | -0.00808582 | -0.00403380 |  |     |
| C/1997 U1                | 1997 10 28.75063 | 14 06 59.9  | -15 00 01   |  | 249 |
| Geocentric position (AU) | -0.00594722      | -0.00808654 | -0.00403439 |  |     |
| C/1997 U1                | 1997 10 28.75432 | 14 07 10.6  | -14 59 04   |  | 249 |
| Geocentric position (AU) | -0.00594694      | -0.00808679 | -0.00403459 |  |     |
| C/1997 U1                | 1997 10 28.75925 | 14 07 08.4  | -14 56 46   |  | 249 |
| Geocentric position (AU) | -0.00594657      | -0.00808712 | -0.00403486 |  |     |
| C/1997 U1                | 1997 10 28.76417 | 14 07 20.0  | -14 55 56   |  | 249 |
| Geocentric position (AU) | -0.00594619      | -0.00808745 | -0.00403513 |  |     |
| C/1997 U1                | 1997 10 28.78778 | 14 07 48.0  | -14 52 15   |  | 249 |
| Geocentric position (AU) | -0.00594441      | -0.00808902 | -0.00403641 |  |     |

**P/1997 V1 (Larsen)**

|           |                  |             |             |        |       |
|-----------|------------------|-------------|-------------|--------|-------|
| P/1997 V1 | 1997 12 19.39688 | 00 23 57.58 | +09 42 04.6 | 18.4 T | 372   |
| P/1997 V1 | 1998 01 19.40417 | 00 49 05.43 | +10 18 35.3 | 18.3 T | 372   |
| P/1997 V1 | 1998 01 19.42049 | 00 49 06.45 | +10 18 38.3 |        | 372   |
| P/1997 V1 | 1998 02 11.43484 | 01 14 00.56 | +11 39 44.0 | 17.4 T | 402   |
| P/1997 V1 | 1998 02 11.43762 | 01 14 00.88 | +11 39 44.8 |        | 402   |
| P/1997 V1 | 1998 02 14.75087 | 01 17 55.11 | +11 53 55.1 |        | 587   |
| P/1997 V1 | 1998 02 14.75903 | 01 17 55.68 | +11 53 56.3 | 17 T   | 587   |
| P/1997 V1 | 1998 02 19.77361 | 01 23 57.57 | +12 16 13.0 | 1 118  |       |
| P/1997 V1 | 1998 02 19.78029 | 01 23 58.06 | +12 16 15.0 | 16.9 T | 5 118 |

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M.P.C. 31329

## 10P/Tempel 2

|     |                  |             |             |        |     |
|-----|------------------|-------------|-------------|--------|-----|
| 10P | 1998 03 02.68472 | 11 29 07.58 | +16 04 06.6 | 19.7 T | 360 |
| 10P | 1998 03 02.69167 | 11 29 07.27 | +16 04 09.2 |        | 360 |

## 21P/Giacobini-Zinner

|     |                  |             |             |        |     |
|-----|------------------|-------------|-------------|--------|-----|
| 21P | 1998 02 23.24874 | 17 05 35.57 | -01 00 26.3 |        | 954 |
| 21P | 1998 02 23.25027 | 17 05 35.66 | -01 00 25.6 |        | 954 |
| 21P | 1998 02 23.25178 | 17 05 35.75 | -01 00 25.0 |        | 954 |
| 21P | 1998 02 23.25330 | 17 05 35.84 | -01 00 24.3 |        | 954 |
| 21P | 1998 02 23.25481 | 17 05 35.93 | -01 00 23.6 |        | 954 |
| 21P | 1998 02 23.25753 | 17 05 36.09 | -01 00 22.4 |        | 954 |
| 21P | 1998 02 23.25905 | 17 05 36.17 | -01 00 21.7 |        | 954 |
| 21P | 1998 02 23.26056 | 17 05 36.26 | -01 00 21.1 |        | 954 |
| 21P | 1998 02 23.26208 | 17 05 36.35 | -01 00 20.4 |        | 954 |
| 21P | 1998 02 23.26359 | 17 05 36.44 | -01 00 19.7 |        | 954 |
| 21P | 1998 02 23.26527 | 17 05 36.54 | -01 00 19.0 |        | 954 |
| 21P | 1998 02 23.26679 | 17 05 36.63 | -01 00 18.3 |        | 954 |
| 21P | 1998 02 23.26830 | 17 05 36.72 | -01 00 17.6 |        | 954 |
| 21P | 1998 02 23.26982 | 17 05 36.81 | -01 00 17.0 |        | 954 |
| 21P | 1998 02 24.20710 | 17 06 31.39 | -00 53 01.6 | 21.9 T | 954 |
| 21P | 1998 02 24.20862 | 17 06 31.47 | -00 53 00.9 | 21.9 T | 954 |
| 21P | 1998 02 24.21013 | 17 06 31.56 | -00 53 00.2 | 21.9 T | 954 |
| 21P | 1998 02 24.21164 | 17 06 31.64 | -00 52 59.5 | 21.9 T | 954 |
| 21P | 1998 02 24.21315 | 17 06 31.73 | -00 52 58.8 | 21.9 T | 954 |
| 21P | 1998 02 24.21468 | 17 06 31.82 | -00 52 58.1 | 21.9 T | 954 |
| 21P | 1998 02 24.21620 | 17 06 31.90 | -00 52 57.4 | 21.9 T | 954 |
| 21P | 1998 02 24.21770 | 17 06 31.99 | -00 52 56.8 | 21.9 T | 954 |
| 21P | 1998 02 24.21922 | 17 06 32.08 | -00 52 55.0 | 21.9 T | 954 |
| 21P | 1998 02 24.22075 | 17 06 32.16 | -00 52 54.3 | 21.9 T | 954 |
| 21P | 1998 02 24.22226 | 17 06 32.25 | -00 52 53.5 | 21.9 T | 954 |
| 21P | 1998 02 24.22378 | 17 06 32.34 | -00 52 52.7 | 21.9 T | 954 |
| 21P | 1998 02 24.22530 | 17 06 32.42 | -00 52 51.9 | 21.9 T | 954 |
| 21P | 1998 02 24.22694 | 17 06 32.52 | -00 52 51.1 | 21.9 T | 954 |
| 21P | 1998 02 24.22845 | 17 06 32.60 | -00 52 50.3 | 21.9 T | 954 |
| 21P | 1998 02 24.22997 | 17 06 32.69 | -00 52 49.6 | 21.9 T | 954 |
| 21P | 1998 02 24.23148 | 17 06 32.77 | -00 52 48.8 | 21.9 T | 954 |
| 21P | 1998 02 24.23300 | 17 06 32.86 | -00 52 48.0 | 21.9 T | 954 |
| 21P | 1998 02 24.23452 | 17 06 32.95 | -00 52 47.3 | 21.9 T | 954 |
| 21P | 1998 02 25.18602 | 17 07 27.84 | -00 45 18.6 |        | 954 |
| 21P | 1998 02 25.18759 | 17 07 27.94 | -00 45 17.9 |        | 954 |
| 21P | 1998 02 25.18917 | 17 07 28.02 | -00 45 17.2 |        | 954 |
| 21P | 1998 02 25.19074 | 17 07 28.11 | -00 45 16.5 |        | 954 |
| 21P | 1998 02 25.19231 | 17 07 28.20 | -00 45 15.8 |        | 954 |
| 21P | 1998 02 25.19390 | 17 07 28.29 | -00 45 15.0 |        | 954 |
| 21P | 1998 02 25.19549 | 17 07 28.38 | -00 45 14.3 |        | 954 |
| 21P | 1998 02 25.19707 | 17 07 28.47 | -00 45 13.5 |        | 954 |
| 21P | 1998 02 25.19865 | 17 07 28.56 | -00 45 12.8 |        | 954 |
| 21P | 1998 02 25.20021 | 17 07 28.65 | -00 45 12.1 |        | 954 |
| 21P | 1998 02 28.52251 | 17 10 36.50 | -00 17 53.1 | 20.6 T | 691 |
| 21P | 1998 02 28.52669 | 17 10 36.73 | -00 17 50.6 | 20.2 T | 691 |
| 21P | 1998 02 28.53175 | 17 10 37.02 | -00 17 47.9 | 20.8 T | 691 |

## 29P/Schwassmann-Wachmann 1

|     |                  |             |             |        |       |
|-----|------------------|-------------|-------------|--------|-------|
| 29P | 1998 02 06.13527 | 13 41 03.33 | -20 27 35.0 |        | 1 118 |
| 29P | 1998 02 06.14193 | 13 41 03.32 | -20 27 36.2 | 14.1 T | 1 118 |
| 29P | 1998 02 07.16791 | 13 41 04.79 | -20 29 37.0 |        | 118   |
| 29P | 1998 02 07.17225 | 13 41 04.80 | -20 29 37.4 | 13.9 T | 118   |
| 29P | 1998 02 09.11914 | 13 41 05.81 | -20 33 16.5 |        | 2 118 |
| 29P | 1998 02 09.12458 | 13 41 05.81 | -20 33 17.6 | 14.2 T | 2 118 |
| 29P | 1998 02 18.11865 | 13 40 38.10 | -20 47 09.7 |        | 2 118 |
| 29P | 1998 02 18.12431 | 13 40 38.06 | -20 47 10.0 | 14.6 T | 2 118 |
| 29P | 1998 02 21.78108 | 13 40 11.80 | -20 51 19.0 | 12.4 T | 360   |
| 29P | 1998 02 21.78385 | 13 40 11.76 | -20 51 19.2 | 16.7 N | 360   |
| 29P | 1998 02 28.50790 | 13 39 01.44 | -20 56 34.5 | 20.3 N | 691   |
| 29P | 1998 02 28.51229 | 13 39 01.41 | -20 56 34.9 | 20.1 N | 691   |
| 29P | 1998 02 28.51642 | 13 39 01.34 | -20 56 34.9 | 19.9 N | 691   |
| 29P | 1998 02 02.77127 | 13 38 31.71 | -20 57 37.8 | 13.5 T | 900   |
| 29P | 1998 03 02.77257 | 13 38 31.72 | -20 57 38.4 | 12.4 T | 360   |
| 29P | 1998 03 02.77569 | 13 38 31.67 | -20 57 38.4 | 16.8 N | 360   |
| 29P | 1998 03 02.78583 | 13 38 31.42 | -20 57 38.8 |        | 900   |
| 29P | 1998 03 08.50368 | 13 37 03.17 | -20 58 40.1 | 17.8 N | 422   |
| 29P | 1998 03 08.50479 | 13 37 03.13 | -20 58 39.9 | 17.7 N | 422   |

## 43P/Wolf-Harrington

|     |                  |             |             |        |       |
|-----|------------------|-------------|-------------|--------|-------|
| 43P | 1997 12 24.80174 | 10 14 19.17 | -13 57 45.5 |        | 372   |
| 43P | 1998 01 06.77118 | 10 14 52.55 | -17 43 29.6 |        | 372   |
| 43P | 1998 01 21.76632 | 10 07 55.77 | -20 45 59.3 |        | 372   |
| 43P | 1998 02 02.65480 | 09 57 59.72 | -21 54 20.1 | 14.1 T | 900   |
| 43P | 1998 02 02.66397 | 09 57 59.18 | -21 54 21.4 |        | 900   |
| 43P | 1998 02 07.02765 | 09 53 48.82 | -22 01 01.6 |        | 1 118 |
| 43P | 1998 02 07.03411 | 09 53 48.45 | -22 01 01.7 |        | 1 118 |
| 43P | 1998 02 07.03684 | 09 53 48.28 | -22 01 01.8 | 13.8 T | 1 118 |
| 43P | 1998 02 08.98331 | 09 51 54.83 | -22 00 52.5 |        | 118   |
| 43P | 1998 02 08.98896 | 09 51 54.50 | -22 00 52.1 | 14.1 T | 118   |
| 43P | 1998 02 13.10622 | 09 47 54.82 | -21 54 15.4 |        | 844   |
| 43P | 1998 02 13.12373 | 09 47 53.75 | -21 54 13.2 | 15.1 T | 844   |
| 43P | 1998 02 13.14233 | 09 47 52.68 | -21 54 10.1 | 15.1 T | 844   |
| 43P | 1998 02 17.95569 | 09 43 19.71 | -21 36 47.9 |        | 118   |
| 43P | 1998 02 17.96149 | 09 43 19.38 | -21 36 46.2 |        | 118   |
| 43P | 1998 02 17.96697 | 09 43 19.10 | -21 36 45.2 | 14.2 T | 118   |
| 43P | 1998 02 20.53958 | 09 41 00.06 | -21 23 13.8 |        | 426   |
| 43P | 1998 02 20.55152 | 09 40 59.42 | -21 23 09.8 |        | 426   |
| 43P | 1998 02 20.56425 | 09 40 58.70 | -21 23 05.4 | 14.3 T | 426   |
| 43P | 1998 02 21.65069 | 09 40 01.53 | -21 16 46.7 | 13.3 T | 360   |
| 43P | 1998 02 21.65382 | 09 40 01.36 | -21 16 45.3 |        | 360   |
| 43P | 1998 02 22.59682 | 09 39 13.08 | -21 10 48.5 | 14.5 T | 900   |
| 43P | 1998 02 22.60977 | 09 39 12.37 | -21 10 43.8 |        | 900   |
| 43P | 1998 02 27.03646 | 09 35 39.61 | -20 38 39.0 |        | 844   |
| 43P | 1998 02 27.05473 | 09 35 38.72 | -20 38 29.8 |        | 844   |
| 43P | 1998 02 27.08106 | 09 35 37.46 | -20 38 16.8 |        | 844   |
| 43P | 1998 03 08.46476 | 09 29 43.46 | -19 13 12.4 | 17.1 N | 422   |
| 43P | 1998 03 08.46946 | 09 29 43.31 | -19 13 09.6 | 16.4 N | 422   |

## 48P/Johnson

|     |                  |             |             |        |     |
|-----|------------------|-------------|-------------|--------|-----|
| 48P | 1997 10 23.00543 | 19 58 01.50 | -26 59 09.4 | 17.3 T | 861 |
| 48P | 1997 10 23.00858 | 19 58 01.78 | -26 59 09.0 | 17.0 T | 861 |

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|     |                  |             |             |        |     |
|-----|------------------|-------------|-------------|--------|-----|
| 48P | 1997 10 23.01159 | 19 58 02.09 | -26 59 08.4 | 17.6 T | 861 |
| 48P | 1997 10 28.04832 | 20 05 58.01 | -26 49 44.3 | 16.6 T | 861 |
| 48P | 1997 10 28.05346 | 20 05 58.56 | -26 49 42.3 | 16.8 T | 861 |
| 48P | 1997 10 28.05785 | 20 05 59.02 | -26 49 42.1 | 16.9 T | 861 |

## 55P/Tempel-Tuttle

|     |                  |             |             |        |     |
|-----|------------------|-------------|-------------|--------|-----|
| 55P | 1997 12 28.79097 | 12 37 45.11 | +27 53 36.0 |        | 372 |
| 55P | 1997 12 30.86007 | 12 37 06.05 | +30 22 57.2 | 14.5 T | 372 |
| 55P | 1998 01 05.78299 | 12 31 47.60 | +40 54 45.2 |        | 372 |
| 55P | 1998 01 06.78437 | 12 29 57.99 | +43 24 26.5 | 11 T   | 372 |
| 55P | 1998 01 09.96266 | 12 19 58.63 | +53 19 11.6 |        | 145 |
| 55P | 1998 01 09.97929 | 12 19 54.12 | +53 22 51.1 |        | 145 |
| 55P | 1998 01 10.95773 | 12 14 27.93 | +57 09 03.3 |        | 145 |
| 55P | 1998 01 10.96042 | 12 14 26.95 | +57 09 42.3 |        | 145 |
| 55P | 1998 01 10.96455 | 12 14 25.31 | +57 10 43.2 |        | 145 |
| 55P | 1998 01 10.96744 | 12 14 24.14 | +57 11 24.8 |        | 145 |
| 55P | 1998 01 10.97037 | 12 14 22.97 | +57 12 07.5 |        | 145 |
| 55P | 1998 01 26.82117 | 01 29 14.26 | +42 12 18.7 |        | 145 |
| 55P | 1998 01 26.82587 | 01 29 13.58 | +42 11 29.3 |        | 145 |
| 55P | 1998 01 26.83223 | 01 29 12.38 | +42 10 18.6 |        | 145 |
| 55P | 1998 02 08.43562 | 01 17 01.68 | +20 26 46.1 |        | 900 |
| 55P | 1998 02 08.44310 | 01 17 01.57 | +20 26 20.6 | 10.2 T | 900 |
| 55P | 1998 02 11.00612 | 01 16 13.36 | +18 12 16.6 | 13.0 N | 758 |
| 55P | 1998 02 11.01635 | 01 16 13.17 | +18 11 47.3 | 13.0 N | 758 |
| 55P | 1998 02 11.02304 | 01 16 13.08 | +18 11 27.9 | 13.1 N | 758 |
| 55P | 1998 02 11.43403 | 01 16 06.32 | +17 52 03.0 |        | 360 |
| 55P | 1998 02 11.43611 | 01 16 06.29 | +17 51 57.3 |        | 360 |
| 55P | 1998 02 11.43750 | 01 16 06.27 | +17 51 53.7 |        | 360 |
| 55P | 1998 02 12.79190 | 01 15 45.90 | +16 51 30.7 |        | 504 |
| 55P | 1998 02 12.79345 | 01 15 45.88 | +16 51 27.1 |        | 504 |
| 55P | 1998 02 12.79373 | 01 15 45.88 | +16 51 25.8 |        | 504 |
| 55P | 1998 02 12.79535 | 01 15 45.85 | +16 51 21.7 |        | 504 |
| 55P | 1998 02 12.79618 | 01 15 45.85 | +16 51 19.8 |        | 504 |
| 55P | 1998 02 12.79653 | 01 15 45.82 | +16 51 19.2 |        | 504 |
| 55P | 1998 02 13.42258 | 01 15 37.15 | +16 25 09.3 |        | 867 |
| 55P | 1998 02 13.42744 | 01 15 37.05 | +16 24 57.4 |        | 867 |
| 55P | 1998 02 13.43334 | 01 15 36.98 | +16 24 42.9 |        | 867 |
| 55P | 1998 02 13.77606 | 01 15 32.45 | +16 10 46.4 |        | 470 |
| 55P | 1998 02 13.78259 | 01 15 32.38 | +16 10 30.6 |        | 470 |
| 55P | 1998 02 13.80280 | 01 15 32.21 | +16 09 42.8 |        | 619 |
| 55P | 1998 02 13.80763 | 01 15 32.12 | +16 09 31.0 |        | 619 |
| 55P | 1998 02 13.81188 | 01 15 32.03 | +16 09 20.6 |        | 619 |
| 55P | 1998 02 14.76615 | 01 15 20.00 | +15 32 07.9 |        | 587 |
| 55P | 1998 02 14.76910 | 01 15 19.97 | +15 32 01.1 |        | 587 |
| 55P | 1998 02 14.85038 | 01 15 18.90 | +15 28 56.0 |        | 619 |
| 55P | 1998 02 14.85368 | 01 15 18.85 | +15 28 49.1 |        | 619 |
| 55P | 1998 02 14.85979 | 01 15 18.83 | +15 28 35.5 |        | 619 |
| 55P | 1998 02 15.41264 | 01 15 12.31 | +15 08 06.1 | 11.4 T | 403 |
| 55P | 1998 02 15.42145 | 01 15 12.13 | +15 07 46.5 | 11.3 T | 403 |
| 55P | 1998 02 17.99668 | 01 14 44.69 | +13 40 03.7 | 13.3 T | 758 |
| 55P | 1998 02 18.00167 | 01 14 44.60 | +13 39 54.9 | 13.2 T | 758 |
| 55P | 1998 02 18.00610 | 01 14 44.57 | +13 39 46.5 | 13.0 T | 758 |
| 55P | 1998 02 19.00387 | 01 14 35.04 | +13 08 52.6 | 13.0 N | 758 |

|     |                  |             |             |        |     |
|-----|------------------|-------------|-------------|--------|-----|
| 55P | 1998 02 19.01218 | 01 14 34.95 | +13 08 38.1 | 13.0 N | 758 |
| 55P | 1998 02 19.02017 | 01 14 34.89 | +13 08 23.2 | 13.0 N | 758 |
| 55P | 1998 02 21.05164 | 01 14 16.93 | +12 10 00.1 | 12.3 N | 758 |
| 55P | 1998 02 21.05886 | 01 14 16.90 | +12 09 47.9 | 12.3 N | 758 |
| 55P | 1998 02 22.42906 | 01 14 05.77 | +11 33 24.1 | 10.2 T | 900 |
| 55P | 1998 02 22.43481 | 01 14 05.68 | +11 33 15.6 |        | 900 |
| 55P | 1998 02 27.73711 | 01 13 27.83 | +09 30 47.7 | 11.5 T | 118 |
| 55P | 1998 02 27.74347 | 01 13 27.92 | +09 30 39.4 |        | 118 |
| 55P | 1998 03 02.42344 | 01 13 10.94 | +08 37 35.2 |        | 360 |
| 55P | 1998 03 02.42517 | 01 13 10.93 | +08 37 33.3 |        | 360 |

## 62P/Tsuchinshan 1

|     |                  |             |             |        |     |
|-----|------------------|-------------|-------------|--------|-----|
| 62P | 1998 03 01.74418 | 03 19 36.59 | +16 43 41.1 | 16.0 T | 118 |
| 62P | 1998 03 01.75003 | 03 19 37.41 | +16 43 46.7 |        | 118 |
| 62P | 1998 03 02.44809 | 03 21 14.05 | +16 54 53.2 | 15.0 T | 360 |
| 62P | 1998 03 02.45122 | 03 21 14.49 | +16 54 56.1 |        | 360 |
| 62P | 1998 03 09.76104 | 03 38 52.86 | +18 48 52.7 |        | 046 |
| 62P | 1998 03 09.76417 | 03 38 53.27 | +18 48 55.4 |        | 046 |
| 62P | 1998 03 09.76670 | 03 38 53.67 | +18 48 58.1 |        | 046 |

## 65P/Gunn

|     |                  |             |             |        |       |
|-----|------------------|-------------|-------------|--------|-------|
| 65P | 1998 02 08.74521 | 00 50 30.98 | -01 40 39.2 |        | 2 118 |
| 65P | 1998 02 08.75108 | 00 50 31.27 | -01 40 37.0 | 17.0 T | 2 118 |

## 69P/Taylor

|     |                  |             |             |        |     |
|-----|------------------|-------------|-------------|--------|-----|
| 69P | 1997 12 27.69236 | 08 30 48.81 | +20 23 28.8 |        | 372 |
| 69P | 1997 12 28.59792 | 08 30 41.09 | +20 40 34.6 | 15.5 T | 372 |
| 69P | 1997 12 28.60799 | 08 30 40.91 | +20 40 46.2 |        | 372 |
| 69P | 1998 01 01.59444 | 08 29 47.69 | +21 58 18.4 | 16.5 T | 372 |
| 69P | 1998 01 05.74410 | 08 28 22.54 | +23 21 52.2 |        | 372 |
| 69P | 1998 01 06.64479 | 08 28 00.98 | +23 40 16.7 | 15 T   | 372 |
| 69P | 1998 01 26.56458 | 08 16 36.20 | +30 16 46.9 | 16 T   | 372 |
| 69P | 1998 02 06.07843 | 08 10 35.69 | +33 06 59.0 |        | 118 |
| 69P | 1998 02 06.08392 | 08 10 35.54 | +33 07 03.7 | 13.2 T | 118 |
| 69P | 1998 02 07.08486 | 08 10 07.39 | +33 21 04.2 |        | 118 |
| 69P | 1998 02 07.09043 | 08 10 07.23 | +33 21 08.6 | 13.2 T | 118 |
| 69P | 1998 02 07.93943 | 08 09 44.78 | +33 32 44.5 |        | 118 |
| 69P | 1998 02 07.94462 | 08 09 44.63 | +33 32 48.8 |        | 118 |
| 69P | 1998 02 07.94679 | 08 09 44.56 | +33 32 50.6 | 13.0 T | 118 |
| 69P | 1998 02 08.51363 | 08 09 30.29 | +33 40 25.8 |        | 900 |
| 69P | 1998 02 08.52218 | 08 09 30.05 | +33 40 32.6 |        | 900 |
| 69P | 1998 02 10.51000 | 08 08 42.82 | +34 05 59.6 | 12.4 T | 403 |
| 69P | 1998 02 10.52241 | 08 08 42.54 | +34 06 08.8 | 12.4 T | 403 |
| 69P | 1998 02 15.57479 | 08 07 12.43 | +35 03 30.8 | 12.9 T | 403 |
| 69P | 1998 02 15.58998 | 08 07 12.20 | +35 03 40.6 | 12.9 T | 403 |
| 69P | 1998 02 15.81957 | 08 07 09.50 | +35 06 01.1 | 15.1 T | 610 |
| 69P | 1998 02 15.82361 | 08 07 09.44 | +35 06 03.5 |        | 610 |
| 69P | 1998 02 15.82682 | 08 07 09.39 | +35 06 05.3 |        | 610 |
| 69P | 1998 02 17.55167 | 08 06 50.14 | +35 23 08.4 | 13.1 T | 403 |
| 69P | 1998 02 17.55442 | 08 06 50.10 | +35 23 09.6 | 13.1 T | 403 |
| 69P | 1998 02 18.04147 | 08 06 45.35 | +35 27 42.8 |        | 118 |
| 69P | 1998 02 18.04722 | 08 06 45.33 | +35 27 46.0 | 12.3 T | 118 |
| 69P | 1998 02 18.62398 | 08 06 40.92 | +35 33 07.8 |        | 867 |
| 69P | 1998 02 18.63058 | 08 06 40.83 | +35 33 11.5 |        | 867 |

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|                      |                  |             |             |        |     |                           |                  |             |             |        |       |
|----------------------|------------------|-------------|-------------|--------|-----|---------------------------|------------------|-------------|-------------|--------|-------|
| 69P                  | 1998 02 18.78591 | 08 06 40.25 | +35 34 34.3 | 14.2 T | 610 | 78P                       | 1998 02 15.53608 | 06 16 27.38 | +14 40 51.5 | 14.4 T | 403   |
| 69P                  | 1998 02 18.79977 | 08 06 40.13 | +35 34 41.9 |        | 610 | 78P                       | 1998 02 17.53386 | 06 16 59.04 | +14 46 22.5 | 14.6 T | 403   |
| 69P                  | 1998 02 18.80613 | 08 06 40.07 | +35 34 45.4 |        | 610 | 78P                       | 1998 02 17.53736 | 06 16 59.04 | +14 46 23.7 | 14.5 T | 403   |
| 69P                  | 1998 02 20.07238 | 08 06 32.29 | +35 45 50.3 |        | 118 | 78P                       | 1998 02 18.19859 | 06 17 10.84 | +14 48 11.6 | 13.8 T | 758   |
| 69P                  | 1998 02 20.07723 | 08 06 32.28 | +35 45 52.6 | 12.4 T | 118 | 78P                       | 1998 02 18.20152 | 06 17 10.89 | +14 48 12.1 | 13.7 T | 758   |
| 69P                  | 1998 02 21.58108 | 08 06 28.36 | +35 58 20.2 | 12.2 T | 360 | 78P                       | 1998 02 18.20605 | 06 17 10.93 | +14 48 12.5 | 14.1 T | 758   |
| 69P                  | 1998 02 21.58455 | 08 06 28.34 | +35 58 21.7 |        | 360 | 78P                       | 1998 02 19.12400 | 06 17 28.76 | +14 50 45.7 | 14.5 T | 758   |
| 69P                  | 1998 02 21.96418 | 08 06 28.06 | +36 01 18.4 |        | 970 | 78P                       | 1998 02 19.12738 | 06 17 28.82 | +14 50 45.9 | 14.5 T | 758   |
| 69P                  | 1998 02 21.96465 | 08 06 28.08 | +36 01 17.4 |        | 970 | 78P                       | 1998 02 19.96759 | 06 17 45.79 | +14 53 00.1 |        | 118   |
| 69P                  | 1998 02 21.96704 | 08 06 28.04 | +36 01 19.0 |        | 970 | 78P                       | 1998 02 19.97308 | 06 17 45.88 | +14 53 00.9 |        | 118   |
| 69P                  | 1998 02 21.96751 | 08 06 28.06 | +36 01 19.9 |        | 970 | 78P                       | 1998 02 19.97566 | 06 17 45.92 | +14 53 01.4 | 13.2 T | 118   |
| 69P                  | 1998 02 21.96799 | 08 06 28.06 | +36 01 19.8 |        | 970 | 78P                       | 1998 02 21.11172 | 06 18 11.04 | +14 56 06.4 | 13.8 T | 758   |
| 69P                  | 1998 02 22.56955 | 08 06 28.22 | +36 05 59.5 | 12.2 T | 900 | 78P                       | 1998 02 22.09451 | 06 18 34.30 | +14 58 47.2 | 13.9 T | 758   |
| 69P                  | 1998 02 22.57688 | 08 06 28.20 | +36 06 02.5 |        | 900 | 78P                       | 1998 03 02.53073 | 06 22 49.17 | +15 20 27.1 | 13.7 T | 360   |
| 69P                  | 1998 02 25.76759 | 08 06 42.24 | +36 28 14.8 |        | 120 | 78P                       | 1998 03 02.53385 | 06 22 49.28 | +15 20 27.5 |        | 360   |
| 69P                  | 1998 02 25.76891 | 08 06 42.20 | +36 28 14.4 |        | 120 | <b>80P/Peters-Hartley</b> |                  |             |             |        |       |
| 69P                  | 1998 02 26.95573 | 08 06 52.44 | +36 35 31.8 |        | 107 | 80P                       | 1998 02 16.47211 | 09 39 29.04 | -35 55 11.4 | 20.4 T | 568   |
| 69P                  | 1998 02 26.96700 | 08 06 52.59 | +36 35 37.8 |        | 107 | 80P                       | 1998 02 16.49678 | 09 39 27.21 | -35 55 21.2 | 20.4 T | 568   |
| 69P                  | 1998 02 28.81436 | 08 07 15.43 | +36 46 00.9 | 14.3 T | 610 | 80P                       | 1998 02 17.51238 | 09 38 16.54 | -36 01 39.1 | 20.4 T | 568   |
| 69P                  | 1998 02 28.82610 | 08 07 15.58 | +36 46 04.4 |        | 610 | 80P                       | 1998 02 17.51238 | 09 38 16.54 | -36 01 39.1 | 20.4 T | 568   |
| 69P                  | 1998 02 28.83214 | 08 07 15.66 | +36 46 06.2 |        | 610 | 80P                       | 1998 02 17.53731 | 09 38 14.72 | -36 01 48.3 |        | 568   |
| 69P                  | 1998 02 28.84228 | 08 07 15.79 | +36 46 09.2 |        | 610 | 80P                       | 1998 02 18.57722 | 09 37 01.81 | -36 07 46.5 | 20.3 T | 568   |
| 69P                  | 1998 02 28.84865 | 08 07 15.87 | +36 46 11.1 |        | 610 | 80P                       | 1998 02 18.58197 | 09 37 01.43 | -36 07 47.9 | 20.5 T | 568   |
| 69P                  | 1998 03 02.52537 | 08 07 42.87 | +36 54 34.3 | 12.6 T | 403 | <b>88P/Howell</b>         |                  |             |             |        |       |
| 69P                  | 1998 03 02.52846 | 08 07 42.99 | +36 54 35.0 |        | 403 | 88P                       | 1998 02 23.52409 | 13 55 53.05 | -07 01 42.7 | 20.7 N | 691   |
| 69P                  | 1998 03 02.55521 | 08 07 43.34 | +36 54 43.9 | 12.5 T | 360 | 88P                       | 1998 02 23.52811 | 13 55 53.10 | -07 01 42.7 | 18.8 T | 691   |
| 69P                  | 1998 03 02.55799 | 08 07 43.38 | +36 54 44.6 |        | 360 | 88P                       | 1998 02 23.53252 | 13 55 53.15 | -07 01 42.7 | 18.8 T | 691   |
| 69P                  | 1998 03 03.49380 | 08 08 01.41 | +36 58 59.6 | 12.7 T | 402 | 88P                       | 1998 03 02.78090 | 13 57 02.24 | -07 01 40.8 | 17.8 T | 360   |
| 69P                  | 1998 03 03.49657 | 08 08 01.45 | +36 59 00.3 |        | 402 | 88P                       | 1998 03 02.78663 | 13 57 02.28 | -07 01 40.5 |        | 360   |
| 69P                  | 1998 03 03.49935 | 08 08 01.50 | +36 59 01.2 |        | 402 | <b>103P/Hartley 2</b>     |                  |             |             |        |       |
| <b>78P/Gehrels 2</b> |                  |             |             |        |     | 103P                      | 1998 01 03.45712 | 23 41 54.94 | -07 04 10.9 | 9 T    | 372   |
| 78P                  | 1997 10 18.21231 | 06 43 29.34 | +17 33 41.3 | 12.5 T | 861 | 103P                      | 1998 01 12.39496 | 00 28 17.21 | -05 28 13.7 | 9 T    | 372   |
| 78P                  | 1997 10 18.21888 | 06 43 29.74 | +17 33 39.4 | 12.4 T | 861 | 103P                      | 1998 01 12.42729 | 00 28 27.20 | -05 27 50.0 |        | 372   |
| 78P                  | 1997 10 18.22380 | 06 43 29.97 | +17 33 38.0 | 12.3 T | 861 | 103P                      | 1998 01 12.42941 | 00 28 27.89 | -05 27 47.9 | 9 T    | 372   |
| 78P                  | 1997 12 24.62500 | 06 39 12.22 | +13 08 55.2 | 14 T   | 372 | 103P                      | 1998 01 16.39722 | 00 49 13.43 | -04 38 34.1 | 8.7 T  | 372   |
| 78P                  | 1997 12 27.70451 | 06 36 34.43 | +13 07 53.9 | 15 T   | 372 | 103P                      | 1998 02 06.72216 | 02 36 46.86 | +00 20 59.3 |        | 5 118 |
| 78P                  | 1998 01 06.65312 | 06 28 25.30 | +13 12 08.5 |        | 372 | 103P                      | 1998 02 06.72630 | 02 36 48.06 | +00 21 02.9 | 11.8 T | 5 118 |
| 78P                  | 1998 01 19.50451 | 06 20 07.35 | +13 31 46.0 |        | 372 | 103P                      | 1998 02 07.78641 | 02 41 48.44 | +00 36 04.5 |        | 118   |
| 78P                  | 1998 02 05.93440 | 06 15 24.76 | +14 14 19.2 | 13.0 T | 118 | 103P                      | 1998 02 07.78815 | 02 41 48.93 | +00 36 06.3 |        | 118   |
| 78P                  | 1998 02 08.90297 | 06 15 27.90 | +14 22 27.4 |        | 118 | 103P                      | 1998 02 07.78987 | 02 41 49.41 | +00 36 07.7 | 12.0 T | 118   |
| 78P                  | 1998 02 08.90876 | 06 15 27.89 | +14 22 28.2 |        | 118 | 103P                      | 1998 02 08.46182 | 02 44 58.62 | +00 45 37.9 |        | 900   |
| 78P                  | 1998 02 08.91153 | 06 15 27.91 | +14 22 28.7 | 13.0 T | 118 | 103P                      | 1998 02 08.46932 | 02 45 00.67 | +00 45 43.7 |        | 900   |
| 78P                  | 1998 02 10.83086 | 06 15 37.84 | +14 27 47.4 | 14.5 T | 118 | 103P                      | 1998 02 13.79193 | 03 09 22.65 | +01 58 58.6 |        | 470   |
| 78P                  | 1998 02 10.83771 | 06 15 37.92 | +14 27 48.4 |        | 118 | 103P                      | 1998 02 13.79880 | 03 09 24.31 | +01 59 04.0 |        | 470   |
| 78P                  | 1998 02 12.99383 | 06 15 56.27 | +14 33 53.5 | 14.2 T | 844 | 103P                      | 1998 02 17.44151 | 03 25 26.03 | +02 47 06.5 | 15.9 N | 422   |
| 78P                  | 1998 02 13.00691 | 06 15 56.40 | +14 33 56.7 | 14.2 T | 844 | 103P                      | 1998 02 17.44240 | 03 25 26.22 | +02 47 06.1 | 16.1 N | 422   |
| 78P                  | 1998 02 13.02220 | 06 15 56.51 | +14 33 58.8 |        | 844 | 103P                      | 1998 02 17.44330 | 03 25 26.46 | +02 47 07.9 | 16.4 N | 422   |
| 78P                  | 1998 02 13.03307 | 06 15 56.57 | +14 33 59.5 |        | 844 | 103P                      | 1998 02 17.44482 | 03 25 26.86 | +02 47 08.3 | 16.0 N | 422   |
| 78P                  | 1998 02 14.79657 | 06 16 17.43 | +14 38 48.0 | 13.4 T | 504 | 103P                      | 1998 02 17.44704 | 03 25 27.45 | +02 47 10.3 | 16.0 N | 422   |
| 78P                  | 1998 02 14.80047 | 06 16 17.49 | +14 38 48.6 | 13.4 T | 504 | 103P                      | 1998 02 17.44822 | 03 25 27.74 | +02 47 10.4 | 15.9 N | 422   |
| 78P                  | 1998 02 14.81157 | 06 16 17.64 | +14 38 50.8 | 13.4 T | 504 | 103P                      | 1998 02 18.80322 | 03 31 17.41 | +03 04 15.2 |        | 470   |
| 78P                  | 1998 02 15.52963 | 06 16 27.33 | +14 40 50.5 | 14.5 T | 403 | 103P                      | 1998 02 18.80666 | 03 31 18.25 | +03 04 17.5 |        | 470   |

|      |                  |             |             |        |     |
|------|------------------|-------------|-------------|--------|-----|
| 103P | 1998 02 19.78920 | 03 35 29.00 | +03 16 36.7 | 12.4 T | 504 |
| 103P | 1998 02 19.79032 | 03 35 29.28 | +03 16 37.1 |        | 504 |
| 103P | 1998 02 19.79225 | 03 35 29.80 | +03 16 38.6 |        | 504 |
| 103P | 1998 02 19.79271 | 03 35 29.91 | +03 16 39.3 |        | 504 |
| 103P | 1998 02 20.81862 | 03 39 49.11 | +03 29 18.1 |        | 118 |
| 103P | 1998 02 20.82043 | 03 39 49.56 | +03 29 19.4 |        | 118 |
| 103P | 1998 02 20.82232 | 03 39 50.05 | +03 29 20.9 | 11.9 T | 118 |
| 103P | 1998 02 22.00282 | 03 44 45.53 | +03 43 43.3 | 13.5 N | 758 |
| 103P | 1998 02 22.01096 | 03 44 47.61 | +03 43 45.9 | 13.3 N | 758 |
| 103P | 1998 02 22.44944 | 03 46 36.07 | +03 49 02.6 | 11.7 T | 900 |
| 103P | 1998 02 22.45806 | 03 46 38.17 | +03 49 08.6 |        | 900 |
| 103P | 1998 02 22.76762 | 03 47 54.87 | +03 52 46.0 |        | 970 |
| 103P | 1998 02 22.78068 | 03 47 58.11 | +03 52 56.7 |        | 970 |
| 103P | 1998 02 22.79733 | 03 48 02.13 | +03 53 09.8 |        | 970 |
| 103P | 1998 02 28.75810 | 04 11 52.19 | +05 00 19.9 |        | 107 |
| 103P | 1998 02 28.77531 | 04 11 56.17 | +05 00 31.1 |        | 107 |
| 103P | 1998 03 01.79896 | 04 15 53.00 | +05 11 15.8 |        | 107 |
| 103P | 1998 03 01.82233 | 04 15 58.39 | +05 11 30.5 |        | 107 |
| 103P | 1998 03 04.02441 | 04 24 20.78 | +05 33 58.1 | 14.1 T | 758 |
| 103P | 1998 03 04.03740 | 04 24 23.72 | +05 34 05.1 | 14.1 T | 758 |
| 103P | 1998 03 09.79130 | 04 45 26.05 | +06 27 30.6 |        | 046 |
| 103P | 1998 03 09.79395 | 04 45 26.67 | +06 27 31.9 |        | 046 |
| 103P | 1998 03 09.79631 | 04 45 27.15 | +06 27 33.0 |        | 046 |

**104P/Kowal 2**

|      |                  |             |             |        |     |
|------|------------------|-------------|-------------|--------|-----|
| 104P | 1998 02 20.75876 | 02 03 45.35 | +11 21 08.2 |        | 118 |
| 104P | 1998 02 20.76568 | 02 03 46.70 | +11 21 10.7 | 13.9 T | 118 |
| 104P | 1998 02 27.75389 | 02 26 36.77 | +12 03 39.2 | 15.0 T | 118 |
| 104P | 1998 02 27.75743 | 02 26 37.53 | +12 03 39.8 |        | 118 |
| 104P | 1998 03 02.42865 | 02 35 28.35 | +12 19 06.1 | 14.0 T | 360 |
| 104P | 1998 03 02.43212 | 02 35 29.00 | +12 19 07.0 |        | 360 |
| 104P | 1998 03 09.75677 | 03 00 01.37 | +12 58 09.8 |        | 046 |
| 104P | 1998 03 09.75815 | 03 00 01.61 | +12 58 10.0 |        | 046 |
| 104P | 1998 03 09.75931 | 03 00 01.86 | +12 58 09.4 |        | 046 |

**111P/Helin-Roman-Crockett**

|      |                  |             |             |        |     |
|------|------------------|-------------|-------------|--------|-----|
| 111P | 1998 02 25.09222 | 12 13 23.69 | +04 34 35.1 |        | 954 |
| 111P | 1998 02 25.09390 | 12 13 23.64 | +04 34 35.4 |        | 954 |
| 111P | 1998 02 25.09561 | 12 13 23.59 | +04 34 35.9 |        | 954 |
| 111P | 1998 02 25.09730 | 12 13 23.54 | +04 34 36.3 |        | 954 |
| 111P | 1998 02 25.09899 | 12 13 23.49 | +04 34 36.7 |        | 954 |
| 111P | 1998 02 25.10069 | 12 13 23.44 | +04 34 37.0 |        | 954 |
| 111P | 1998 02 25.10238 | 12 13 23.39 | +04 34 37.5 |        | 954 |
| 111P | 1998 02 25.10409 | 12 13 23.35 | +04 34 37.9 |        | 954 |
| 111P | 1998 02 25.10578 | 12 13 23.30 | +04 34 38.3 |        | 954 |
| 111P | 1998 02 25.10747 | 12 13 23.25 | +04 34 38.7 |        | 954 |
| 111P | 1998 02 25.10917 | 12 13 23.20 | +04 34 39.1 |        | 954 |
| 111P | 1998 02 25.11086 | 12 13 23.15 | +04 34 39.5 |        | 954 |
| 111P | 1998 02 28.48613 | 12 11 42.35 | +04 48 22.0 | 20.8 T | 691 |
| 111P | 1998 02 28.49074 | 12 11 42.22 | +04 48 23.6 | 20.5 T | 691 |
| 111P | 1998 02 28.49532 | 12 11 42.08 | +04 48 24.3 | 20.8 T | 691 |

**118P/Shoemaker-Levy 4**

|      |                  |             |             |        |     |
|------|------------------|-------------|-------------|--------|-----|
| 118P | 1998 02 26.52125 | 14 41 27.84 | -07 07 00.5 | 22.7 N | 691 |
| 118P | 1998 02 26.52545 | 14 41 27.82 | -07 06 59.4 | 20.4 T | 691 |
| 118P | 1998 02 26.52926 | 14 41 27.85 | -07 06 58.9 | 20.3 T | 691 |
| 118P | 1998 02 26.53349 | 14 41 27.80 | -07 06 59.0 | 22.7 N | 691 |
| 118P | 1998 02 26.53743 | 14 41 27.72 | -07 06 56.3 | 20.6 T | 691 |
| 118P | 1998 02 26.54138 | 14 41 27.82 | -07 06 56.4 | 20.6 T | 691 |
| 118P | 1998 03 02.83234 | 14 41 21.58 | -06 52 21.5 | 19.4 T | 867 |
| 118P | 1998 03 02.84241 | 14 41 21.53 | -06 52 19.1 |        | 867 |

**119P/Parker-Hartley**

|      |                  |             |             |        |       |
|------|------------------|-------------|-------------|--------|-------|
| 119P | 1998 02 07.13688 | 11 21 35.83 | -02 51 26.9 |        | 118   |
| 119P | 1998 02 07.14006 | 11 21 35.74 | -02 51 26.3 | 18.7 T | 118   |
| 119P | 1998 02 18.08448 | 11 16 09.88 | -02 24 32.6 |        | 2 118 |
| 119P | 1998 02 18.08917 | 11 16 09.73 | -02 24 31.6 |        | 2 118 |
| 119P | 1998 02 18.09166 | 11 16 09.63 | -02 24 31.0 | 18.7 T | 2 118 |
| 119P | 1998 03 01.21220 | 11 09 44.46 | -01 46 55.2 | 19.1 T | 688   |
| 119P | 1998 03 01.23178 | 11 09 43.84 | -01 46 51.5 |        | 688   |

**128P/Shoemaker-Holt 1**

|        |                  |             |             |        |       |
|--------|------------------|-------------|-------------|--------|-------|
| 128P-B | 1997 12 28.56215 | 04 03 45.19 | +16 55 04.0 |        | 372   |
| 128P-B | 1998 01 01.54549 | 04 02 33.46 | +16 50 55.1 | 17.5 T | 372   |
| 128P-B | 1998 02 06.92999 | 04 07 52.84 | +17 12 16.0 |        | 2 118 |
| 128P-B | 1998 02 06.94316 | 04 07 53.26 | +17 12 17.3 | 17.0 T | 2 118 |
| 128P-B | 1998 02 13.47268 | 04 11 47.77 | +17 25 12.6 | 16.8 T | 402   |
| 128P-B | 1998 02 13.47546 | 04 11 47.91 | +17 25 12.3 |        | 402   |
| 128P-B | 1998 02 13.47824 | 04 11 48.01 | +17 25 13.6 |        | 402   |
| 128P-B | 1998 02 14.85193 | 04 12 43.37 | +17 28 08.4 | 16.0 T | 504   |
| 128P-B | 1998 02 14.85678 | 04 12 43.58 | +17 28 09.4 | 15.9 T | 504   |
| 128P-B | 1998 02 20.87499 | 04 17 09.16 | +17 41 47.4 |        | 118   |
| 128P-B | 1998 02 20.87971 | 04 17 09.37 | +17 41 48.2 |        | 118   |
| 128P-B | 1998 02 20.88248 | 04 17 09.47 | +17 41 48.3 | 16.1 T | 118   |
| 128P-B | 1998 02 22.01512 | 04 18 03.57 | +17 44 30.9 | 15.8 T | 758   |
| 128P-B | 1998 02 22.09770 | 04 18 07.64 | +17 44 42.0 | 16.6 T | 758   |
| 128P-B | 1998 03 02.49028 | 04 25 26.59 | +18 05 23.7 | 16.5 T | 360   |
| 128P-B | 1998 03 02.49479 | 04 25 26.81 | +18 05 24.5 |        | 360   |

**129P/Shoemaker-Levy 3**

|      |                  |             |             |        |     |
|------|------------------|-------------|-------------|--------|-----|
| 129P | 1997 12 24.67118 | 07 57 49.73 | +22 37 33.6 | 17 T   | 372 |
| 129P | 1998 02 05.97859 | 07 25 10.56 | +22 37 53.2 |        | 118 |
| 129P | 1998 02 05.98149 | 07 25 10.45 | +22 37 53.1 |        | 118 |
| 129P | 1998 02 05.98457 | 07 25 10.36 | +22 37 53.0 | 16.1 T | 118 |
| 129P | 1998 02 06.98380 | 07 24 36.24 | +22 37 06.1 |        | 118 |
| 129P | 1998 02 06.98657 | 07 24 36.15 | +22 37 05.9 |        | 118 |
| 129P | 1998 02 06.99233 | 07 24 35.96 | +22 37 05.3 | 15.5 T | 118 |
| 129P | 1998 02 10.90553 | 07 22 35.19 | +22 33 38.3 | 15.8 T | 118 |
| 129P | 1998 02 10.95541 | 07 22 33.73 | +22 33 35.1 |        | 118 |
| 129P | 1998 02 10.96858 | 07 22 33.35 | +22 33 34.9 |        | 118 |
| 129P | 1998 02 11.97953 | 07 22 05.66 | +22 32 34.9 |        | 118 |
| 129P | 1998 02 11.98782 | 07 22 05.40 | +22 32 33.9 | 16.2 T | 118 |
| 129P | 1998 02 11.99216 | 07 22 05.26 | +22 32 33.3 |        | 118 |
| 129P | 1998 02 13.50612 | 07 21 26.73 | +22 31 00.9 | 16.0 T | 402 |
| 129P | 1998 02 13.50890 | 07 21 26.72 | +22 31 00.1 |        | 402 |
| 129P | 1998 02 13.51168 | 07 21 26.64 | +22 31 00.0 |        | 402 |

|      |                  |             |             |        |     |
|------|------------------|-------------|-------------|--------|-----|
| 129P | 1998 02 15.54436 | 07 20 39.91 | +22 28 44.7 | 16.5 T | 403 |
| 129P | 1998 02 15.55775 | 07 20 39.58 | +22 28 44.0 | 16.5 T | 403 |
| 129P | 1998 02 17.99955 | 07 19 51.67 | +22 25 47.1 |        | 118 |
| 129P | 1998 02 18.00686 | 07 19 51.53 | +22 25 46.4 |        | 118 |
| 129P | 1998 02 18.01208 | 07 19 51.43 | +22 25 46.0 | 15.9 T | 118 |
| 129P | 1998 02 18.60940 | 07 19 41.19 | +22 25 02.5 | 16.1 T | 867 |
| 129P | 1998 02 18.61565 | 07 19 41.07 | +22 25 02.1 |        | 867 |
| 129P | 1998 02 19.84532 | 07 19 21.83 | +22 23 26.3 | 15.9 T | 504 |
| 129P | 1998 02 19.84911 | 07 19 21.74 | +22 23 25.9 | 16.3 T | 504 |
| 129P | 1998 02 19.85135 | 07 19 21.73 | +22 23 25.7 | 16.1 T | 504 |
| 129P | 1998 02 20.03650 | 07 19 18.79 | +22 23 10.6 |        | 118 |
| 129P | 1998 02 20.04005 | 07 19 18.75 | +22 23 10.1 |        | 118 |
| 129P | 1998 02 20.04348 | 07 19 18.68 | +22 23 10.0 | 15.7 T | 118 |
| 129P | 1998 02 21.57049 | 07 18 58.42 | +22 21 08.1 | 16.3 T | 360 |
| 129P | 1998 02 21.57569 | 07 18 58.38 | +22 21 07.9 |        | 360 |
| 129P | 1998 02 22.53723 | 07 18 47.54 | +22 19 47.7 | 16.1 T | 900 |
| 129P | 1998 02 22.55340 | 07 18 47.37 | +22 19 46.7 |        | 900 |
| 129P | 1998 03 02.53924 | 07 18 14.20 | +22 07 25.5 | 16.3 T | 360 |
| 129P | 1998 03 02.54427 | 07 18 14.21 | +22 07 25.0 |        | 360 |

**132P/Helin-Roman-Alu 2**

|      |                  |             |             |        |       |
|------|------------------|-------------|-------------|--------|-------|
| 132P | 1998 02 20.83591 | 03 39 59.08 | +13 13 53.7 |        | 2 118 |
| 132P | 1998 02 20.84179 | 03 39 59.69 | +13 13 56.2 | 17.3 T | 2 118 |
| 132P | 1998 03 02.45764 | 03 57 29.03 | +14 27 36.4 | 17.9 T | 360   |
| 132P | 1998 03 02.46215 | 03 57 29.55 | +14 27 38.7 |        | 360   |
| 132P | 1998 03 09.78066 | 04 11 12.23 | +15 19 10.2 |        | 6 046 |
| 132P | 1998 03 09.78889 | 04 11 13.25 | +15 19 14.2 |        | 6 046 |

**134P/Kowal-Vávrová**

|      |                  |             |             |        |     |
|------|------------------|-------------|-------------|--------|-----|
| 134P | 1998 02 18.63857 | 10 18 15.41 | +05 32 53.6 | 18.8 T | 867 |
| 134P | 1998 02 18.64551 | 10 18 15.14 | +05 32 55.6 |        | 867 |
| 134P | 1998 02 21.67691 | 10 16 22.66 | +05 45 17.2 | 19.3 T | 360 |
| 134P | 1998 02 21.69618 | 10 16 21.90 | +05 45 20.9 |        | 360 |
| 134P | 1998 02 21.70191 | 10 16 21.72 | +05 45 22.9 |        | 360 |
| 134P | 1998 02 24.32198 | 10 14 43.38 | +05 56 26.0 | 21.6 N | 691 |
| 134P | 1998 02 24.32628 | 10 14 43.20 | +05 56 27.3 | 18.8 T | 691 |
| 134P | 1998 02 24.33005 | 10 14 43.05 | +05 56 28.1 | 19.3 T | 691 |

Note 1: bad seeing. 2: measurement difficult. 3: involved with star. 4: faint image.

5: poor configuration of reference stars. 6: poor sky.

**OBSERVATIONS OF MINOR PLANETS**

The summary lists, for each observatory code, the designation of each object observed (an asterisk signifying a new discovery), with three numbers indicating the number of observations, the number of different nights on which the object was observed and the arc (in days) covered by the observations; at the end of each observatory listing there is a count of the total number of observations, of the number of objects and of the number of discoveries followed by an asterisk, together with the total range of dates covered by the observations.

**012 Uccle**

T. Pauwels, Koninklijke Sterrenwacht van België, Ringlaan 3, B-1180 Brussels, Belgium [Thierry.Pauwels@oma.be]  
Observers E. Elst, T. Pauwels

Measurer T. Pauwels

0.85-m  $f/2.5$  Schmidt + CCD

GSC 1.2

1987 BS<sub>2</sub>, 6, 2, 6; 1989 RF, 6, 2, 1; 1989 SJ<sub>5</sub>, 3, 1, 0; 1994 CC<sub>18</sub>, 6, 2, 17; 1996 XG<sub>9</sub>, 3, 1, 0; 1997 YQ<sub>11</sub>, 3, 1, 0; 1998 BB<sub>2</sub>, 6, 2, 14; 1998 BJ<sub>9</sub>, 6, 2, 1; 1998 BH<sub>36</sub>, 3, 1, 0; 1998 BY<sub>45</sub>, 3, 1, 0; (1210), 3, 1, 0; [48, 11, 0\*, 1998/01/27–1998/02/24]

**033 Tautenburg**

F. Börngen, Thüringer Landessternwarte, Sternwarte 5, D-07778 Tautenburg, Germany [boerg@tls.tautenburg.de]

1.3-m Schmidt telescope

PPM

1986 QO<sub>4</sub>, 2, 1, 0; 1994 BQ<sub>5</sub> \*, 3, 2, 1; 1994 BR<sub>5</sub> \*, 3, 2, 1; (355), 3, 2, 1; (4427), 3, 2, 1; (5816), 3, 2, 1; (7027), 3, 2, 1; (7166), 3, 2, 1; (7258), 3, 2, 1; (7500), 3, 2, 1; [29, 10, 2\*, 1994/01/17–1995/03/24]

**046 Kleť**

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Observers J. Tichá, M. Tichý, Z. Moravec

Measurer M. Tichý

0.57-m  $f/5.2$  reflector + CCD

GSC, USNO-SA1.0

1984 SK<sub>1</sub>, 3, 1, 0; 1995 EO, 6, 2, 2; 1995 KH, 6, 2, 2; 1996 HW<sub>1</sub>, 6, 2, 1; 1996 TL<sub>9</sub>, 6, 2, 8; 1996 TM<sub>9</sub>, 6, 2, 7; 1996 TR<sub>9</sub>, 3, 1, 0; 1996 VP, 6, 2, 2; 1996 VR<sub>1</sub>, 7, 2, 2; 1996 XJ<sub>2</sub>, 7, 2, 7; 1997 AX<sub>14</sub>, 6, 2, 7; 1997 ET<sub>1</sub>, 6, 2, 7; 1997 UF<sub>9</sub>, 3, 1, 0; 1997 YO<sub>21</sub>, 11, 2, 2; 1998 AK<sub>8</sub>, 7, 2, 3; 1998 AL<sub>8</sub>, 23, 9, 26; 1998 AA<sub>10</sub>, 15, 6, 20; 1998 BE<sub>7</sub>, 6, 2, 8; 1998 BX<sub>7</sub>, 4, 1, 0; 1998 BY<sub>7</sub>, 5, 1, 0; 1998 BZ<sub>7</sub>, 6, 2, 8; 1998 BG<sub>9</sub>, 6, 2, 8; 1998 BN<sub>10</sub>, 20, 7, 28; 1998 BP<sub>10</sub>, 21, 7, 30; 1998 BL<sub>11</sub>, 3, 1, 0; 1998 BQ<sub>25</sub>, 20, 7, 27; 1998 BR<sub>25</sub>, 21, 7, 27; 1998 BT<sub>25</sub>, 17, 6, 27; 1998 BO<sub>26</sub>, 3, 1, 0; 1998 BP<sub>26</sub>, 6, 2, 8; 1998 BU<sub>26</sub>, 20, 7, 26; 1998 BL<sub>30</sub>, 26, 9, 25; 1998 BM<sub>30</sub>, 20, 7, 25; 1998 BZ<sub>33</sub>, 18, 6, 24; 1998 CE, 14, 4, 15; 1998 CF, 15, 5, 15; 1998 CG, 19, 6, 15; 1998 CH, 15, 5, 14; 1998 CJ, 21, 7, 29; 1998 CK, 8, 3, 14; 1998 CM, 12, 4, 13; 1998 CN, 16, 5, 28; 1998 CO, 16, 5, 28; 1998 CP, 12, 4, 15; 1998 CR, 15, 5, 28; 1998 CU, 6, 2, 4; 1998 CV, 9, 3, 12; 1998 CW, 9, 3, 14; 1998 CX, 6, 2, 12; 1998 CY, 12, 4, 27; 1998 CB<sub>1</sub>, 6, 2, 2; 1998 CK<sub>1</sub>, 19, 6, 25; 1998 CP<sub>1</sub>, 9, 3, 18; 1998 CS<sub>1</sub>, 19, 4, 10; 1998 DP \*, 8, 2, 1; 1998 DQ \*, 7, 2, 1; 1998 DR \*, 8, 2, 1; 1998 DV \*, 18, 4, 8; 1998 DW \*, 8, 2, 2; 1998 DY \*, 12, 4, 8; 1998 DZ \*, 15, 4, 8; 1998 DA<sub>1</sub> \*, 16, 4, 8; 1998 DB<sub>1</sub> \*, 11, 3, 3; 1998 DD<sub>1</sub> \*, 14, 4, 8; 1998 DE<sub>1</sub> \*, 13, 4, 8; 1998 DF<sub>1</sub> \*, 13, 4, 8; 1998 DG<sub>1</sub> \*, 15, 4, 8; 1998 DH<sub>1</sub> \*, 18, 4, 8; 1998 DQ<sub>1</sub> \*, 15, 4, 6; 1998 DR<sub>1</sub> \*, 13, 4, 6; 1998 DS<sub>1</sub> \*, 9, 3, 6; 1998 DT<sub>1</sub> \*, 14, 3, 3; 1998 DU<sub>1</sub> \*, 13, 3, 6; 1998 DD<sub>3</sub> \*, 11, 2, 2; 1998 DQ<sub>3</sub>, 4, 1, 0; 1998 DV<sub>9</sub>, 2, 1, 0; 1998 DF<sub>11</sub>, 4, 1, 0; 1998 DK<sub>11</sub> \*, 9, 2, 3; 1998 DW<sub>12</sub> \*, 8, 2, 1; 1998 DM<sub>20</sub>, 4, 1, 0; 1998 EC<sub>3</sub>, 9, 2, 4; 4545 P-L, 3, 1, 0; (237), 6, 2, 7; (887), 4, 1, 0; (1620), 1, 1, 0; (1773), 6, 2, 5; (3863), 3, 1, 0; (5094), 3, 1, 0; [924, 88, 22\*, 1998/01/15–1998/03/06]

**098 Asiago Observatory, Cima Ekar**

U. Munari, Osservatorio Astronomico di Padova, Sede di Asiago, I-36012 Asiago (VI), Italy [munari@astras.pd.astro.it]

Observers U. Munari, A. Boattini, M. Tombelli

Measurers A. Boattini, M. Tombelli, G. Forti

0.67-m  $f/3.2$  Schmidt

1981 ET<sub>10</sub>, 2, 1, 0; 1991 GH<sub>10</sub>, 2, 1, 0; 1991 VX<sub>5</sub>, 6, 3, 7; 1992 UL<sub>6</sub>, 10, 5, 33; 1994 BA<sub>1</sub>, 2, 1, 0; 1996 TN<sub>10</sub>, 2, 1, 0; 1998 BK, 8, 4, 8; 1998 BU<sub>1</sub>, 2, 1, 0; 1998 BA<sub>19</sub>, 4, 2, 1; 1998 BW<sub>24</sub>, 2, 1, 0; 1998 BW<sub>43</sub> \*, 6, 3, 7; 1998 BX<sub>43</sub> \*, 6, 3, 2; 1998 BY<sub>43</sub> \*, 10, 5, 8; 1998 BZ<sub>43</sub> \*, 4, 2, 1; 1998 BA<sub>44</sub> \*, 8, 4, 8; 1998 BB<sub>44</sub> \*, 15, 7, 34; 1998 BC<sub>44</sub> \*, 8, 4, 33; 1998 BD<sub>44</sub> \*, 14, 7, 34; 1998 BE<sub>44</sub> \*, 12, 6, 33; 1998 BF<sub>44</sub> \*, 6, 3, 7; 1998 BG<sub>44</sub> \*, 10, 5, 33; 1998 DW<sub>32</sub> \*, 4, 2, 1; 1998 DX<sub>32</sub> \*, 4, 2, 1; 1998 DY<sub>32</sub> \*, 4, 2, 1; (134), 6, 3, 7; (2127), 4, 2, 1; (3252), 2, 1, 0; (4735), 6, 3, 32; (5155), 4, 2, 1; (5214), 6, 3, 32; (5420), 4, 2, 31; [183, 31, 14\*, 1998/01/24–1998/02/27]

**104 San Marcello Pistoiese**

L. Tesi, Osservatorio di Pian dei Termini, Viale Panoramico 45, I-51028 San Marcello Pistoiese (PT), Italy [iau@arcetri.astro.it]

Observers L. Tesi, A. Boattini, A. Caronia, G. Forti

Measurers A. Boattini, G. Forti, L. Tesi

0.40-m  $f/5$  reflector + CCD

GSC

1995 OG, 9, 3, 18; 1995 PC, 6, 2, 1; 1996 OJ<sub>2</sub>, 3, 1, 0; 1996 RD<sub>4</sub>, 3, 1, 0; 1996 UL<sub>1</sub>, 3, 1, 0; 1996 VU<sub>2</sub>, 3, 1, 0; 1997 UK<sub>5</sub>, 3, 1, 0; 1998 AN<sub>11</sub> \*, 3, 1, 0; 1998 BA<sub>4</sub>, 3, 1, 0; 1998 BP<sub>24</sub>, 13, 4, 17; 1998 CS<sub>1</sub>, 13, 3, 7; 1998 CD<sub>2</sub> \*, 21, 6, 17; 1998 CE<sub>2</sub> \*, 20, 6, 13; 1998 CF<sub>2</sub> \*, 19, 6, 20; 1998 CT<sub>2</sub> \*, 15, 5, 16; 1998 DQ<sub>3</sub>, 6, 1, 0; 1998 DF<sub>11</sub>, 4, 1, 0; 1998 DM<sub>23</sub> \*, 11, 4, 7; 1998 EC<sub>3</sub>, 4, 1, 0; 1998 EY<sub>6</sub> \*, 6, 2, 3; [168, 20, 7\*, 1998/01/01–1998/03/05]

### 106 Crni vrh

H. Mikuž, Kersnikova 11, SI-61000 Ljubljana, Slovenia [herman.mikuz@uni-lj.si]

Observers H. Mikuž, B. Dintinjana, J. Skvarc

0.36-m  $f/6.7$  Schmidt-Cassegrain + CCD

USNO SA-1

1998 BZ<sub>7</sub>, 5, 1, 0; 1998 DS<sub>10</sub>, 7, 2, 4; 1998 DF<sub>11</sub>, 7, 2, 4; 1998 EC<sub>3</sub>, 3, 1, 0; [22, 4, 0\*, 1998/02/18–1998/03/02]

### 108 Montelupo

M. Tombelli, Via Bozzeto 26, I-50056 Montelupo (Fi), Italy

[iau@arcetri.astro.it]

Observers M. Tombelli, A. Boattini, G. Forti

0.30-m  $f/5.7$  Schmidt-Cassegrain + CCD

GSC

1994 BM, 6, 2, 7; 1996 XN<sub>26</sub>, 6, 2, 10; 1998 BU<sub>43</sub>, 4, 1, 0; 1998 BW<sub>43</sub>, 3, 1, 0; 1998 BC<sub>44</sub>, 3, 1, 0; 1998 BD<sub>44</sub>, 3, 1, 0; 1998 BE<sub>44</sub>, 3, 1, 0; 1998 BF<sub>44</sub>, 5, 1, 0; (7197), 2, 1, 0; (7198), 1, 1, 0; [36, 10, 0\*, 1998/02/17–1998/02/27]

### 113 Volkssternwarte Drebach, Schönbrunn

G. Lehmann, Volkssternwarte Drebach, D-09430 Drebach, Germany

[lehmann@stw-drebach.zp.sn.schule.de]

Observers J. Kandler, G. Lehmann

0.18-m  $f/9$  refractor + CCD, 0.50-m  $f/4$  reflector + CCD

GSC, USNO-SA1.0

1988 VS<sub>6</sub>, 3, 1, 0; 1989 CE<sub>6</sub>, 8, 3, 3; 1990 TK<sub>13</sub>, 6, 2, 2; 1991 GH<sub>10</sub>, 13, 5, 13; 1991 GM<sub>10</sub>, 8, 3, 3; 1991 TQ<sub>6</sub>, 5, 2, 2; 1992 FO<sub>3</sub>, 10, 4, 5; 1992 SO<sub>24</sub>, 11, 3, 3; 1992 SK<sub>26</sub>, 2, 1, 0; 1994 GY<sub>9</sub>, 2, 1, 0; 1997 CU<sub>26</sub>, 5, 2, 2; 1998 BZ<sub>7</sub>, 20, 2, 5; 1998 BF<sub>14</sub>, 11, 4, 5; 1998 CA, 15, 5, 13; 1998 CC<sub>2</sub>, 7, 3, 3; 1998 DL<sub>1</sub> \*, 15, 4, 5; 1998 DB<sub>2</sub> \*, 4, 2, 1; (4585), 2, 1, 0; (5532), 3, 1, 0; (6421), 2, 1, 0; (7582), 6, 2, 1; (8284), 6, 2, 8; [164, 22, 2\*, 1998/02/10–1998/02/23]

### 118 Modra

A. Galád, AGO MFF UK, P.O. Box 4, SK-90001 Modra, Slovakia

[ago.modra@center.fmph.uniba.sk]

Observers P. Kolény, L. Kornoš, A. Galád, A. Pravda

0.6-m  $f/5.5$  reflector + CCD

GSC

1991 VH, 2, 1, 0; 1992 AB, 2, 1, 0; 1994 CN<sub>2</sub>, 2, 1, 0; 1996 DH, 2, 1, 0; 1996 FG<sub>3</sub>, 2, 1, 0; 1996 PK, 4, 2, 4; 1996 UA<sub>3</sub>, 8, 3, 7; 1996 YG<sub>1</sub>, 2, 1, 0; 1997 CT<sub>1</sub>, 2, 1, 0; 1997 CU<sub>26</sub>, 2, 1, 0; 1997 QA, 2, 1, 0; 1997 WT<sub>22</sub>, 2, 1, 0; 1998 AS<sub>1</sub>, 9, 3, 13; 1998 AW<sub>4</sub>, 2, 1, 0; 1998 AP<sub>7</sub>, 2, 1, 0; 1998 AQ<sub>7</sub>, 3, 1, 0; 1998 AV<sub>8</sub>, 2, 1, 0; 1998 BG, 27, 12, 37; 1998 BH, 25, 10, 33; 1998 BM<sub>4</sub>, 3, 1, 0; 1998 BE<sub>7</sub>, 7, 3, 19; 1998 BX<sub>7</sub>, 3, 1, 0; 1998 BZ<sub>7</sub>, 5, 2, 2; 1998 BG<sub>9</sub>, 2, 1, 0; 1998 BV<sub>14</sub>, 3, 1, 0; 1998 BW<sub>14</sub>, 2, 1, 0; 1998 BP<sub>26</sub>, 2, 1, 0; 1998 BS<sub>26</sub>, 10, 4, 6; 1998 BT<sub>26</sub>, 22, 9, 29; 1998 BV<sub>41</sub>, 8, 3, 7; 1998 CB, 12, 5, 22; 1998 CC, 12, 5, 22; 1998 CQ, 16, 7, 22; 1998 CT, 5, 2, 11; 1998 CL<sub>1</sub>, 9, 4, 11; 1998 CH<sub>2</sub> \*, 14, 5, 15; 1998 DG \*, 17, 6, 6; 1998 DH \*, 20, 7, 6; 1998 DJ \*, 13, 5, 4; 1998 DK \*, 13, 5, 4; 1998 DL \*, 20, 7, 8; 1998 DS \*, 20, 7, 9; 1998 DC<sub>1</sub> \*, 14, 5, 4; 1998 DO<sub>1</sub> \*, 18, 6, 7; 1998 DC<sub>2</sub> \*, 17, 6, 8; 1998 DD<sub>2</sub> \*, 12, 4, 6; 1998 DR<sub>9</sub> \*, 12, 4, 5; 1998 DT<sub>23</sub> \*, 5, 2, 2; 1998 DU<sub>23</sub> \*, 6, 2, 2; (887), 2, 1, 0; (1545), 3, 1, 0; (1980), 4, 2, 13; (3688), 2, 1, 0; (4183), 2, 1, 0; (5622), 2, 1, 0; (5870), 2, 1, 0; (6500), 2, 1, 0; (7304), 4, 2, 17; (7889), 2, 1, 0; [449, 59, 14\*, 1998/01/23–1998/03/01]

### 120 Višňjan

K. Korlević, Istarska 5, HR-51463 Višňjan, Croatia [kkorlevic@x400.srce.hr]

Observers K. Korlević, V. Jelic, I. Turcin, A. Vukorepa

Measurer V. Jelic

0.41-m  $f/4.3$  reflector + CCD

GSC

1998 DQ<sub>3</sub>, 6, 1, 0; 1998 DS<sub>10</sub>, 3, 1, 0; 1998 DF<sub>11</sub>, 6, 1, 0; (1521), 4, 1, 0; (1951), 5, 1, 0; (3800), 3, 1, 0; [27, 6, 0\*, 1998/02/23–1998/02/26]

### 121 Kharkov University, Chuguevskaya Station

V. G. Shevchenko, Astronomical Observatory of the Kharkov State University,

Sumskaya Str. 35, UA-310022 Kharkov, Ukraine

[shevchenko@astron.kharkov.ua]

0.70-m  $f/4$  reflector + CCD

GSC

1996 TY<sub>67</sub>, 2, 1, 0; [2, 1, 0\*, 1996/10/16]

### 122 Pises Observatory

B. Gaillard, 34 rue du Mas de Lemasson, F-34070 Montpellier, France

[observatoire.pises@hol.fr]

Observers B. Gaillard, J. M. Lopez

Measurer B. Gaillard

0.40-m  $f/4.7$  reflector + CCD

USNO-SA1.0

1987 RA<sub>3</sub>, 4, 2, 1; 1998 BH<sub>30</sub>, 2, 1, 0; 1998 BB<sub>42</sub>, 3, 1, 0; 1998 DE, 3, 1, 0; 1998 DF, 3, 1, 0; 1998 DN<sub>1</sub>, 3, 1, 0; 1998 DN<sub>3</sub>, 4, 2, 1; 1998 DY<sub>12</sub> \*, 5, 2, 1; 1998 DQ<sub>13</sub> \*, 7, 2, 1; 1998 DR<sub>13</sub> \*, 7, 2, 1; 1998 DS<sub>13</sub> \*, 7, 2, 1; [48, 11, 4\*, 1998/02/24–1998/02/28]

### 126 Monte Viseggi

L. Zannoni, via Del Prione no 42, I-19121 La Spezia, Italy [luzannon@tin.it]

Observers L. Zannoni, L. Sannino

Measurer L. Zannoni

0.40-m  $f/6$  reflector + CCD

USNO-SA1.0, GSC

1998 AZ<sub>4</sub>, 2, 1, 0; [2, 1, 0\*, 1998/02/26]

### 127 Bornheim

N. Ehring, Stationenweg 54, D-53332 Bornheim, Germany [norbert.ehring@t-

online.de]

0.19-m  $f/4$  FFC + CCD

GSC

1989 RO<sub>2</sub>, 4, 2, 10; 1990 RV, 2, 1, 0; 1990 UL<sub>2</sub>, 2, 1, 0; 1992 AP<sub>1</sub>, 2, 1, 0; 1992 SW<sub>10</sub>, 4, 2, 10; 1995 AN, 4, 2, 10; 1995 GW, 4, 2, 15; 1996 NF<sub>3</sub>, 2, 1, 0; 1997 WB<sub>22</sub>, 4, 2, 15; 1998 AH, 7, 3, 25; 1998 DR<sub>8</sub>, 3, 1, 0; 2561 P-L, 4, 2, 15; (5229), 2, 1, 0; [44, 13, 0\*, 1997/10/27–1998/02/28]

### 130 Lumezzane

S. Foglia, F. Bisleri 11, I-20418 Milan, Italy [md3576@mclink.it]

Observers W. Marinello, G. Pizzetti

Measurer G. Pizzetti, S. Foglia

0.40-m  $f/6.5$  reflector + CCD

GSC

(1951), 4, 1, 0; (5445), 3, 1, 0; [7, 2, 0\*, 1998/02/08]

### 132 Bedoin

P. Antonini, 47 rue Guillaume Puy, F-84000 Avignon, France

[Pierre.Antonini@wanadoo.fr]

0.16-m  $f/3.3$  reflector + CCD

GSC

1993 HH<sub>3</sub>, 3, 1, 0; 1998 BK<sub>30</sub>, 5, 2, 10; 1998 CP<sub>2</sub> \*, 12, 4, 10; 1998 DE \*, 8, 3, 8; 1998 DF \*, 9, 3, 8; 1998 DN<sub>1</sub> \*, 5, 2, 8; 1998 DL<sub>27</sub> \*, 5, 2, 3; 1998 DM<sub>27</sub> \*, 5, 2, 3; 1998 DN<sub>27</sub> \*, 4, 2, 3; (6436), 4, 1, 0; [60, 10, 7\*, 1998/02/15–1998/03/03]

### 133 Les Tardieux

M. Boeuf, Les Tardieux, St Julien, F-13500 Martigues, France

[Michel.Boeuf@wanadoo.fr]

0.20-m  $f/3.5$  reflector + CCD

GSC

1998 BW<sub>1</sub>, 3, 1, 0; 1998 BK<sub>30</sub>, 3, 1, 0; 1998 DY<sub>9</sub> \*, 8, 3, 3; 1998 DO<sub>20</sub> \*, 7, 3, 2; [21, 4, 2\*, 1998/02/18–1998/03/02]

### 138 Village-Neuf

C. Demeautis, 9 rue de Huningue, F-68300 Saint-Louis, France

[Sky.walker@wanadoo.fr]

Observers C. Demeautis, D. Matter

Measurer C. Demeautis

0.20-m  $f/3.3$  Schmidt-Cassegrain + CCD

GSC

1989 CE<sub>8</sub>, 2, 1, 0; 1992 BB<sub>5</sub>, 4, 1, 0; 1995 AN, 4, 1, 0; [10, 3, 0\*, 1998/02/19–1998/02/20]

### 141 Hottviller

P. Buttani, 2 Allée Blaise Pascal, F-67800 Bischheim, France

[philippe.buttani@hol.fr]

Observers P. Buttani, R. Philipps

Measurer P. Buttani

0.31-m  $f/6$  Newton + CCD

GSC, USNO-SA1.0

1998 BY<sub>7</sub>, 2, 1, 0; 1998 BH<sub>30</sub>, 3, 1, 0; 1998 BK<sub>30</sub>, 5, 1, 0; (2054), 3, 1, 0; [13, 4, 0\*, 1998/02/15]

### 144 Bray et Lu

L. Parmeggiani, 11 residence Croix Sante, F-95710 Bray et Lu, France

[lionel.parmeggiani@hol.fr]

0.21-m  $f/11.5$  reflector + CCD

GSC

(1035), 25, 3, 2; [25, 1, 0\*, 1998/02/10–1998/02/12]

### 145 's-Gravenwezel Observatory

T. Alderweireldt, Rozenlaan 14, 2970 's-Gravenwezel, Belgium

[Tom.Alderweireldt@ping.be]

0.20-m  $f/2$  Schmidt-Cassegrain + CCD

Hipparcos, ACT, Tycho, PPM, GSC 1.2

(2), 16, 4, 25; (10), 1, 1, 0; (69), 3, 1, 0; (142), 5, 1, 0; (313), 2, 1, 0; (368), 4, 2, 37; (444), 3, 1, 0; (509), 2, 1, 0; (513), 2, 1, 0; (551), 7, 2, 2; (607), 3, 1, 0; (774), 4, 1, 0; (805), 4, 2, 5; (1096), 2, 2, 2; (1116), 8, 2, 118; (2010), 7, 1, 0; [73, 16, 0\*, 1996/10/07–1998/02/14]

### 292 Burlington

T. Handley, 13 Linden Road, Burlington, NJ 08016, U.S.A.

0.30-m  $f/3.0$  Schmidt-Cassegrain + focal reducer + CCD

GSC

1998 CT<sub>1</sub> \*, 12, 4, 15; 1998 DS<sub>3</sub>, 12, 4, 11; 1998 DT<sub>3</sub>, 6, 2, 4; 3078 P-L, 3, 1, 0; [33, 4, 1\*, 1998/02/01–1998/02/26]

### 294 Astrophysical Observatory, College of Staten Island

I. Robbins, The College of Staten Island, 2800 Victory Boulevard, Staten Island,

NY 10314, U.S.A. [robbins@postbox.csi.cuny.edu]

Observers I. Robbins, K. Rowan, S. Parello

Measurers S. Parello, K. Rowan

0.41-m  $f/6.3$  Schmidt-Cassegrain + CCD

GSC, USNO-SA1.0

(1035), 4, 2, 6; (1843), 3, 2, 1; (2816), 4, 2, 11; (3521), 4, 2, 11; (3800), 2, 1, 0; (4663), 2, 1, 0; [19, 6, 0\*, 1998/01/20–1998/02/02]

### 327 Peking Observatory, Xinglong Station

J. Zhu, Peking Astronomical Observatory, Chinese Academy of Sciences,

Zhongguancun, Peking 100101, Peoples Republic of China

[zj@bac.pku.edu.cn]

Observers B. Zhao, X. Y. Li, Z. Y. Zheng, J. Zhu, X. Zhou, R. Chen, L. C. Deng,

Y. J. Chen, X. M. Teng

Measurers X. Y. Li, X. M. Teng, Y. J. Chen, J. Zhu

0.60-m Schmidt + CCD

1971 SB, 3, 1, 0; 1975 VV<sub>2</sub>, 4, 1, 0; 1978 SA<sub>8</sub>, 12, 4, 4; 1979 MG<sub>4</sub>, 3, 1, 0; 1979 QJ<sub>1</sub>, 3, 1, 0; 1982 SM<sub>2</sub>, 3, 1, 0; 1983 BD, 3, 1, 0; 1985 RJ<sub>3</sub>, 7, 1, 0; 1988 VB<sub>1</sub>, 12, 3, 4; 1989 EH<sub>1</sub>, 4, 1, 0; 1990 RR<sub>5</sub>, 9, 3, 2; 1990 ST<sub>6</sub>, 3, 1, 0; 1990 SF<sub>9</sub>, 3, 1, 0; 1991 GG<sub>7</sub>, 3, 1, 0; 1991 RZ<sub>10</sub>, 3, 1, 0; 1991 VB<sub>9</sub>, 3, 1, 0; 1992 OZ<sub>9</sub>, 6, 2, 3; 1992 SQ<sub>26</sub>, 3, 1, 0; 1992 UA<sub>3</sub>, 3, 1, 0; 1992 WX<sub>2</sub>, 6, 2, 3; 1993 CO, 12, 3, 10; 1993 FD<sub>22</sub>, 3, 1, 0; 1993 FR<sub>26</sub>, 9, 3, 6; 1993 TH<sub>32</sub>, 12, 4, 12; 1993 TU<sub>36</sub>, 14, 4, 5; 1993 VS, 6, 2, 1; 1993 XO, 28, 8, 18; 1995 AW<sub>2</sub>, 15, 4, 14; 1996 TG<sub>7</sub>, 3, 1, 0; 1996 TF<sub>15</sub>, 3, 1, 0; 1996 TV<sub>67</sub>, 3, 1, 0; 1996 UH<sub>5</sub> \*, 13, 4, 31; 1996 VP<sub>3</sub>, 6, 2, 10; 1996 VA<sub>7</sub>, 9, 3, 5; 1996 VY<sub>29</sub>, 9, 3, 15; 1996 VQ<sub>39</sub> \*, 6, 2, 35; 1996 VV<sub>39</sub> \*, 3, 1, 0; 1997 ST, 10, 3, 8; 1997 SB<sub>10</sub>, 4, 1, 0; 1997 SO<sub>33</sub>, 6, 2, 11; 1997 SL<sub>34</sub> \*, 5, 2, 1; 1997 TB<sub>10</sub>, 3, 1, 0; 1997 TK<sub>27</sub>, 3, 1, 0; 1997 UY<sub>3</sub>, 12, 4, 4; 1997 UZ<sub>8</sub>, 3, 1, 0; 1997 UG<sub>15</sub>, 9, 3, 4; 1997 UA<sub>22</sub>, 7, 1, 0; 1997 VW<sub>3</sub>, 3, 1, 0; 1997 VV<sub>4</sub>, 3, 1, 0; 1997 VO<sub>6</sub>, 3, 1, 0; 1997 VJ<sub>8</sub>, 13, 4, 14; 1997 WR<sub>5</sub>, 3, 1, 0; 1997 WE<sub>8</sub>, 3, 1, 0; 1997 WU<sub>8</sub>, 6, 2, 1; 1997 WH<sub>10</sub>, 3, 1, 0; 1997 WP<sub>14</sub>, 3, 1, 0; 1997 WU<sub>22</sub>, 3, 1, 0; 1997 WO<sub>23</sub>, 21, 5, 28; 1997 WT<sub>23</sub>, 3, 1, 0; 1997 WZ<sub>29</sub>, 3, 1, 0; 1997 WZ<sub>30</sub>, 3, 1, 0; 1997 WP<sub>32</sub>, 6, 2, 5; 1997 WS<sub>32</sub>, 9, 3, 3; 1997 WB<sub>33</sub>, 9, 3, 6; 1997 WW<sub>36</sub>, 3, 1, 0; 1997 WB<sub>37</sub>, 10, 3, 5; 1997 WQ<sub>37</sub>, 15, 4, 6; 1997 WT<sub>37</sub>, 3, 1, 0; 1997 WK<sub>47</sub>, 6, 2, 3; 1997 WR<sub>49</sub>, 3, 1, 0; 1997 WO<sub>51</sub>, 15, 5, 5; 1997 WQ<sub>54</sub>, 9, 3, 5; 1997 WF<sub>56</sub> \*, 6, 2, 10; 1997 WG<sub>56</sub>, 3, 1, 0; 1997 XQ<sub>2</sub>, 4, 1, 0; 1997 XS<sub>3</sub>, 12, 4, 56; 1997 XN<sub>12</sub>, 3, 1, 0; 1997 YD<sub>1</sub>, 3, 1, 0; 1997 YN<sub>1</sub>, 3, 1, 0; 1997 YR<sub>4</sub>, 3, 1, 0; 1997 YH<sub>5</sub>, 3, 1, 0; 1997 YJ<sub>5</sub>, 3, 1, 0; 1997 YZ<sub>6</sub>, 6, 2, 1; 1997 YP<sub>7</sub>, 3, 1, 0; 1997 YR<sub>7</sub>, 3, 1, 0; 1997 YO<sub>8</sub>, 3, 1, 0; 1997 YT<sub>10</sub>, 6, 1, 0; 1997 YX<sub>13</sub>, 3, 1, 0; 1997 YN<sub>16</sub>, 3, 1, 0; 1997 YE<sub>18</sub>, 3, 1, 0; 1997 YF<sub>18</sub>, 6, 2, 4; 1997 YY<sub>20</sub>, 3, 1, 0; 1997 YD<sub>21</sub> \*, 3, 1, 0; 1997 YL<sub>21</sub> \*, 7, 2, 5; 1997 YM<sub>21</sub> \*, 6, 2, 5; 1997 YN<sub>21</sub>, 3, 1, 0; 1997 YO<sub>21</sub>, 3, 1, 0; 1997 YP<sub>21</sub> \*, 3, 1, 0; 1998 AP, 3, 1, 0; 1998 AP<sub>6</sub>, 9, 3, 28; 1998 AR<sub>6</sub>, 3, 1, 0; 1998 AW<sub>8</sub>, 4, 1, 0; 1998 AD<sub>10</sub>, 3, 1, 0; 1998 AE<sub>11</sub> \*, 11, 2, 1; 1998 AF<sub>11</sub> \*, 17, 4, 12; 1998 AG<sub>11</sub> \*, 14, 3, 3; 1998 AH<sub>11</sub> \*, 7, 2, 1; 1998 AJ<sub>11</sub> \*, 7, 2, 1; 1998 AK<sub>11</sub> \*, 10, 2, 1; 1998 AL<sub>11</sub> \*, 3, 1, 0; 1998 AM<sub>11</sub> \*, 3, 1, 0; 1998 AN<sub>11</sub>, 4, 1, 0; 1998 BK<sub>1</sub>, 6, 2, 12; 1998 BY<sub>2</sub>, 3, 1, 0; 1998 BK<sub>4</sub>, 3, 1, 0; 1998 BW<sub>4</sub>, 3, 1, 0; 1998 BW<sub>6</sub>, 3, 1, 0; 1998 BK<sub>8</sub>, 6, 2, 7; 1998 BW<sub>8</sub>, 6, 2, 8; 1998 BX<sub>8</sub>, 3, 1, 0; 1998 BZ<sub>8</sub>, 3, 1, 0; 1998 BX<sub>9</sub>, 6, 2, 4; 1998 BQ<sub>13</sub>, 3, 1, 0; 1998 BT<sub>14</sub>, 3, 1, 0; 1998 BB<sub>15</sub>, 3, 1, 0; 1998 BV<sub>29</sub>, 15, 5, 7; 1998 BZ<sub>31</sub>, 3, 1, 0; 1998 BB<sub>32</sub>, 3, 1, 0; 1998 BZ<sub>32</sub>, 6, 1, 0; 1998 BC<sub>35</sub>, 4, 1, 0; 1998 BQ<sub>41</sub>, 3, 1, 0; 1998 BC<sub>42</sub>, 6, 1, 0; 1998 BG<sub>42</sub>, 9, 3, 7; 1998 BJ<sub>42</sub>, 10, 3, 7; 1998 BK<sub>42</sub>, 10, 3, 7; 1998 BU<sub>43</sub>, 3, 1, 0; 1998 BC<sub>44</sub>, 3, 1, 0; 1998 BK<sub>44</sub> \*, 3, 1, 0; 1998 BL<sub>44</sub> \*, 3, 1, 0; 1998 BB<sub>47</sub> \*, 9, 3, 42; 1998 BC<sub>47</sub> \*, 3, 1, 0; 1998 CA, 3, 1, 0; 1998 CD, 6, 2, 1; 1998 CD<sub>1</sub>, 6, 2, 4; 1998 CF<sub>1</sub>, 9, 3, 16; 1998 CG<sub>1</sub>, 3, 1, 0; 1998 CH<sub>1</sub>, 3, 1, 0; 1998 CM<sub>1</sub>, 3, 1, 0; 1998 CN<sub>1</sub>, 15, 4, 16; 1998 CS<sub>1</sub> \*, 11, 4, 6; 1998 CU<sub>1</sub> \*, 7, 2, 10; 1998 CV<sub>1</sub> \*, 15, 5, 29; 1998 CW<sub>1</sub> \*, 18, 6, 28; 1998 CX<sub>1</sub> \*, 15, 5, 18; 1998 CY<sub>1</sub> \*, 6, 2, 7; 1998 CZ<sub>1</sub> \*, 16, 5, 24; 1998 CA<sub>2</sub> \*, 6, 2, 4; 1998 CE<sub>2</sub>, 3, 1, 0; 1998 CG<sub>2</sub> \*, 6, 2, 1; 1998 CJ<sub>2</sub> \*, 12, 4, 22; 1998 CK<sub>2</sub> \*, 6, 2, 1; 1998 CL<sub>2</sub> \*, 14, 4, 11; 1998 CM<sub>2</sub> \*, 13, 4, 11; 1998 CN<sub>2</sub> \*, 7, 2, 1; 1998 CO<sub>2</sub> \*, 9, 3, 7; 1998 CR<sub>2</sub> \*, 15, 5, 30; 1998 CS<sub>2</sub> \*, 22, 7, 14; 1998 CD<sub>4</sub> \*, 6, 2, 8; 1998 CE<sub>4</sub> \*, 9, 3, 10; 1998 DC \*, 18, 6, 14; 1998 DD \*, 18, 6, 20; 1998 DS<sub>2</sub> \*, 10, 3, 11; 1998 DT<sub>2</sub> \*, 5, 2, 5; 1998 DV<sub>2</sub> \*, 9, 3, 7; 1998 DV<sub>2</sub> \*, 6, 2, 4; 1998 DW<sub>2</sub> \*, 21, 7, 19; 1998 DX<sub>2</sub> \*, 12, 4, 12; 1998 DY<sub>2</sub> \*, 6, 2, 4; 1998 DZ<sub>2</sub> \*, 27, 8, 14; 1998 DQ<sub>3</sub>, 4, 1, 0; 1998 DV<sub>7</sub> \*, 12, 3, 12; 1998 DW<sub>7</sub> \*, 6, 2, 6; 1998 DX<sub>7</sub> \*, 6, 2, 6; 1998 DY<sub>7</sub> \*, 6, 2, 6; 1998 DZ<sub>7</sub> \*, 6, 2, 6; 1998 DA<sub>8</sub> \*, 6, 2, 6; 1998 DB<sub>8</sub> \*, 6, 2, 6; 1998 DC<sub>8</sub> \*, 9, 3, 9; 1998 DD<sub>8</sub> \*, 6, 2, 2; 1998 DE<sub>8</sub> \*, 12, 4, 29; 1998 DF<sub>8</sub> \*, 12, 4, 28; 1998 DG<sub>8</sub> \*, 9, 3, 9; 1998 DH<sub>8</sub> \*, 9, 3, 9; 1998 DJ<sub>8</sub> \*, 12, 4, 9; 1998 DK<sub>8</sub> \*, 12, 4, 12; 1998 DL<sub>8</sub> \*, 9, 3, 8; 1998 DM<sub>8</sub> \*, 6, 2, 2; 1998 DN<sub>8</sub> \*, 12, 4, 9; 1998 DO<sub>8</sub> \*, 18, 6, 15; 1998 DP<sub>8</sub> \*, 6, 2, 2; 1998 DQ<sub>8</sub> \*, 12, 4, 9; 1998 DR<sub>8</sub> \*, 10, 3, 7; 1998 DS<sub>8</sub> \*, 10, 3, 7; 1998 DS<sub>9</sub> \*, 14, 4, 16; 1998 DT<sub>9</sub>, 3, 1, 0; 1998 DU<sub>9</sub>, 3, 1, 0; 1998 DV<sub>10</sub> \*, 6, 2, 6; 1998 DW<sub>10</sub> \*, 12, 4, 28; 1998 DX<sub>10</sub> \*, 6, 2, 4; 1998 DY<sub>10</sub> \*, 12, 4, 23; 1998 DZ<sub>10</sub> \*, 12, 4, 13; 1998 DA<sub>11</sub> \*, 6, 2, 4; 1998 DB<sub>11</sub> \*, 6, 2, 2; 1998 DC<sub>11</sub> \*, 12, 4, 9; 1998 DL<sub>11</sub>, 3, 1, 0; 1998 DJ<sub>14</sub>, 3, 1, 0; 1998 DM<sub>20</sub>, 12, 3, 4; 1998 DP<sub>20</sub> \*, 12, 4, 6; 1998 DQ<sub>20</sub> \*, 6, 2, 2; 1998 DU<sub>20</sub> \*, 6, 2, 1; 1998 DN<sub>31</sub> \*, 6, 2, 6; 1998 DO<sub>31</sub> \*, 9, 3, 7; 1998 DQ<sub>31</sub> \*, 6, 2, 6; 1998 DR<sub>31</sub> \*, 6, 2, 5; 1998 DS<sub>31</sub> \*, 6, 2, 5; 1998 DA<sub>32</sub> \*, 6, 2, 8; 1998 DB<sub>32</sub> \*, 6, 2, 3; 1998 DC<sub>32</sub> \*,

6, 2, 8; 1998 DD<sub>32</sub> \*, 6, 2, 8; 1998 DE<sub>32</sub> \*, 9, 3, 9; 1998 DF<sub>32</sub> \*, 6, 2, 8; 1998 DG<sub>32</sub> \*, 13, 4, 11; 1998 DH<sub>32</sub> \*, 7, 2, 5; 1998 DJ<sub>32</sub> \*, 9, 3, 5; 1998 DK<sub>32</sub> \*, 6, 2, 2; 1998 DL<sub>32</sub> \*, 6, 2, 5; 1998 DM<sub>32</sub> \*, 6, 2, 4; 1998 DN<sub>32</sub> \*, 6, 2, 4; 1998 DO<sub>32</sub> \*, 6, 2, 2; 1998 DP<sub>32</sub> \*, 7, 2, 4; 1998 DQ<sub>32</sub> \*, 6, 2, 10; 1998 DR<sub>32</sub> \*, 6, 2, 7; 1998 DS<sub>32</sub> \*, 6, 2, 10; 1998 DT<sub>32</sub> \*, 6, 2, 5; 1998 DU<sub>32</sub> \*, 6, 2, 8; 1998 EY<sub>2</sub> \*, 9, 3, 7; 1998 EZ<sub>2</sub> \*, 6, 2, 1; 1998 EA<sub>3</sub> \*, 9, 3, 4; 1998 EB<sub>3</sub> \*, 6, 2, 1; 1998 EC<sub>3</sub> \*, 6, 2, 1; 1998 EW<sub>7</sub> \*, 9, 3, 6; 1998 EX<sub>7</sub> \*, 9, 3, 6; 1998 EY<sub>7</sub> \*, 6, 2, 3; 1998 EZ<sub>7</sub> \*, 6, 2, 3; 1998 EA<sub>8</sub> \*, 6, 2, 3; 1998 EB<sub>8</sub> \*, 6, 2, 3; 1998 EC<sub>8</sub> \*, 9, 3, 6; 1998 ED<sub>8</sub> \*, 12, 3, 6; 1998 EE<sub>8</sub> \*, 6, 2, 3; 1998 EF<sub>8</sub> \*, 6, 2, 3; 1998 EG<sub>8</sub> \*, 6, 2, 3; 1998 EH<sub>8</sub> \*, 6, 2, 3; 1998 EJ<sub>8</sub> \*, 6, 2, 3; 1998 EQ<sub>8</sub> \*, 6, 2, 6; 1998 ER<sub>8</sub> \*, 6, 2, 3; 1998 ES<sub>8</sub> \*, 6, 2, 3; 1998 ET<sub>8</sub> \*, 6, 2, 3; 1998 EU<sub>8</sub> \*, 6, 2, 3; 1998 EV<sub>8</sub> \*, 6, 2, 3; 3057 T-1, 3, 1, 0; 4194 T-1, 3, 1, 0; 3327 T-2, 3, 1, 0; 1107 T-3, 4, 1, 0; (156), 17, 5, 13; (274), 10, 3, 12; (407), 3, 1, 0; (419), 21, 6, 14; (465), 3, 1, 0; (571), 3, 1, 0; (937), 9, 3, 14; (1011), 4, 1, 0; (1036), 4, 1, 0; (1159), 3, 1, 0; (1161), 3, 1, 0; (1177), 3, 1, 0; (1228), 6, 2, 3; (1278), 13, 4, 5; (1350), 20, 6, 12; (1408), 4, 1, 0; (1418), 3, 1, 0; (1469), 4, 1, 0; (1512), 3, 1, 0; (1541), 3, 1, 0; (1543), 3, 1, 0; (1590), 26, 6, 10; (1683), 3, 1, 0; (1840), 3, 1, 0; (1854), 9, 3, 13; (1960), 4, 1, 0; (1961), 6, 2, 9; (2248), 6, 2, 12; (2279), 3, 1, 0; (2281), 3, 1, 0; (2342), 3, 1, 0; (2360), 6, 2, 10; (2375), 3, 1, 0; (2412), 3, 1, 0; (2510), 3, 1, 0; (2648), 3, 1, 0; (2665), 3, 1, 0; (2718), 6, 2, 4; (2837), 3, 1, 0; (3147), 3, 1, 0; (3169), 6, 1, 0; (3218), 6, 2, 3; (3313), 3, 1, 0; (3702), 15, 5, 15; (3724), 3, 1, 0; (3725), 6, 2, 8; (3732), 3, 1, 0; (3759), 3, 1, 0; (3783), 3, 1, 0; (3905), 3, 1, 0; (3931), 3, 1, 0; (4597), 3, 1, 0; (4633), 3, 1, 0; (4689), 33, 10, 19; (4712), 3, 1, 0; (4837), 3, 1, 0; (5318), 16, 5, 14; (5338), 3, 1, 0; (5380), 6, 2, 3; (5669), 4, 1, 0; (5677), 7, 2, 6; (6051), 3, 1, 0; (6086), 3, 1, 0; (6396), 3, 1, 0; (6398), 6, 1, 0; (6408), 18, 5, 14; (6438), 3, 1, 0; (6492), 12, 4, 5; (6603), 6, 2, 5; (6802), 3, 1, 0; (7020), 9, 3, 2; (7055), 3, 1, 0; (7076), 10, 3, 4; (7427), 3, 1, 0; (8009), 3, 1, 0; (8063), 3, 1, 0; (8070), 3, 1, 0; (8111), 6, 1, 0; (8144), 3, 1, 0; (8172), 3, 1, 0; (8183), 6, 2, 1; (8186), 3, 1, 0; (8189), 22, 6, 14; (8195), 3, 1, 0; (8196), 20, 6, 9; (8211), 27, 7, 27; (8247), 3, 1, 0; (8260), 16, 5, 7; (8280), 3, 1, 0; (8301), 6, 2, 5; (8315), 9, 3, 11; [2511, 364, 133\*, 1996/09/21–1998/03/08]

### 355 Hadano

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[asami@st.rim.or.jp]

0.2-m  $f/6.0$  reflector + CCD, 0.28-m  $f/5.0$  reflector + CCD  
GSC

1998 BY<sub>7</sub>, 4, 1, 0; 1998 EC<sub>3</sub>, 5, 2, 1; (1590), 5, 1, 0; [14, 3, 0\*, 1998/02/17–1998/03/03]

### 358 Nanyou

T. Okuni, 158-28, Mitsuma-dori, Nanyou, Yamagata-Ken, 999-22 Japan  
0.28-m  $f/6.3$  Schmidt-Cassegrain + CCD  
GSC

1995 SD<sub>5</sub>, 6, 3, 4; 1998 DW<sub>31</sub> \*, 7, 3, 5; [13, 2, 1\*, 1998/02/18–1998/02/27]

### 360 Kuma Kogen Astronomical Observatory

A. Nakamura, Shimo-Hatanokawa, Kuma, Kamiukena-Gun, Ehime-Ken, 791-12  
Japan [a-nakamu@mx2.nisiq.net]

0.60-m  $f/6.0$  Ritchey-Chrétien + CCD  
GSC, USNO-SA1.0

1981 EF<sub>3</sub>, 3, 1, 0; 1981 EC<sub>18</sub>, 3, 1, 0; 1981 EC<sub>43</sub>, 6, 2, 5; 1990 YK, 3, 1, 0; 1991 CB<sub>1</sub>, 3, 1, 0; 1995 GO, 3, 1, 0; 1996 DH, 3, 1, 0; 1996 FG<sub>3</sub>, 3, 1, 0; 1996 HW<sub>1</sub>, 3, 1, 0; 1996 OL, 4, 2, 9; 1996 TO<sub>6</sub>, 6, 2, 1; 1996 TJ<sub>7</sub>, 6, 2, 8; 1996 TY<sub>7</sub>, 6, 2, 1; 1996 UC, 4, 2, 6; 1996 WC<sub>3</sub>, 5, 2, 9; 1997 CU<sub>26</sub>, 2, 1, 0; 1997 YD<sub>18</sub>, 4, 2, 6; 1998 BE<sub>7</sub>, 6, 2, 15; 1998 BY<sub>7</sub>, 3, 1, 0; 1998 BZ<sub>7</sub>, 3, 1, 0; 1998 BG<sub>9</sub>, 3, 1, 0; 1998 BP<sub>26</sub>, 6, 2, 9; 1998 CS, 8, 4, 14; 1998 CA<sub>1</sub>, 4, 2, 6; 1998 CS<sub>1</sub>, 4, 1, 0; 1998 DV<sub>9</sub>, 3, 1, 0; 1998 DF<sub>11</sub>, 3, 1, 0; 1998 DB<sub>13</sub> \*, 9, 3, 8; 1998 DG<sub>16</sub>, 3, 1, 0; 1998 EC<sub>3</sub>, 3, 1, 0; (551), 3, 1, 0; (2329), 2, 1, 0; (7605), 2, 1, 0; [132, 33, 1\*, 1998/02/11–1998/03/02]

### 367 Yatsuka

H. Abe, 461-2, Futago, Yatsuka-Cho, Shimane-Ken, 690-14 Japan  
0.26-m  $f/6.0$  reflector + CCD  
GSC

1993 XO<sub>1</sub>, 2, 1, 0; 1993 XP<sub>1</sub>, 2, 1, 0; 1996 UX, 2, 1, 0; 1996 VS<sub>4</sub>, 2, 1, 0; 1996 WZ, 2, 1, 0; 1996 XF<sub>1</sub>, 2, 1, 0; 1997 AY, 2, 1, 0; 1998 EC<sub>3</sub>, 5, 2, 1; 1998 EX<sub>6</sub> \*, 4, 2, 3; [23, 9, 1\*, 1998/03/02–1998/03/06]

### 376 Uenohara

N. Kawasato, 3-11-10, Hana-Koganei, Kodaira, Tokyo, 187 Japan

0.30-m reflector + CCD

GSC

1998 BW<sub>25</sub>, 2, 1, 0; [2, 1, 0\*, 1998/01/31]

### 385 Nihondaira Observatory

T. Urata, 1-8, Dobayashi 1 Chome, Shimizu, Shizuoka-Ken 424, Japan  
[urata@sannet.ne.jp]

0.31-m  $f/4.7$  reflector + CCD

GSC, USNO-A1.0

1996 UR, 4, 2, 25; 1998 BX<sub>2</sub>, 2, 1, 0; 1998 BK<sub>4</sub>, 2, 1, 0; 1998 BT<sub>14</sub>, 2, 1, 0; 1998 BU<sub>14</sub>, 2, 1, 0; 1998 BC<sub>41</sub>, 2, 1, 0; 1998 DZ<sub>23</sub>, 2, 1, 0; 1998 DC<sub>24</sub>, 2, 1, 0; 1998 ED<sub>6</sub>, 1, 1, 0; 1998 EE<sub>6</sub>, 1, 1, 0; 1998 EF<sub>6</sub>, 2, 1, 0; 1998 EO<sub>8</sub> \*, 2, 1, 0; (6431), 2, 1, 0; [26, 13, 1\*, 1998/02/06–1998/03/06]

### 399 Kushiro

H. Kaneda, Taiyo MS 2-H, 2-15, Kawazoe 8 Jo 2 Chime, Minami-Ku, Sapporo, 005  
Japan

Observer S. Ueda

Measurer H. Kaneda

0.25-m  $f/3.4$  hyperboloid astrocamera

GSC

1998 CJ<sub>4</sub>, 6, 3, 4; 1998 CF<sub>5</sub>, 6, 3, 4; 1998 DZ<sub>5</sub>, 6, 3, 4; 1998 DT<sub>31</sub> \*, 4, 2, 4; 1998 DU<sub>31</sub> \*, 4, 2, 4; 1998 DV<sub>31</sub> \*, 4, 2, 3; [30, 6, 3\*, 1998/02/18–1998/02/22]

### 402 Dync Astronomical Observatory

A. Sugie, Dync Astronomical Observatory, Taga 283-1, Taga, Inukami-Gun, Shiga-Ken 522-03, Japan [hnhf00201@niftyserve.or.jp]

Observers A. Sugie, Y. Ikari

0.60-m  $f/5.0$  reflector + CCD

GSC

1996 EN, 3, 1, 0; 1996 HW<sub>1</sub>, 6, 2, 1; 1997 CU<sub>26</sub>, 3, 1, 0; 1997 TA<sub>18</sub>, 6, 2, 19; 1997 XZ<sub>10</sub>, 6, 2, 2; 1997 YX<sub>3</sub>, 3, 1, 0; 1997 YL<sub>11</sub>, 3, 1, 0; 1998 AF, 5, 2, 10; 1998 BE<sub>7</sub>, 6, 2, 2; 1998 BP<sub>26</sub>, 3, 1, 0; 1998 CS<sub>1</sub>, 4, 1, 0; 1998 DG<sub>16</sub>, 3, 1, 0; 1998 EC<sub>3</sub>, 6, 2, 1; [57, 13, 0\*, 1998/02/11–1998/03/03]

### 403 Kani

Y. Mizuno, 1445-192, Yato, Kani, Gifu-Ken, 509-0252 Japan [mizuno@oaa.gr.jp]

0.28-m  $f/6.3$  Schmidt-Cassegrain + CCD

GSC

1990 RV, 4, 2, 2; 1991 RQ<sub>11</sub>, 2, 1, 0; 1998 BO<sub>46</sub>, 8, 4, 7; 1998 EC<sub>3</sub>, 3, 1, 0; [17, 4, 0\*, 1998/02/15–1998/03/02]

### 411 Oizumi

T. Kobayashi, 8-6, Nishi Koizumi 1 Chome, Oizumi, Ora-Gun, Gunma-Ken, 370-05  
Japan [kobataka@oaa.iiinet.or.jp]

0.25-m  $f/4.4$  reflector + CCD, 0.41-m  $f/4.3$  reflector + CCD

GSC

1988 VB<sub>1</sub>, 2, 1, 0; 1993 XN<sub>1</sub>, 2, 1, 0; 1993 XO<sub>1</sub>, 3, 1, 0; 1993 YK, 4, 2, 1; 1994 AD, 5, 2, 1; 1994 AQ, 2, 1, 0; 1994 CS<sub>2</sub>, 2, 1, 0; 1994 JG, 2, 1, 0; 1996 WZ, 2, 1, 0; 1996 XC<sub>18</sub>, 4, 2, 1; 1997 YQ<sub>13</sub>, 2, 1, 0; 1998 BB, 2, 1, 0; 1998 BC, 2, 1, 0; 1998 BD, 2, 1, 0; 1998 BK, 2, 1, 0; 1998 BL, 2, 1, 0; 1998 BM, 2, 1, 0; 1998 BN, 2, 1, 0; 1998 BO, 2, 1, 0; 1998 BP, 2, 1, 0; 1998 BT, 2, 1, 0; 1998 BU, 2, 1, 0; 1998 BV, 6, 3, 15; 1998 BW, 2, 1, 0; 1998 BX, 5, 2, 1; 1998 BY, 2, 1, 0; 1998 BZ, 2, 1, 0; 1998 BA<sub>1</sub>, 4, 2, 1; 1998 BB<sub>1</sub>, 2, 1, 0; 1998 BC<sub>1</sub>, 2, 1, 0; 1998 BD<sub>1</sub>, 2, 1, 0; 1998 BE<sub>1</sub>, 2, 1, 0; 1998 BF<sub>1</sub>, 2, 1, 0; 1998 BG<sub>1</sub>, 2, 1, 0; 1998 BH<sub>1</sub>, 2, 1, 0; 1998 BJ<sub>1</sub>, 2, 1, 0; 1998 BK<sub>1</sub>, 2, 1, 0; 1998 BL<sub>1</sub>, 2, 1, 0; 1998 BM<sub>1</sub>, 2, 1, 0; 1998 BN<sub>1</sub>, 2, 1, 0; 1998 BO<sub>1</sub>, 2, 1, 0; 1998 BQ<sub>1</sub>, 2, 1, 0; 1998 BR<sub>1</sub>, 2, 1, 0; 1998 BS<sub>1</sub>, 2, 1, 0; 1998 BU<sub>1</sub>, 2, 1, 0; 1998 BR<sub>6</sub>, 2, 1, 0; 1998 BS<sub>6</sub>, 2, 1, 0; 1998 BT<sub>6</sub>, 2, 1, 0; 1998 BU<sub>6</sub>, 2, 1, 0; 1998 BV<sub>6</sub>, 2, 1, 0; 1998 BW<sub>6</sub>, 2, 1, 0; 1998 BX<sub>6</sub>, 2, 1, 0; 1998 BY<sub>6</sub>, 2, 1, 0; 1998 BZ<sub>6</sub>, 2, 1, 0; 1998 BA<sub>7</sub>, 2, 1, 0; 1998 BB<sub>7</sub>, 2, 1, 0; 1998 BA<sub>8</sub>, 2, 1, 0; 1998 BB<sub>8</sub>, 2, 1, 0; 1998 BD<sub>8</sub>, 2, 1, 0; 1998 BE<sub>8</sub>, 2, 1, 0; 1998 BF<sub>8</sub>, 2, 1, 0; 1998 BG<sub>8</sub>, 2, 1, 0; 1998 BH<sub>8</sub>, 2, 1, 0; 1998 BJ<sub>8</sub>, 2, 1, 0; 1998 BK<sub>8</sub>, 2, 1, 0; 1998 BL<sub>8</sub>, 2, 1, 0; 1998 BM<sub>8</sub>, 2, 1, 0; 1998 BN<sub>8</sub>, 4, 2, 2; 1998 BP<sub>8</sub>, 4, 2, 2; 1998 BQ<sub>8</sub>, 2, 1, 0; 1998 BR<sub>8</sub>, 2, 1, 0; 1998 BS<sub>8</sub>, 2, 1, 0; 1998 BT<sub>8</sub>, 2, 1, 0; 1998 BR<sub>10</sub>, 2, 1, 0; 1998 BS<sub>10</sub>, 2, 1, 0; 1998 BQ<sub>24</sub>, 2, 1, 0;

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1998 BR<sub>24</sub>, 4, 2, 14; 1998 BS<sub>24</sub>, 4, 2, 14; 1998 BT<sub>24</sub>, 4, 2, 14; 1998 BU<sub>24</sub>, 4, 2, 3; 1998 BV<sub>24</sub>, 2, 1, 0; 1998 BW<sub>24</sub>, 6, 3, 16; 1998 BX<sub>24</sub>, 2, 1, 0; 1998 BY<sub>24</sub>, 4, 2, 14; 1998 BZ<sub>24</sub>, 4, 2, 14; 1998 BA<sub>25</sub>, 4, 2, 14; 1998 BB<sub>25</sub>, 4, 2, 17; 1998 BC<sub>25</sub>, 4, 2, 14; 1998 BG<sub>25</sub>, 4, 2, 16; 1998 BH<sub>25</sub>, 4, 2, 14; 1998 BJ<sub>25</sub>, 4, 2, 14; 1998 BK<sub>25</sub>, 4, 2, 14; 1998 BL<sub>25</sub>, 4, 2, 14; 1998 BM<sub>25</sub>, 4, 2, 14; 1998 BN<sub>25</sub>, 4, 2, 14; 1998 BP<sub>25</sub>, 4, 2, 14; 1998 BY<sub>25</sub>, 4, 2, 14; 1998 BZ<sub>25</sub>, 4, 2, 16; 1998 BA<sub>26</sub>, 4, 2, 13; 1998 BB<sub>26</sub>, 4, 2, 13; 1998 BC<sub>26</sub>, 8, 4, 15; 1998 BE<sub>30</sub>, 4, 2, 11; 1998 BK<sub>33</sub>, 4, 2, 13; 1998 BL<sub>33</sub>, 4, 2, 11; 1998 BM<sub>33</sub>, 4, 2, 11; 1998 BN<sub>33</sub>, 4, 2, 11; 1998 BO<sub>33</sub>, 2, 1, 0; 1998 BP<sub>33</sub>, 4, 2, 11; 1998 BQ<sub>33</sub>, 4, 2, 11; 1998 BR<sub>33</sub>, 4, 2, 11; 1998 BS<sub>33</sub>, 6, 3, 11; 1998 BT<sub>33</sub>, 4, 2, 11; 1998 BU<sub>33</sub>, 4, 2, 11; 1998 BV<sub>33</sub>, 4, 2, 11; 1998 BW<sub>33</sub>, 4, 2, 11; 1998 BX<sub>33</sub>, 5, 2, 11; 1998 BY<sub>33</sub>, 4, 2, 11; 1998 BB<sub>34</sub>, 3, 1, 0; 1998 BF<sub>47</sub>, 4, 2, 1; 1998 CD, 2, 1, 0; 1998 DB \*, 9, 4, 15; 1998 DR<sub>2</sub> \*, 9, 4, 11; 1998 DL<sub>20</sub> \*, 7, 3, 11; 1998 DM<sub>20</sub> \*, 6, 2, 6; 1998 EC \*, 6, 3, 7; 1998 ED \*, 6, 3, 6; 1998 EE \*, 6, 3, 6; 1998 EF \*, 6, 3, 6; 1998 EC<sub>3</sub> \*, 21, 6, 7; 1998 ES<sub>3</sub> \*, 6, 3, 5; 1998 ET<sub>3</sub> \*, 6, 3, 5; 1998 EU<sub>3</sub> \*, 9, 4, 5; *[446, 132, 12\*, 1998/02/17–1998/03/08]*

#### 422 Loomberah

G. J. Garradd, P.O. Box 157, Tamworth, NSW 2340, Australia [gjjg@mpx.com.au]  
0.25-m  $f/4.1$  reflector + CCD  
GSC

1997 SG<sub>35</sub>, 3, 1, 0; 1998 BP<sub>26</sub>, 11, 4, 13; 1998 DQ<sub>3</sub>, 4, 1, 0; 1998 DT<sub>9</sub>, 3, 1, 0; 1998 DU<sub>9</sub>, 6, 2, 1; 1998 DS<sub>10</sub>, 5, 2, 1; 1998 DF<sub>11</sub>, 3, 1, 0; 1998 EC<sub>3</sub>, 8, 2, 1; (59), 7, 2, 13; (95), 7, 3, 2; (102), 4, 1, 0; (140), 6, 2, 6; (153), 5, 1, 0; (432), 7, 2, 13; (433), 40, 6, 18; (1408), 4, 1, 0; (1867), 3, 1, 0; (2703), 5, 2, 6; (2938), 5, 2, 5; (3581), 3, 1, 0; (4599), 1, 1, 0; (5066), 3, 1, 0; (5751), 3, 1, 0; (6037), 20, 4, 5; *[166, 24, 0\*, 1997/10/01–1998/03/03]*

#### 423 North Ryde

S. McAndrew, 2/32 Twin Rd, North Ryde, NSW 2113, Australia  
[mcandrew@trinity.nsw.edu.au]  
0.2-m  $f/4$  hyperbolic astrograph + CCD  
GSC

1987 BO<sub>1</sub>, 12, 3, 3; 1991 CU<sub>1</sub>, 11, 3, 5; 1994 EJ<sub>1</sub>, 14, 5, 6; 1994 GH<sub>9</sub>, 4, 2, 3; 1995 KL<sub>1</sub>, 6, 2, 1; *[47, 5, 0\*, 1998/02/14–1998/03/03]*

#### 426 Woomera

F. B. Zoltowski, 10 Gundawarra St., P.O. Box 84, Woomera, SA 5720, Australia  
[100356.23@CompuServe.com]  
0.30-m  $f/3.3$  Schmidt-Cassegrain + CCD  
USNO-SA1.0, GSC

1980 TZ<sub>3</sub>, 6, 2, 2; 1981 DV, 6, 2, 4; 1981 DX, 6, 2, 4; 1991 CB<sub>1</sub>, 6, 2, 1; 1992 SK<sub>26</sub>, 6, 2, 2; 1993 FE<sub>48</sub>, 6, 2, 2; 1993 TJ<sub>1</sub>, 9, 3, 3; 1995 US, 6, 2, 4; 1996 DH, 3, 1, 0; 1996 EN, 4, 1, 0; 1997 YA<sub>5</sub>, 6, 2, 21; 1997 YN<sub>8</sub>, 4, 2, 2; 1998 AA<sub>5</sub>, 5, 2, 1; 1998 AB<sub>5</sub>, 5, 2, 1; 1998 BE<sub>5</sub>, 6, 2, 1; 1998 BX<sub>7</sub>, 3, 1, 0; 1998 BZ<sub>7</sub>, 8, 2, 5; 1998 BJ<sub>10</sub>, 5, 2, 21; 1998 BK<sub>10</sub>, 9, 4, 24; 1998 BP<sub>26</sub>, 7, 2, 5; 1998 BF<sub>41</sub>, 8, 3, 3; 1998 BM<sub>46</sub>, 3, 1, 0; 1998 DZ<sub>1</sub> \*, 12, 4, 10; 1998 DA<sub>2</sub> \*, 11, 4, 10; 1998 DQ<sub>3</sub>, 4, 1, 0; 1998 DT<sub>9</sub>, 3, 1, 0; 1998 DU<sub>9</sub>, 3, 1, 0; 1998 DW<sub>9</sub> \*, 6, 2, 4; 1998 DS<sub>10</sub>, 3, 1, 0; 1998 DG<sub>16</sub>, 3, 1, 0; (699), 3, 1, 0; (1168), 6, 2, 4; (1408), 4, 1, 0; (2054), 3, 1, 0; (2827), 13, 4, 10; (5395), 6, 2, 2; (5870), 2, 1, 0; (6037), 16, 3, 3; (7544), 6, 2, 2; (8175), 3, 1, 0; *[234, 40, 3\*, 1998/01/24–1998/02/28]*

#### 468 Astronomical Observatory, Campo Catino

F. Mallia, Via dei Siculi 37, I-04100 Latina, Italy [pa0115@panservice.it]  
Observers F. Mallia, F. Rossi, L. Fortuna  
Measurers M. Di Sora, F. Mallia, G. Falzone, L. Fortuna  
0.80-m  $f/4.0$  reflector + CCD  
GSC

1998 DN \*, 19, 4, 11; 1998 DF<sub>11</sub>, 3, 1, 0; 1998 DH<sub>20</sub> \*, 9, 2, 2; (2816), 3, 1, 0; (3521), 3, 1, 0; (3648), 3, 1, 0; (4130), 3, 1, 0; *[43, 7, 2\*, 1998/02/17–1998/02/28]*

#### 470 Ceccano

G. Masi, Via Madonna de Loco 47, I-03023 Ceccano (FR), Italy  
[gianmasi@fr.flashnet.it]  
0.15-m  $f/5$  reflector + CCD  
GSC, USNO-A1.0

1979 UH, 5, 2, 1; 1988 BX, 4, 2, 1; 1988 EA<sub>2</sub>, 3, 1, 0; 1991 GR, 5, 2, 1; 1992 SW<sub>17</sub>, 5, 2, 1; 1993 UR<sub>2</sub>, 5, 2, 1; 1993 VC<sub>5</sub>, 3, 1, 0; 1994 AQ, 3, 1, 0; 1996 WQ, 3, 1, 0; 1998 DA \*, 18, 7, 13; (2285), 2, 1, 0; (2816), 3, 1, 0; (3521), 7, 3, 2; (3800), 2, 1, 0; *[68, 14, 1\*, 1998/02/12–1998/03/03]*

#### 494 Stakenbridge

B. G. W. Manning, Moonrakers, Stakenbridge, Churchill, Kidderminster, Worcs.  
DY10 3LS, England [bgwm@star.sr.bham.ac.uk]

0.26-m  $f/7.3$  reflector + CCD

PPM

1996 RB, 4, 2, 10; *[4, 1, 0\*, 1998/01/24–1998/02/03]*

#### 504 Le Creusot

J.-C. Merlin, 18 rue P. Mendès-France, F-71200 Le Creusot, France  
[merlin@obspm.fr]

0.40-m  $f/5.1$  reflector + CCD

GSC

1997 XQ<sub>2</sub>, 5, 1, 0; *[5, 1, 0\*, 1998/02/12]*

#### 540 Linz

E. Meyer, F. Marklstrasse 1/62, A-4040 Linz, Austria [erich.meyer@ooenet.at]  
Observers E. Meyer, E. Obermair, H. Raab  
0.30-m  $f/5.2$  Schmidt Cassegrain + CCD  
GSC

1998 BQ, 4, 1, 0; 1998 BY<sub>7</sub>, 11, 3, 2; 1998 BZ<sub>7</sub>, 5, 2, 4; 1998 BS<sub>13</sub>, 6, 2, 13; 1998 DT \*, 18, 5, 8; 1998 DM<sub>1</sub> \*, 14, 4, 8; (158), 4, 1, 0; (2576), 2, 1, 0; (3800), 6, 2, 4; *[70, 9, 2\*, 1998/02/04–1998/02/26]*

#### 552 San Vittore

E. Colombini, Via S. Vittore 44, I-40136 Bologna, Italy  
[ermes.colombini@iol.it]

Observers C. Vacchi, G. Sassi, E. Colombini, R. Di Luca  
0.45-m  $f/3.3$  reflector + CCD  
GSC

1989 SR<sub>3</sub>, 8, 3, 3; 1991 TJ<sub>14</sub>, 10, 5, 12; 1993 BR<sub>2</sub>, 7, 3, 3; 1995 OE, 3, 1, 0; 1996 PQ, 4, 2, 9; 1996 RQ<sub>2</sub>, 4, 2, 10; 1996 TM<sub>6</sub>, 6, 3, 3; 1998 BP<sub>17</sub>, 4, 2, 1; 1998 CB<sub>4</sub> \*, 13, 5, 12; 1998 DA<sub>3</sub> \*, 13, 5, 7; 1998 DB<sub>3</sub> \*, 9, 4, 7; 1998 DC<sub>3</sub> \*, 9, 3, 7; 1998 DV<sub>3</sub>, 5, 2, 2; 1998 DL<sub>14</sub> \*, 6, 3, 5; 1998 DR<sub>20</sub> \*, 6, 3, 5; 1998 DY<sub>23</sub> \*, 7, 3, 11; 1998 DE<sub>24</sub> \*, 4, 2, 3; (1649), 2, 1, 0; (3132), 2, 1, 0; (8269), 5, 2, 10; *[127, 20, 8\*, 1998/02/05–1998/03/01]*

#### 557 Ondřejov

P. Pravec, Astronomical Institute, Czech Academy of Sciences, CZ-25165 Ondřejov,  
Czech Republic [ppravec@asu.cas.cz]

Observers L. Šarounová, M. Wolf

0.65-m  $f/3.6$  reflector + CCD

USNO-SA1.0, GSC

1980 XX, 5, 2, 9; 1981 DF<sub>2</sub>, 5, 2, 9; 1982 KK<sub>1</sub>, 4, 2, 9; 1984 SK<sub>1</sub>, 5, 2, 3; 1984 SF<sub>6</sub>, 5, 2, 3; 1987 RT<sub>5</sub>, 1, 1, 0; 1989 RQ<sub>1</sub>, 6, 2, 3; 1989 VN<sub>5</sub>, 7, 3, 6; 1989 WJ<sub>1</sub>, 5, 2, 9; 1991 GR<sub>1</sub>, 4, 2, 3; 1991 GH<sub>10</sub>, 4, 2, 4; 1992 DM<sub>6</sub>, 4, 2, 3; 1992 EC<sub>12</sub>, 4, 2, 3; 1992 JE, 2, 1, 0; 1992 SD<sub>1</sub>, 5, 2, 11; 1993 BB<sub>6</sub>, 6, 2, 5; 1995 HJ, 4, 2, 12; 1995 OJ, 6, 2, 3; 1995 OK, 2, 1, 0; 1995 OE<sub>1</sub>, 5, 2, 3; 1995 SH, 5, 2, 7; 1995 SX<sub>12</sub>, 3, 1, 0; 1996 DH, 3, 1, 0; 1996 FG<sub>3</sub>, 3, 1, 0; 1996 HW<sub>1</sub>, 3, 1, 0; 1996 TV<sub>10</sub>, 5, 2, 5; 1996 TC<sub>15</sub>, 4, 2, 8; 1996 VB<sub>8</sub>, 5, 2, 3; 1996 XA<sub>9</sub>, 6, 2, 3; 1997 CB, 4, 2, 2; 1997 SE<sub>5</sub>, 4, 1, 0; 1997 SJ<sub>34</sub> \*, 3, 1, 0; 1997 SK<sub>34</sub> \*, 2, 1, 0; 1997 TL<sub>27</sub>, 2, 1, 0; 1997 UF<sub>9</sub>, 4, 1, 0; 1997 UU<sub>10</sub>, 3, 1, 0; 1997 VU<sub>2</sub>, 3, 1, 0; 1997 VC<sub>5</sub>, 2, 1, 0; 1997 WX, 3, 1, 0; 1997 WS<sub>22</sub>, 2, 1, 0; 1997 WT<sub>22</sub>, 2, 1, 0; 1997 WU<sub>22</sub>, 2, 1, 0; 1997 YM<sub>3</sub>, 1, 1, 0; 1998 AN<sub>8</sub>, 2, 1, 0; 1998 AP<sub>8</sub>, 1, 1, 0; 1998 AQ<sub>8</sub>, 4, 2, 13; 1998 AW<sub>8</sub>, 1, 1, 0; 1998 AX<sub>8</sub>, 2, 1, 0; 1998 BX<sub>7</sub>, 3, 1, 0; 1998 BY<sub>7</sub>, 9, 2, 2; 1998 BZ<sub>7</sub>, 3, 1, 0; 1998 BG<sub>9</sub>, 5, 3, 8; 1998 BF<sub>26</sub>, 3, 1, 0; 1998 BA<sub>34</sub>, 3, 1, 0; 1998 BF<sub>41</sub>, 4, 1, 0; 1998 CS<sub>1</sub>, 5, 1, 0; 1998 DP<sub>1</sub> \*, 6, 2, 1; 1998 DQ<sub>3</sub>, 3, 1, 0; 1998 DT<sub>9</sub>, 4, 1, 0; 1998 DU<sub>9</sub>, 3, 1, 0; 1998 DV<sub>9</sub>, 6, 2, 6; 1998 DA<sub>13</sub>, 4, 1, 0; 1998 DG<sub>16</sub>, 3, 1, 0; 1998 DF<sub>20</sub> \*, 12, 4, 10; 1998 DG<sub>20</sub> \*, 15, 4, 7; 1998 DM<sub>20</sub>, 12, 3, 4; 1998 EC<sub>3</sub>, 8, 2, 3; 1017 T-3, 5, 2, 12; (220), 4, 1, 0; (1862), 3, 1,

0; (2296), 4, 1, 0; (2329), 1, 1, 0; (3863), 2, 1, 0; (5751), 7, 2, 1; (5995), 6, 1, 0; (6456), 1, 1, 0; (7544), 4, 1, 0; [321, 77, 5\*, 1997/09/25–1998/03/06]

### 561 Piskéztető

L. Kiss, Pf. 596, H-6701 Szeged, Hungary [l.kiss@physx.u-szeged.hu]

Observers K. Sárneczky, Gy. Szabó, L. Kiss

Measurers L. Kiss, K. Sárneczky

0.60-m Schmidt telescope + CCD

USNO-A1.0

1931 TD<sub>3</sub>, 3, 1, 0; 1951 SY, 3, 1, 0; 1968 OH, 2, 1, 0; 1968 OL, 2, 1, 0; 1971 UG, 2, 1, 0; 1971 UT, 3, 1, 0; 1973 QG<sub>2</sub>, 2, 1, 0; 1974 QF<sub>1</sub>, 5, 2, 4; 1979 OA, 3, 1, 0; 1984 LK, 2, 1, 0; 1992 ST, 3, 1, 0; 1994 JF<sub>1</sub>, 3, 1, 0; 1995 NB, 2, 1, 0; 1996 PA<sub>7</sub>, 6, 2, 2; 1997 UG<sub>9</sub>, 3, 1, 0; 1997 YU<sub>1</sub>, 3, 1, 0; 1998 DA<sub>13</sub>, 3, 1, 0; 1998 DM<sub>20</sub>, 3, 1, 0; 1998 EC<sub>3</sub>, 3, 1, 0; (470), 2, 1, 0; (2722), 3, 1, 0; (2795), 3, 1, 0; (6654), 3, 1, 0; (6732), 2, 1, 0; [69, 24, 0\*, 1998/02/26–1998/03/02]

### 566 Haleakala-NEAT/GEODSS

E. F. Helin, MS 183-501, Jet Propulsion Laboratory, Pasadena, CA 91109, U.S.A.

[efh@ipl.jpl.nasa.gov]

Observers E. F. Helin, S. H. Pravdo, K. J. Lawrence, D. L. Rabinowitz, S. Groom,

C. Clark, R. Bamberg, S. Levin, J. Lorre, S. Shaklan, R. Byrd, A. Esquibel,

C. Cotton, D. Bascon

1-m  $f/2.2$  Ritchey-Chrétien + CCD

1973 QR<sub>1</sub>, 6, 2, 4; 1974 OE, 3, 1, 0; 1976 YO<sub>2</sub>, 3, 1, 0; 1977 QL<sub>1</sub>, 3, 1, 0; 1978 RX<sub>7</sub>, 3, 1, 0; 1978 VE<sub>15</sub>, 6, 2, 1; 1979 MH<sub>6</sub>, 3, 1, 0; 1979 QJ<sub>1</sub>, 3, 1, 0; 1981 DF, 3, 1, 0; 1981 DK<sub>2</sub>, 3, 1, 0; 1981 EM<sub>1</sub>, 3, 1, 0; 1981 EY<sub>9</sub>, 3, 1, 0; 1981 EC<sub>19</sub>, 6, 2, 1; 1981 EJ<sub>19</sub>, 3, 1, 0; 1981 ET<sub>20</sub>, 3, 1, 0; 1981 EM<sub>27</sub>, 3, 1, 0; 1981 EF<sub>28</sub>, 3, 1, 0; 1981 ET<sub>29</sub>, 3, 1, 0; 1981 ES<sub>35</sub>, 3, 1, 0; 1981 EG<sub>40</sub>, 3, 1, 0; 1981 JE<sub>3</sub>, 9, 3, 5; 1981 SD<sub>2</sub>, 3, 1, 0; 1981 SG<sub>3</sub>, 3, 1, 0; 1981 TZ, 3, 1, 0; 1981 UV<sub>23</sub>, 3, 1, 0; 1982 VF, 3, 1, 0; 1983 CZ<sub>2</sub>, 3, 1, 0; 1983 WQ, 6, 2, 5; 1984 CF, 3, 1, 0; 1984 SC<sub>6</sub>, 3, 1, 0; 1984 SF<sub>6</sub>, 3, 1, 0; 1985 GA<sub>1</sub>, 3, 1, 0; 1985 QM<sub>5</sub>, 3, 1, 0; 1985 TS<sub>1</sub>, 3, 1, 0; 1985 UH<sub>2</sub>, 3, 1, 0; 1985 UF<sub>5</sub>, 3, 1, 0; 1986 QC<sub>1</sub>, 3, 1, 0; 1986 QN<sub>3</sub>, 6, 2, 5; 1986 QO<sub>4</sub>, 3, 1, 0; 1986 RF<sub>7</sub>, 3, 1, 0; 1986 TG<sub>3</sub>, 3, 1, 0; 1987 BB, 3, 1, 0; 1987 RD<sub>1</sub>, 3, 1, 0; 1987 RN<sub>3</sub>, 3, 1, 0; 1987 RO<sub>5</sub>, 3, 1, 0; 1987 SH<sub>4</sub>, 3, 1, 0; 1988 CP<sub>1</sub>, 3, 1, 0; 1988 DH<sub>1</sub>, 3, 1, 0; 1988 EA<sub>2</sub>, 3, 1, 0; 1988 FM<sub>1</sub>, 6, 2, 1; 1988 RC<sub>5</sub>, 3, 1, 0; 1988 SY<sub>1</sub>, 3, 1, 0; 1988 VM<sub>2</sub>, 9, 3, 2; 1988 XX<sub>1</sub>, 6, 2, 5; 1989 CE<sub>8</sub>, 6, 2, 32; 1989 EH<sub>1</sub>, 3, 1, 0; 1989 SC<sub>1</sub>, 3, 1, 0; 1989 SR<sub>1</sub>, 3, 1, 0; 1989 SR<sub>3</sub>, 3, 1, 0; 1989 TY<sub>4</sub>, 3, 1, 0; 1989 TU<sub>10</sub>, 3, 1, 0; 1989 UE, 9, 3, 2; 1989 VN<sub>5</sub>, 3, 1, 0; 1989 WR, 3, 1, 0; 1989 WC<sub>2</sub>, 3, 1, 0; 1990 DZ<sub>1</sub>, 3, 1, 0; 1990 EA<sub>7</sub>, 6, 2, 1; 1990 GS, 6, 2, 1; 1990 HW<sub>1</sub>, 3, 1, 0; 1990 QM<sub>1</sub>, 3, 1, 0; 1990 QO<sub>3</sub>, 3, 1, 0; 1990 RE<sub>5</sub>, 3, 1, 0; 1990 RE<sub>7</sub>, 3, 1, 0; 1990 RW<sub>7</sub>, 3, 1, 0; 1990 RM<sub>17</sub>, 3, 1, 0; 1990 SC<sub>13</sub>, 3, 1, 0; 1990 SX<sub>16</sub>, 3, 1, 0; 1990 TU, 3, 1, 0; 1990 TJ<sub>3</sub>, 3, 1, 0; 1990 TK<sub>8</sub>, 3, 1, 0; 1990 TK<sub>13</sub>, 3, 1, 0; 1990 UB<sub>1</sub>, 3, 1, 0; 1990 UJ<sub>5</sub>, 3, 1, 0; 1990 WX<sub>3</sub>, 3, 1, 0; 1990 YC, 3, 1, 0; 1990 YK, 3, 1, 0; 1991 CN, 3, 1, 0; 1991 GW, 6, 2, 1; 1991 GR<sub>1</sub>, 3, 1, 0; 1991 GY<sub>2</sub>, 3, 1, 0; 1991 GG<sub>7</sub>, 3, 1, 0; 1991 GM<sub>10</sub>, 3, 1, 0; 1991 HM, 3, 1, 0; 1991 LM, 6, 2, 1; 1991 PH<sub>2</sub>, 3, 1, 0; 1991 PE<sub>10</sub>, 3, 1, 0; 1991 PY<sub>10</sub>, 3, 1, 0; 1991 RJ, 3, 1, 0; 1991 RE<sub>20</sub>, 3, 1, 0; 1991 RS<sub>40</sub>, 3, 1, 0; 1991 TW<sub>1</sub>, 3, 1, 0; 1991 VC<sub>2</sub>, 3, 1, 0; 1991 VD<sub>6</sub>, 3, 1, 0; 1991 YZ, 3, 1, 0; 1992 AK<sub>1</sub>, 3, 1, 0; 1992 BB<sub>5</sub>, 3, 1, 0; 1992 CQ<sub>2</sub>, 3, 1, 0; 1992 EB<sub>5</sub>, 3, 1, 0; 1992 FZ<sub>2</sub>, 3, 1, 0; 1992 ML, 3, 1, 0; 1992 OO<sub>1</sub>, 3, 1, 0; 1992 OJ<sub>8</sub>, 3, 1, 0; 1992 PV<sub>1</sub>, 3, 1, 0; 1992 RZ<sub>5</sub>, 3, 1, 0; 1992 SN<sub>1</sub>, 3, 1, 0; 1992 SO<sub>24</sub>, 3, 1, 0; 1992 SK<sub>26</sub>, 6, 2, 1; 1992 SQ<sub>26</sub>, 3, 1, 0; 1992 UR, 3, 1, 0; 1992 UA<sub>3</sub>, 6, 2, 1; 1992 UK<sub>5</sub>, 3, 1, 0; 1992 WX<sub>2</sub>, 6, 1, 0; 1992 WN<sub>3</sub>, 6, 2, 1; 1992 YH, 3, 1, 0; 1992 YW<sub>3</sub>, 3, 1, 0; 1993 CO, 3, 1, 0; 1993 FF<sub>4</sub>, 3, 1, 0; 1993 FO<sub>6</sub>, 3, 1, 0; 1993 FM<sub>7</sub>, 3, 1, 0; 1993 FS<sub>14</sub>, 3, 1, 0; 1993 FM<sub>16</sub>, 3, 1, 0; 1993 FD<sub>22</sub>, 3, 1, 0; 1993 FY<sub>22</sub>, 3, 1, 0; 1993 FG<sub>24</sub>, 6, 1, 0; 1993 FT<sub>37</sub>, 3, 1, 0; 1993 FK<sub>81</sub>, 3, 1, 0; 1993 HH<sub>3</sub>, 6, 2, 2; 1993 SZ, 3, 1, 0; 1993 TC<sub>3</sub>, 6, 2, 5; 1993 TM<sub>12</sub>, 3, 1, 0; 1993 TQ<sub>23</sub>, 3, 1, 0; 1993 TZ<sub>32</sub>, 3, 1, 0; 1993 UR<sub>2</sub>, 3, 1, 0; 1993 UF<sub>7</sub>, 3, 1, 0; 1993 VC<sub>5</sub>, 6, 2, 1; 1993 VB<sub>8</sub>, 3, 1, 0; 1993 YN<sub>2</sub>, 6, 2, 32; 1994 AF, 3, 1, 0; 1994 AV<sub>1</sub>, 3, 1, 0; 1994 AH<sub>3</sub>, 6, 1, 0; 1994 BN<sub>4</sub>, 3, 1, 0; 1994 CE<sub>1</sub>, 3, 1, 0; 1994 CT<sub>12</sub>, 3, 1, 0; 1994 CC<sub>18</sub>, 3, 1, 0; 1994 EQ, 3, 1, 0; 1994 FS, 6, 2, 5; 1994 JG, 6, 2, 1; 1994 JS<sub>1</sub>, 9, 2, 1; 1994 VC<sub>7</sub>, 3, 1, 0; 1995 AN, 6, 2, 2; 1995 HP, 3, 1, 0; 1995 KZ, 3, 1, 0; 1995 OD<sub>1</sub>, 6, 2, 5; 1995 SO<sub>5</sub>, 3, 1, 0; 1995 WC<sub>4</sub>, 3, 1, 0; 1995 WB<sub>43</sub>, 3, 1, 0; 1996 EN, 6, 2, 1; 1996 LP<sub>1</sub>, 6, 2, 1; 1996 PK, 3, 1, 0; 1996 RE<sub>1</sub>, 3, 1, 0; 1996 RB<sub>4</sub>, 3, 1, 0; 1996 SS<sub>4</sub>, 6, 2, 5; 1996 TG, 3, 1, 0; 1996 TL<sub>10</sub>, 3, 1, 0; 1996 TO<sub>10</sub>, 3, 1, 0; 1996 TV<sub>10</sub>, 3, 1, 0; 1996 TB<sub>67</sub>, 3, 1, 0; 1996 TC<sub>67</sub>, 3, 1, 0; 1996 TE<sub>67</sub>, 3, 1, 0; 1996 TK<sub>67</sub>, 3, 1, 0; 1996 TL<sub>67</sub>, 3, 1, 0; 1996 TP<sub>67</sub> \*, 3, 1, 0; 1996 TQ<sub>67</sub> \*, 3, 1, 0; 1996 TR<sub>67</sub> \*, 3, 1, 0; 1996 TT<sub>67</sub>, 3, 1, 0; 1996 TU<sub>67</sub> \*, 3, 1, 0; 1996 TV<sub>67</sub> \*, 3, 1, 0; 1996 TY<sub>67</sub> \*, 3, 1, 0; 1996 UT, 3, 1, 0; 1996 UV, 3, 1, 0; 1996 UD<sub>3</sub>, 3, 1, 0; 1996 VC<sub>1</sub>, 3, 1, 0; 1996 VO<sub>1</sub>, 3, 1, 0; 1996 VS<sub>4</sub>, 3, 1, 0; 1996 VB<sub>5</sub>, 3, 1, 0; 1996 VP<sub>6</sub>, 3, 1, 0; 1996 VA<sub>7</sub>, 3, 1, 0; 1996 VE<sub>8</sub>, 3, 1, 0; 1996 VG<sub>8</sub>, 15, 2, 1; 1996 VL<sub>8</sub>, 6, 2, 5; 1996 VD<sub>9</sub>, 3, 1, 0; 1996 VJ<sub>30</sub>, 3, 1, 0; 1996 VM<sub>30</sub>, 6, 2, 1; 1996 VS<sub>30</sub>, 3, 1, 0; 1996 WQ, 6, 2, 2; 1996 XR<sub>1</sub>, 3, 1, 0; 1996 XT<sub>1</sub>, 3, 1, 0; 1996 XG<sub>9</sub>, 3, 1, 0; 1996 XW<sub>12</sub>,

3, 1, 0; 1996 XV<sub>19</sub>, 3, 1, 0; 1996 XN<sub>26</sub>, 6, 2, 1; 1996 YO<sub>2</sub>, 3, 1, 0; 1997 AY, 3, 1, 0; 1997 AO<sub>1</sub>, 6, 1, 0; 1997 SU<sub>34</sub> \*, 6, 2, 2; 1997 SV<sub>34</sub> \*, 6, 2, 2; 1997 SW<sub>34</sub> \*, 6, 2, 3; 1997 SX<sub>34</sub> \*, 6, 2, 2; 1997 SG<sub>35</sub> \*, 6, 2, 61; 1997 TC<sub>18</sub>, 3, 1, 0; 1997 TM<sub>27</sub>, 3, 1, 0; 1997 UC<sub>25</sub>, 3, 1, 0; 1997 VE<sub>6</sub>, 3, 1, 0; 1997 VM<sub>6</sub>, 3, 1, 0; 1997 WU<sub>8</sub>, 3, 1, 0; 1997 WB<sub>22</sub>, 3, 1, 0; 1997 WO<sub>23</sub>, 6, 2, 32; 1997 WG<sub>44</sub>, 3, 1, 0; 1997 WT<sub>44</sub>, 3, 1, 0; 1997 WJ<sub>46</sub>, 3, 1, 0; 1997 WV<sub>55</sub>, 3, 1, 0; 1997 XF<sub>1</sub>, 3, 1, 0; 1997 XS<sub>3</sub>, 3, 1, 0; 1997 XX<sub>3</sub>, 3, 1, 0; 1997 XD<sub>5</sub>, 3, 1, 0; 1997 XV<sub>7</sub>, 6, 2, 27; 1997 XN<sub>8</sub>, 6, 1, 0; 1997 YK<sub>4</sub>, 3, 1, 0; 1997 YO<sub>7</sub>, 3, 1, 0; 1997 YN<sub>10</sub>, 3, 1, 0; 1997 YT<sub>10</sub>, 3, 1, 0; 1997 YA<sub>11</sub>, 3, 1, 0; 1997 YF<sub>11</sub>, 6, 2, 1; 1997 YJ<sub>11</sub>, 3, 1, 0; 1997 YS<sub>11</sub>, 3, 1, 0; 1997 YT<sub>11</sub>, 3, 1, 0; 1997 YU<sub>11</sub>, 3, 1, 0; 1997 YQ<sub>13</sub>, 6, 2, 1; 1997 YR<sub>13</sub>, 6, 2, 26; 1997 YS<sub>13</sub>, 6, 2, 27; 1997 YY<sub>13</sub>, 6, 2, 26; 1997 YB<sub>14</sub>, 3, 1, 0; 1997 YC<sub>14</sub>, 3, 1, 0; 1997 YD<sub>14</sub>, 3, 1, 0; 1997 YE<sub>14</sub>, 9, 3, 4; 1997 YF<sub>14</sub>, 3, 1, 0; 1997 YQ<sub>14</sub>, 3, 1, 0; 1997 YB<sub>17</sub>, 3, 1, 0; 1997 YE<sub>18</sub>, 3, 1, 0; 1997 YF<sub>18</sub>, 3, 1, 0; 1997 YK<sub>20</sub> \*, 3, 1, 0; 1997 YL<sub>20</sub> \*, 3, 1, 0; 1997 YM<sub>20</sub> \*, 3, 1, 0; 1997 YN<sub>20</sub> \*, 3, 1, 0; 1997 YQ<sub>20</sub> \*, 3, 1, 0; 1997 YR<sub>20</sub> \*, 3, 1, 0; 1997 YU<sub>20</sub> \*, 3, 1, 0; 1997 YV<sub>20</sub> \*, 3, 1, 0; 1997 YW<sub>20</sub> \*, 3, 1, 0; 1997 YX<sub>20</sub> \*, 3, 1, 0; 1997 YY<sub>20</sub> \*, 3, 1, 0; 1997 YA<sub>21</sub> \*, 3, 1, 0; 1997 YB<sub>21</sub> \*, 3, 1, 0; 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(5917), 6, 2, 1; (5935), 3, 1, 0; (5937), 3, 1, 0; (5938), 3, 1, 0; (5962), 3, 1, 0; (5969), 3, 1, 0; (5971), 3, 1, 0; (5977), 3, 1, 0; (5996), 3, 1, 0; (5998), 6, 1, 0; (6001), 3, 1, 0; (6005), 3, 1, 0; (6006), 6, 2, 1; (6028), 3, 1, 0; (6030), 3, 1, 0; (6051), 3, 1, 0; (6068), 3, 1, 0; (6075), 3, 1, 0; (6079), 3, 1, 0; (6086), 3, 1, 0; (6103), 3, 1, 0; (6113), 3, 1, 0; (6124), 3, 1, 0; (6165), 3, 1, 0; (6227), 3, 1, 0; (6244), 6, 2, 1; (6336), 3, 1, 0; (6344), 3, 1, 0; (6377), 6, 2, 1; (6406), 3, 1, 0; (6422), 3, 1, 0; (6427), 6, 2, 5; (6430), 3, 1, 0; (6433), 3, 1, 0; (6438), 3, 1, 0; (6449), 6, 2, 1; (6453), 3, 1, 0; (6483), 3, 1, 0; (6495), 3, 1, 0; (6502), 3, 1, 0; (6508), 3, 1, 0; (6512), 3, 1, 0; (6517), 3, 1, 0; (6521), 3, 1, 0; (6539), 3, 1, 0; (6557), 3, 1, 0; (6559), 6, 1, 0; (6570), 6, 2, 1; (6580), 3, 1, 0; (6588), 3, 1, 0; (6590), 3, 1, 0; (6591), 3, 1, 0; (6639), 3, 1, 0; (6653), 3, 1, 0; (6665), 3, 1, 0; (6668), 6, 2, 5; (6670), 6, 1, 0; (6677), 3, 1, 0; (6730), 6, 2, 1; (6785), 3, 1, 0; (6799), 3, 1, 0; (7129), 3, 1, 0; (7133), 3, 1, 0; (7163), 3, 1, 0; (7168), 3, 1, 0; (7195), 3, 1, 0; (7224), 6, 2, 32; (7227), 3, 1, 0; (7230), 3, 1, 0; (7232), 3, 1, 0; (7242), 6, 2, 5; (7249), 3, 1, 0; (7251), 3, 1, 0; (7257), 3, 1, 0; (7261), 3, 1, 0; (7263), 3, 1, 0; (7265), 3, 1, 0; (7269), 3, 1, 0; (7281), 3, 1, 0; (7293), 3, 1, 0; (7297), 3, 1, 0; (7302), 3, 1, 0; (7307), 6, 2, 1; (7309), 3, 1, 0; (7319), 3, 1, 0; (7325), 3, 1, 0; (7326), 3, 1, 0; (7343), 3, 1, 0; (7346), 6, 2, 1; (7347), 9, 3, 3; (7355), 3, 1, 0; (7356), 3, 1, 0; (7365), 3, 1, 0; (7375), 3, 1, 0; (7380), 3, 1, 0; (7381), 3, 1, 0; (7390), 3, 1, 0; (7397), 3, 1, 0; (7419), 3, 1, 0; (7429), 3, 1, 0; (7431), 3, 1, 0; (7432), 3, 1, 0; (7444), 3, 1, 0; (7446), 3, 1, 0; (7454), 3, 1, 0; (7456), 6, 1, 0; (7457), 3, 1, 0; (7466), 3, 1, 0; (7501), 9, 3, 4; (7502), 6, 2, 5; (7505), 3, 1, 0; (7507), 3, 1, 0; (7529), 3, 1, 0; (7551), 9, 3, 5; (7577), 3, 1, 0; (7582), 6, 2, 5; (7593), 3, 1, 0; (7617), 3, 1, 0; (7692), 3, 1, 0; (7737), 3, 1, 0; (7775), 6, 2, 2; (8116), 3, 1, 0; (8159), 3, 1, 0; (8170), 3, 1, 0; (8229), 3, 1, 0; (8249), 3, 1, 0; (8257), 6, 2, 1; (8272), 3, 1, 0; (8275), 3, 1, 0; (8281), 3, 1, 0; (8289), 3, 1, 0; (8298), 6, 2, 1; (8307), 6, 2, 1; (8310), 3, 1, 0; [5247, 1276, 233\*, 1996/10/08-1998/02/2

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Observers D. J. Tholen (2), C. Veillet (3), R. Carlberg (4), D. Patton (4), G. Wirth (4), H. Lin (4), M. Sawicki (4), S. L. Morris (4), H. Yee (4), D. Schade (4)

Measurers D. J. Tholen (2), R. J. Whiteley (3), D. D. Balam (4)

2.24-m reflector + CCD, 3.6-m reflector + CCD

GSC, USNO-A1.0

(2) 1998 DV<sub>9</sub> \*, 12, 4, 3; [12, 1, 1\*, 1998/02/23–1998/02/26]

(3) 1997 CQ<sub>29</sub>, 7, 3, 2; 1997 CR<sub>29</sub>, 5, 2, 2; 1997 CV<sub>29</sub>, 7, 3, 2; [19, 3, 0\*, 1998/02/16–1998/02/18]

(4) 1996 TY<sub>66</sub> \*, 4, 2, 4; 1996 TZ<sub>66</sub> \*, 4, 2, 4; 1996 TA<sub>67</sub> \*, 4, 2, 2; 1996 TS<sub>67</sub> \*, 4, 2, 4; (4354), 2, 1, 0; [18, 5, 4\*, 1996/10/11–1997/08/31]

### 587 Sormano

P. Sicoli, Via Valli 9, I-23846 Garbagnate Monastero (Lecco), Italy

[[sormano@tin.it](mailto:sormano@tin.it)]

Observers M. Cavagna, P. Sicoli, P. Ghezzi, P. Chiavenna, A. Testa, F. Manca, G. Ventre

0.5-m reflector + CCD

GSC

1981 GG, 4, 2, 2; 1992 AP<sub>1</sub>, 5, 2, 2; 1992 YU<sub>1</sub>, 4, 2, 2; 1993 YN<sub>2</sub>, 9, 3, 3; 1994 AD<sub>3</sub>, 10, 4, 1011; 1994 VW<sub>1</sub>, 2, 1, 0; 1996 VW<sub>39</sub> \*, 4, 1, 0; 1996 YP<sub>3</sub>, 3, 2, 7; 1998 AX<sub>4</sub>, 5, 2, 10; 1998 BE<sub>7</sub>, 4, 2, 16; 1998 BX<sub>7</sub>, 4, 2, 3; 1998 BY<sub>7</sub>, 15, 4, 5; 1998 BZ<sub>7</sub>, 17, 6, 16; 1998 BG<sub>9</sub>, 2, 1, 0; 1998 BN<sub>16</sub>, 8, 2, 1; 1998 BA<sub>19</sub>, 3, 1, 0; 1998 BB<sub>19</sub>, 4, 2, 11; 1998 BC<sub>19</sub>, 4, 2, 12; 1998 BD<sub>19</sub>, 5, 3, 12; 1998 BQ<sub>26</sub>, 3, 1, 0; 1998 CS<sub>1</sub>, 7, 2, 1; 1998 DM \*, 5, 2, 1; 1998 DH<sub>5</sub>, 5, 2, 1; 1998 DJ<sub>5</sub>, 4, 2, 1; 1998 DV<sub>9</sub>, 5, 2, 1; 1998 DG<sub>11</sub> \*, 13, 6, 14; 1998 DY<sub>11</sub> \*, 8, 4, 4; 1998 DA<sub>13</sub>, 2, 1, 0; 1998 DK<sub>23</sub> \*, 9, 4, 6; 1998 DL<sub>23</sub> \*, 9, 3, 3; 1998 EC<sub>3</sub>, 2, 1, 0; 1998 EM<sub>8</sub> \*, 5, 2, 3; (1333), 2, 1, 0; (2722), 5, 2, 1; (5996), 4, 2, 2; (7307), 2, 1, 0; [202, 36, 7\*, 1995/05/21–1998/03/05]

### 589 Santa Lucia Stroncone

A. Vagnozzi, Via Santa Lucia 68, I-05039 Stroncone (Terni), Italy

[[vagnozzi@freenet.hut.fi](mailto:vagnozzi@freenet.hut.fi)]

Observers A. Vagnozzi, G. Bernabei, V. Risoldi, V. Scirri

0.50-m  $f/2.8$  Ritchey-Chrétien + CCD

GSC

1992 WG<sub>5</sub>, 2, 1, 0; 1996 QU, 14, 5, 25; 1997 YR<sub>8</sub>, 11, 3, 4; 1998 BW<sub>7</sub>, 9, 3, 19; 1998 DX \*, 18, 5, 8; 1998 DU<sub>10</sub> \*, 17, 5, 10; 1998 DD<sub>20</sub> \*, 24, 7, 10; 1998 DE<sub>20</sub> \*, 8, 2, 1; (8243), 6, 2, 1; [109, 9, 4\*, 1998/02/02–1998/03/06]

### 595 Farra d'Isonzo

L. Bittesini, Via dei Conventi 10, I-34070 Farra D'Isonzo (GO), Italy

[[ccaf@tmedia.it](mailto:ccaf@tmedia.it)]

Observers A. Toso, W. Boschin, L. Drigo, G. Lombardi, E. Pettarin, F. Piani

Measurers L. Drigo, G. Lombardi, E. Pettarin, A. Toso

0.4-m  $f/4.5$  reflector + CCD

GSC

1993 UD<sub>1</sub>, 2, 1, 0; 1993 XY, 4, 2, 1; 1994 DA, 2, 1, 0; 1996 LP<sub>1</sub>, 2, 1, 0; 1996 TO, 6, 3, 3; 1996 TX<sub>7</sub>, 5, 2, 1; 1996 XJ<sub>26</sub>, 4, 2, 2; 1997 YK<sub>9</sub>, 4, 2, 1; 1998 BJ<sub>19</sub>, 5, 2, 1; 1998 BK<sub>19</sub>, 4, 2, 1; 1998 BM<sub>26</sub>, 6, 2, 3; 1998 BA<sub>30</sub>, 4, 2, 1; 1998 CQ<sub>1</sub>, 4, 2, 12; 1998 CC<sub>4</sub> \*, 6, 3, 9; 1998 DW<sub>1</sub> \*, 7, 3, 6; 1998 DX<sub>1</sub> \*, 9, 4, 8; 1998 DY<sub>1</sub> \*, 7, 3, 5; 1998 DH<sub>14</sub> \*, 6, 2, 2; 1998 DJ<sub>14</sub> \*, 8, 3, 3; 1998 DK<sub>14</sub> \*, 4, 2, 2; 1998 DR<sub>23</sub> \*, 4, 2, 1; 1998 DS<sub>23</sub> \*, 4, 2, 1; [107, 22, 9\*, 1998/01/17–1998/02/27]

### 596 Colleverde di Guidonia

V. S. Casulli, Via M. Rosa 1, I-00010 Colleverde di Guidonia (RM), Italy

[[v.casulli@priminet.it](mailto:v.casulli@priminet.it)]

0.40-m  $f/3.2$  reflector + CCD

GSC

1993 WB, 8, 3, 25; 1994 CE<sub>1</sub>, 4, 2, 1; 1994 EB, 3, 1, 0; 1996 RB<sub>4</sub>, 3, 1, 0; 1996 TG, 3, 1, 0; 1996 UD<sub>3</sub>, 6, 2, 16; 1996 VM, 2, 1, 0; 1997 AP<sub>17</sub>, 3, 1, 0; 1998 BA<sub>4</sub>, 8, 3, 12; 1998 CB<sub>2</sub> \*, 15, 5, 17; 1998 DO \*, 12, 4, 11; 1998 DJ<sub>11</sub> \*, 12, 4, 5; 1998 DP<sub>13</sub> \*, 9, 3, 3; (7303), 6, 2, 2; [94, 14, 4\*, 1998/02/06–1998/03/03]

### 610 Pianoro

V. Goretta, Via Resistenza 93, I-40065 Pianoro (BO), Italy

[[astrofil@astbo1.bo.cnr.it](mailto:astrofil@astbo1.bo.cnr.it)]

0.25-m  $f/4$  Schmidt-Cassegrain + CCD

GSC

1981 EM<sub>1</sub>, 3, 1, 0; 1987 DW<sub>6</sub>, 3, 1, 0; 1988 DH<sub>1</sub>, 3, 1, 0; 1988 EA<sub>2</sub>, 3, 1, 0; 1990 RV, 9, 3, 21; 1991 RK<sub>11</sub>, 6, 2, 8; 1992 CQ<sub>2</sub>, 3, 1, 0; 1993 CO, 3, 1, 0; 1993 DO, 3, 1, 0; 1993 FT<sub>37</sub>, 3, 1, 0; 1993 FR<sub>44</sub>, 3, 1, 0; 1993 HH<sub>3</sub>, 6, 2, 2; 1993 XV, 3, 1, 0; 1996 VQ<sub>1</sub>, 7, 2, 13; 1998 BZ<sub>7</sub>, 9, 3, 5; (516), 3, 1, 0; (569), 3, 1, 0; (602), 3, 1, 0; (1285), 3, 1, 0; (1521), 3, 1, 0; (1638), 3, 1, 0; (1691), 3, 1, 0; (1755), 6, 2, 3; (1945), 3, 1, 0; (1951), 3, 1, 0; (2409), 3, 1, 0; (2731), 3, 1, 0; (2935), 3, 1, 0; (3060), 3, 1, 0; (3074), 6, 2, 3; (3389), 3, 1, 0; (3436), 3, 1, 0; (3798), 3, 1, 0; (3800), 6, 2, 2; (4345), 3, 1, 0; (4807), 3, 1, 0; (4963), 3, 1, 0; (5528), 3, 1, 0; (5548), 6, 2, 3; (5609), 3, 1, 0; (5870), 3, 1, 0; (6676), 3, 1, 0; [160, 42, 0\*, 1998/02/05–1998/02/28]

### 611 Starkenburg Sternwarte, Heppenheim

M. Busch, Giessener Strasse 4, D-64646 Heppenheim, Germany [[mab@iez.com](mailto:mab@iez.com)]

Observers P. Geffert, S. Kluegl, J. Rothermel, E. Schwab, K. Sonneberg,

P. Thiessen, R. Stoss, S. Kl=FCgl

Measurers F. Hormuth, S. Kluegl, P. Geffert, R. Stoss, S. Kl=FCgl, J. Rothermel,

P. Geffert

0.45-m  $f/4.4$  Newtonian reflector + CCD, 0.20-m  $f/6$  Newtonian reflector + CCD,

0.19-m  $f/4$  Flat-Field camera + CCD

USNO-SA1.0

1998 CC<sub>2</sub> \*, 23, 7, 20; 1998 DK<sub>1</sub> \*, 14, 4, 8; [37, 2, 2\*, 1998/02/07–1998/02/26]

### 619 Sabadell

F. Casarramona, P.O. Box 50, E-8200 Sabadell (BCN), Spain

[[astrosab@redestb.es](mailto:astrosab@redestb.es)]

Observers F. Casarramona, E. Vigil, A. Ruiz, J. Presa, J. Camarasa, M. Guillen

Measurer F. Casarramona

0.51-m  $f/3.9$  reflector + CCD

GSC

1998 BZ<sub>7</sub>, 5, 2, 1; [5, 1, 0\*, 1998/02/13–1998/02/14]

### 620 Observatorio Astronómico de Mallorca

M. Blasco, Afueras s/n, E-07144 Costitx, Balears, Spain

[[astroam@dinky.bitel.es](mailto:astroam@dinky.bitel.es)]

Observers R. Pacheco, A. Lopez

Measurer A. Lopez

0.30-m  $f/3.3$  Schmidt-Cassegrain + CCD

GSC

1991 RE<sub>20</sub>, 7, 2, 1; 1998 DD<sub>11</sub> \*, 14, 4, 11; 1998 DO<sub>27</sub> \*, 7, 2, 3; 1998 EC<sub>3</sub>, 5, 1, 0; [33, 4, 2\*, 1998/02/19–1998/03/03]

### 621 Bergisch Gladbach

W. Bickel, Schau ins Land 21, D-51429 Bergisch Gladbach, Germany [0220455671-0001@t-online.de]

0.60-m  $f/5$  reflector + CCD

GSC

1996 TO<sub>66</sub>, 4, 4, 58; 1997 RB<sub>9</sub>, 14, 4, 57; 1997 UO<sub>24</sub>, 6, 2, 29; 1997 UQ<sub>24</sub>, 3, 1, 0; 1998 BY<sub>46</sub> \*, 6, 2, 1; (2285), 7, 2, 1; (5972), 9, 2, 1; [49, 7, 1\*, 1997/07/30–1998/02/02]

**627 Blauvac**

R. Roy, Le Badassier St Esteve, F-84570 Blauvac, France [Rene.Roy@wanadoo.fr]

0.26-m  $f/4.7$  reflector + CCD

GSC

1989 CE<sub>8</sub>, 3, 1, 0; 1997 AY, 3, 1, 0; 1997 AO<sub>1</sub>, 3, 1, 0; 1998 BB<sub>42</sub>, 9, 4, 24; 1998 DN<sub>1</sub>, 2, 1, 0; 1998 DJ<sub>20</sub> \*, 9, 3, 4; 1998 DK<sub>20</sub> \*, 9, 3, 4; 6643 P-L, 3, 1, 0; 2045 T-2, 3, 1, 0; (959), 3, 1, 0; (4119), 3, 1, 0; [50, 11, 2\*, 1998/01/29–1998/03/02]

**628 Mülheim-Ruhr**

A. Martin, Turtle Star Observatory, Friedhostr. 15, D-45478 Mülheim-Ruhr,

Germany [axelm@bph.ruhr-uni-bochum.de]

0.2-m Schmidt-Cassegrain + CCD

GSC

1992 AB, 10, 3, 5; [10, 1, 0\*, 1998/02/13–1998/02/18]

**631 Hamburg-Georgswerder**

M. Buck, Niedergeorgswerder Deich 96a, D-21109 Hamburg, Germany

[michael.buck@hamburg.netsurf.de]

0.15-m  $f/8$  refractor + CCD

GSC

1986 QQ, 2, 1, 0; 1989 RO<sub>2</sub>, 4, 2, 9; 1990 FD<sub>1</sub>, 2, 1, 0; 1992 SW<sub>17</sub>, 2, 1, 0; 1993 QO, 2, 1, 0; 1995 GW, 4, 2, 9; 4343 T-3, 4, 2, 9; (1035), 2, 1, 0; (1843), 2, 1, 0; (3560), 4, 2, 9; (3800), 4, 2, 9; (8141), 2, 1, 0; (8284), 2, 1, 0; (8292), 2, 1, 0; [38, 14, 0\*, 1998/01/31–1998/03/01]

**632 San Polo A Mosciano**

L. Ferrini, C/O Villa Mirenda, Via San Polo A Mosciano, Firenze, Italy

[ferrini@dada.it]

Observers M. Mannucci, N. Montigiani, W. Benedetti

Measurers G. Forti, M. Mannucci, N. Montigiani

0.25-m  $f/5.6$  Newtonian reflector + CCD

GSC

1997 XK<sub>10</sub>, 3, 2, 2; (2407), 2, 1, 0; (6463), 2, 1, 0; [7, 3, 0\*, 1998/01/18–1998/02/21]

**633 Romito**

M. Bernazzani, via Provinciale 170, I-19030 Romito Magra (SP), Italy

[naidabis@col.it]

Observers N. Biso, M. Bernazzani

Measurer M. Bernazzani

0.30-m  $f/5.1$  Schmidt-Cassegrain + CCD

GSC

(2834), 3, 1, 0; (3258), 3, 1, 0; (3651), 3, 1, 0; (3729), 3, 1, 0; (3783), 3, 1, 0; (4383), 3, 1, 0; (4480), 3, 1, 0; (4735), 3, 1, 0; (4837), 3, 1, 0; (5151), 3, 1, 0; (6409), 3, 1, 0; (6668), 6, 2, 3; [39, 12, 0\*, 1998/02/26–1998/03/05]

**634 Crolles**

O. Thizy, 267 rue Victor Hugo, Cidex 272F, F-38920 Crolles, France

[thizy@alpes-net.fr]

0.30-m  $f/3.45$  reflector + CCD

GSC

(6037), 34, 1, 0; [34, 1, 0\*, 1998/03/06–1998/03/07]

**658 Dominion Astrophysical Observatory, Victoria**

J. B. Tatum, Dept. of Physics, University of Victoria, P.O. Box 3055, Victoria, BC

V8W 3P6, Canada [universe@uvvm.uvic.ca]

Observers D. D. Balam, G. C. L. Aikman, S. Banh

Measurers D. D. Balam, G. C. L. Aikman

1.82-m Plaskett telescope + CCD

GSC, USNO-A1.0

1998 DV<sub>9</sub>, 2, 1, 0; 1998 DV<sub>20</sub>, 2, 1, 0; 1998 DC<sub>30</sub>, 3, 1, 0; 1998 EP<sub>4</sub>, 3, 1, 0; 1998 EP<sub>8</sub>, 6, 2, 1; [16, 5, 0\*, 1998/03/05–1998/03/06]

**670 Camarillo**

J. E. Rogers, 441 Rowland Avenue, Camarillo, CA 93010, U.S.A.

[72401.3174@compuserve.com]

0.25-m Schmidt-Cassegrain + CCD

GSC

(6037), 11, 2, 2; [11, 1, 0\*, 1998/03/07–1998/03/09]

**673 Table Mountain Observatory**

D. L. Rabinowitz, Jet Propulsion Laboratory, Pasadena, CA 91109, U.S.A.

[dlr@ipl.jpl.nasa.gov]

Observers D. L. Rabinowitz, L. Benner

0.6-m reflector + CCD

1998 BT<sub>23</sub>, 3, 1, 0; 1998 DA<sub>13</sub>, 3, 1, 0; 1998 DG<sub>16</sub>, 6, 2, 1; [12, 3, 0\*, 1998/02/27–1998/03/01]

**675 Palomar**

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E. Bowell, Lowell Observatory, 1400 West Mars Hill Road, Flagstaff, AZ 86001, U.S.A. [elgb@lowell.edu] (6)

B. Gladman, Canadian Institute for Theoretical Astrophysics, 60 St. George Street, Toronto, ON M5S 1A7, Canada [gladman@cita.utoronto.ca] (8)

9 = 6 + 3

Observers P. Benjoya, J. A. Burns (8, H), T. Gehrels (4, L), B. Gladman (8, H),

H. E. Holt (3, S), J. J. Kavelaars (8, H), K. A. Lawler (3, S), D. H. Levy

(3, S), F. J. Méndez (3, S), P. D. Nicholson (8, H), C. M. Olmstead

(3, S), C. S. Shoemaker (3, S), E. M. Shoemaker (3, S), J. Stiffler (3, S),

N. G. Thomas (3, S), D. K. Williams (3, S), L. A. Zimmerman (3, S)

Measurers B. Gladman (8), J. J. Kavelaars (8), S. M. Hermann (6), B. A. Skiff (6),

C. S. Shoemaker (3), C. J. van Houten (4), I. van Houten-Groeneveld (4),

A. Wisse (4)

5-m Hale reflector (H), 1.2-m Oschin Schmidt (L), 0.46-m Schmidt (S)

GSC, PPM

(4) 2727 P-L \*, 7, 7, 32; 9056 P-L \*, 4, 4, 9; 2202 T-2 \*, 15, 8, 16; 4188 T-2 \*, 15, 8, 16; 4223 T-2 \*, 10, 5, 11; 5185 T-2 \*, 12, 6, 11; 1084 T-3 \*, 11, 6, 15; 2029 T-3 \*, 13, 7, 15; 2282 T-3 \*, 19, 7, 15; 2293 T-3 \*, 13, 7, 15; 2332 T-3 \*, 17, 7, 15; 4138 T-3 \*, 13, 7, 15; 4251 T-3 \*, 12, 6, 11; [161, 13, 13\*, 1960/09/24–1977/10/22]

(8) 1997 RL<sub>13</sub> \*, 4, 2, 1; [4, 1, 1\*, 1997/09/05–1997/09/06]

(9) 1980 UL, 2, 1, 0; 1983 CH, 4, 2, 39; 1984 YL<sub>1</sub>, 2, 1, 0; 1986 RP<sub>2</sub>, 4, 3, 1455; 1989 EX, 2, 1, 0; 1989 GB, 2, 1, 0; 1989 GE, 2, 1, 0; 1990 KX, 1, 1, 0; 1990 OX<sub>1</sub>, 2, 1, 0; 1990 QZ<sub>5</sub>, 2, 1, 0; 1991 PZ<sub>17</sub>, 2, 1, 0; 1991 RP, 2, 1, 0; 1991 RJ<sub>22</sub>, 2, 1, 0; 1991 RD<sub>24</sub>, 2, 1, 0; 1991 SM, 2, 1, 0; 1991 SN, 2, 1, 0; 1991 SO, 2, 1, 0; 1991 SP, 2, 1, 0; 1991 SQ, 2, 1, 0; 1991 SR, 2, 1, 0; 1991 ST, 2, 1, 0; 1991 SU, 2, 1, 0; 1991 SA<sub>1</sub>, 2, 1, 0; 1993 EJ, 2, 1, 0; 1993 FA<sub>2</sub>, 2, 1, 0; 1993 FR<sub>11</sub>, 3, 2, 2010; 1993 FS<sub>13</sub>, 2, 1, 0; 1993 FU<sub>13</sub>, 2, 1, 0; 1993 FF<sub>14</sub>, 1, 1, 0; 1993 FS<sub>14</sub>, 2, 1, 0; 1993 FT<sub>14</sub>, 2, 1, 0; 1993 FY<sub>14</sub>, 1, 1, 0; 1993 FA<sub>15</sub>, 1, 1, 0; 1993 FE<sub>15</sub>, 2, 1, 0; 1993 FG<sub>15</sub>, 2, 1, 0; 1994 GQ, 2, 1, 0; 1994 RX, 2, 1, 0; 1995 WE, 4, 2, 1043; 1996 DF, 2, 1, 0; 1996 XY, 4, 2, 2; 1996 XU<sub>1</sub>, 2, 1, 0; 1997 AP<sub>17</sub>, 2, 1, 0; 1997 BH<sub>3</sub>, 2, 1, 0; 1997 FU, 2, 1, 0; 1997 TH<sub>17</sub>, 1, 1, 0; 1997 XT<sub>5</sub>, 2, 1, 0; 1997 YO<sub>4</sub>, 4, 2, 2; 1997 YB<sub>8</sub>, 2, 1, 0; 6673 P-L, 1, 1, 0; 1324 T-2, 1, 1, 0; (28), 2, 1, 0; (87), 2, 1, 0; (166), 2, 1, 0; (250), 2, 1, 0; (353), 2, 1, 0; (414), 2, 1, 0; (512), 1, 1, 0; (520), 2, 1, 0; (715), 2, 1, 0; (721), 2, 1, 0; (1119), 2, 1, 0; (1123), 2, 1, 0; (1211), 2, 1, 0; (1216), 2, 1, 0; (1346), 2, 1, 0; (1384), 2, 1, 0; (1466), 2, 1, 0; (1534), 2, 1, 0; (1594), 3, 2, 2; (2287), 2, 1, 0; (2330), 2,

1, 0; (2373), 2, 1, 0; (2471), 3, 2, 39; (2531), 2, 1, 0; (2612), 2, 1, 0; (2741), 2, 1, 0; (2801), 2, 1, 0; (2846), 4, 2, 2; (3203), 2, 1, 0; (3275), 2, 1, 0; (3344), 2, 1, 0; (3368), 2, 1, 0; (3411), 2, 1, 0; (3446), 2, 1, 0; (3493), 2, 1, 0; (3779), 2, 1, 0; (4100), 4, 2, 2; (4167), 2, 1, 0; (4173), 1, 1, 0; (4262), 2, 1, 0; (4315), 2, 1, 0; (4544), 2, 1, 0; (4580), 2, 1, 0; (4681), 2, 1, 0; (5006), 4, 2, 899; (5180), 2, 1, 0; (5485), 2, 1, 0; (5611), 2, 1, 0; (5734), 2, 1, 0; (5944), 2, 1, 0; (6148), 2, 1, 0; (6424), 2, 1, 0; (6673), 2, 1, 0; (6740), 2, 1, 0; (6845), 2, 1, 0; (7260), 2, 1, 0; (7936), 2, 1, 0; (8030), 2, 1, 0; (8113), 2, 1, 0; (8173), 2, 1, 0; [230, 110, 0\*, 1988/03/18–1994/09/30]

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0.46-m  $f/4.5$  reflector + CCD

GSC

1995 ON, 6, 2, 1; 1996 OF, 4, 2, 2; 1996 RE<sub>1</sub>, 4, 2, 1; 1996 RK<sub>1</sub>, 5, 2, 1; 1996 TF<sub>5</sub>, 4, 2, 1; 1996 TH<sub>5</sub>, 4, 2, 1; 1996 TT<sub>11</sub>, 8, 3, 2; 1996 VM<sub>2</sub>, 4, 2, 2; 1996 VQ<sub>6</sub>, 4, 2, 2; 1996 WQ, 3, 1, 0; 1996 XC, 5, 2, 1; 1996 XE<sub>2</sub>, 6, 2, 1; 1996 XD<sub>20</sub>, 5, 2, 1; 1996 XZ<sub>25</sub>, 4, 2, 1; 1997 AA, 5, 2, 2; 1997 YZ<sub>7</sub>, 6, 2, 2; 1997 YA<sub>8</sub>, 6, 2, 2; 1997 YE<sub>8</sub>, 4, 2, 9; 1997 YP<sub>14</sub>, 3, 2, 5; 1997 YQ<sub>14</sub>, 4, 2, 7; 1998 BW<sub>3</sub>, 4, 2, 5; 1998 BZ<sub>3</sub>, 4, 2, 1; 1998 BG<sub>30</sub>, 4, 2, 1; 1998 CD<sub>2</sub>, 4, 2, 1; 1998 DU<sub>12</sub> \*, 4, 2, 1; 1998 DV<sub>12</sub> \*, 6, 3, 2; 1998 DS<sub>20</sub> \*, 6, 3, 4; 1998 EA \*, 5, 2, 1; 1998 EB \*, 5, 2, 1; 1998 ED<sub>3</sub> \*, 8, 3, 2; [148, 31, 6\*, 1998/02/17–1998/03/05]

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Observers M. W. Buie, B. A. Skiff

Measurer B. A. Skiff

1.07-m Hall reflector + CCD

USNO-A1.0

1997 YJ<sub>21</sub>, 2, 1, 0; 1997 YK<sub>21</sub>, 2, 1, 0; 1998 BN<sub>15</sub>, 2, 1, 0; 1998 DM, 2, 1, 0; [8, 4, 0\*, 1997/12/29–1998/01/08]

#### 691 Kitt Peak, Steward Observatory

T. Gehrels, Space Sciences Building, University of Arizona, Tucson, AZ 85721,

U.S.A. [tgehrels@lpl.arizona.edu]

Observers T. Gehrels, J. Larsen, J. Montani, J. V. Scotti

0.91-m Spacewatch telescope + CCD

GSC

1973 SF<sub>6</sub>, 3, 1, 0; 1976 UT<sub>1</sub>, 3, 1, 0; 1977 QH<sub>3</sub>, 6, 2, 3; 1977 RR<sub>6</sub>, 6, 2, 7; 1979 TH<sub>2</sub>, 9, 3, 7; 1981 EQ, 5, 2, 9; 1981 EA<sub>40</sub>, 3, 1, 0; 1981 EZ<sub>40</sub>, 6, 2, 7; 1982 SA<sub>4</sub>, 3, 1, 0; 1982 TL<sub>2</sub>, 6, 2, 14; 1983 RL, 6, 2, 5; 1984 DZ<sub>6</sub>, 2, 6; 1986 QT<sub>2</sub>, 3, 1, 0; 1986 QO<sub>4</sub>, 3, 1, 0; 1987 DW<sub>6</sub>, 6, 2, 7; 1988 BL<sub>3</sub>, 3, 1, 0; 1988 RA<sub>11</sub>, 5, 2, 9; 1988 SN<sub>1</sub>, 3, 1, 0; 1989 EF<sub>6</sub>, 6, 2, 4; 1989 WJ<sub>1</sub>, 3, 1, 0; 1992 DW<sub>13</sub> \*, 3, 1, 0; 1992 EB<sub>2</sub>, 3, 1, 0; 1992 EC<sub>12</sub>, 3, 1, 0; 1992 ML, 9, 2, 5; 1992 OY<sub>2</sub>, 3, 1, 0; 1992 SP<sub>26</sub>, 2, 1, 0; 1993 FZ<sub>4</sub>, 6, 2, 4; 1993 FK<sub>23</sub>, 3, 1, 0; 1993 VN<sub>2</sub>, 3, 1, 0; 1993 XP<sub>1</sub>, 3, 1, 0; 1994 JT<sub>9</sub> \*, 2, 1, 0; 1994 WQ<sub>13</sub> \*, 3, 1, 0; 1995 DC<sub>14</sub> \*, 5, 2, 5; 1995 DD<sub>14</sub> \*, 5, 2, 7; 1995 SV<sub>52</sub>, 9, 3, 5; 1995 SH<sub>55</sub>, 3, 1, 0; 1995 SJ<sub>55</sub>, 3, 1, 0; 1995 US<sub>11</sub>, 6, 2, 5; 1996 FV<sub>23</sub> \*, 3, 1, 0; 1996 PQ, 3, 1, 0; 1996 TR<sub>10</sub>, 3, 1, 0; 1996 TW<sub>10</sub>, 6, 2, 4; 1996 TN<sub>19</sub>, 3, 1, 0; 1996 TB<sub>67</sub> \*, 3, 1, 0; 1996 TC<sub>67</sub> \*, 3, 1, 0; 1996 TD<sub>67</sub> \*, 5, 2, 4; 1996 TE<sub>67</sub> \*, 3, 1, 0; 1996 TF<sub>67</sub> \*, 6, 2, 8; 1996 TG<sub>67</sub> \*, 6, 2, 10; 1996 TH<sub>67</sub> \*, 6, 2, 5; 1996 TJ<sub>67</sub> \*, 8, 3, 8; 1996 TK<sub>67</sub> \*, 3, 1, 0; 1996 TL<sub>67</sub> \*, 3, 1, 0; 1996 TM<sub>67</sub> \*, 5, 2, 7; 1996 TN<sub>67</sub> \*, 6, 2, 4; 1996 TO<sub>67</sub> \*, 6, 2, 4; 1996 TP<sub>67</sub> \*, 3, 1, 0; 1996 TQ<sub>67</sub>, 3, 1, 0; 1996 TR<sub>67</sub>, 3, 1, 0; 1996 TT<sub>67</sub> \*, 3, 1, 0; 1996 TW<sub>67</sub> \*, 6, 2, 3; 1996 TX<sub>67</sub> \*, 6, 2, 3; 1996 UX, 3, 1, 0; 1996 UH<sub>5</sub>, 3, 1, 0; 1996 VJ<sub>2</sub>, 3, 1, 0; 1996 VL<sub>8</sub>, 3, 1, 0; 1996 VB<sub>30</sub>, 3, 1, 0; 1996 VR<sub>39</sub> \*, 6, 2, 5; 1996 VS<sub>39</sub> \*, 6, 2, 6; 1996 VT<sub>39</sub> \*, 5, 2, 6; 1996 VU<sub>39</sub> \*, 5, 2, 6; 1996 VV<sub>39</sub>, 3, 1, 0; 1996 VW<sub>39</sub>, 3, 1, 0; 1996 VX<sub>39</sub> \*, 6, 2, 8; 1996 VY<sub>39</sub> \*, 6, 2, 6; 1996 XR, 9, 3, 8; 1997 EF<sub>59</sub> \*, 3, 1, 0; 1997 EG<sub>59</sub> \*, 5, 2, 1; 1997 EH<sub>59</sub> \*, 5, 2, 1; 1997 EJ<sub>59</sub> \*, 5, 2, 1; 1997 EK<sub>59</sub> \*, 3, 1, 0; 1997 EL<sub>59</sub> \*, 6, 2, 7; 1997 EM<sub>59</sub> \*, 6, 2, 7; 1997 EN<sub>59</sub> \*, 5, 2, 3; 1997 EP<sub>59</sub> \*, 5, 2, 1; 1997 GW<sub>26</sub>, 3, 1, 0; 1997 SJ<sub>34</sub>, 3, 1, 0; 1997 SK<sub>34</sub>, 3, 1, 0; 1997 SM<sub>34</sub> \*, 5, 2, 7; 1997 SN<sub>34</sub> \*, 5, 2, 3; 1997 SO<sub>34</sub>, 3, 1, 0; 1997 SP<sub>34</sub> \*, 5, 2, 2; 1997 SQ<sub>34</sub> \*, 5, 2, 7; 1997 SR<sub>34</sub> \*, 5, 2, 2; 1997 SS<sub>34</sub> \*, 5, 2, 2; 1997 ST<sub>34</sub> \*, 5, 2, 7; 1997 SY<sub>34</sub> \*, 6, 2, 7; 1997 SZ<sub>34</sub> \*, 5, 2, 6; 1997 SA<sub>35</sub> \*, 5, 2, 6; 1997 SB<sub>35</sub> \*, 6, 2, 6; 1997 SC<sub>35</sub> \*, 5, 2, 6; 1997 SD<sub>35</sub> \*, 5, 2, 4; 1997 SE<sub>35</sub> \*, 5, 2, 4; 1997 SF<sub>35</sub> \*, 5, 2, 5; 1997 TJ<sub>27</sub> \*, 5, 2, 4; 1997 WU<sub>8</sub>, 3, 1, 0; 1997 WP<sub>32</sub>, 3, 1, 0; 1997 WS<sub>32</sub>, 3, 1, 0; 1997 WV<sub>55</sub> \*, 3, 1, 0; 1997 WW<sub>55</sub> \*, 6, 2, 7; 1997 WX<sub>55</sub> \*, 6, 2, 7; 1997 WY<sub>55</sub> \*, 6, 2, 6; 1997 WZ<sub>55</sub> \*, 3, 1, 0; 1997 WA<sub>56</sub> \*, 3, 1, 0; 1997 WB<sub>56</sub> \*, 3, 1, 0; 1997 WC<sub>56</sub> \*, 3, 1, 0; 1997 WD<sub>56</sub>, 3, 1, 0; 1997 WE<sub>56</sub>, 3, 1, 0; 1997 XV<sub>4</sub>, 9, 3, 8; 1997 XG<sub>5</sub>, 6, 2,

4; 1997 XV<sub>7</sub>, 3, 1, 0; 1997 YX<sub>3</sub>, 2, 1, 0; 1997 YA<sub>11</sub>, 3, 1, 0; 1997 YW<sub>13</sub>, 3, 1, 0; 1997 YQ<sub>14</sub>, 3, 1, 0; 1997 YO<sub>20</sub> \*, 5, 2, 5; 1997 YP<sub>20</sub> \*, 5, 2, 5; 1997 YS<sub>20</sub> \*, 3, 1, 0; 1997 YT<sub>20</sub> \*, 3, 1, 0; 1997 YV<sub>20</sub>, 3, 1, 0; 1997 YW<sub>20</sub>, 3, 1, 0; 1997 YZ<sub>20</sub> \*, 5, 2, 4; 1997 YN<sub>21</sub> \*, 3, 1, 0; 1997 YO<sub>21</sub> \*, 3, 1, 0; 1997 YP<sub>21</sub>, 3, 1, 0; 1998 AH<sub>4</sub>, 6, 2, 57; 1998 AB<sub>6</sub>, 5, 2, 1; 1998 AX<sub>8</sub>, 3, 1, 0; 1998 AF<sub>11</sub>, 3, 1, 0; 1998 AL<sub>11</sub>, 3, 1, 0; 1998 AM<sub>11</sub>, 3, 1, 0; 1998 AO<sub>11</sub> \*, 5, 2, 6; 1998 AP<sub>11</sub> \*, 5, 2, 6; 1998 AQ<sub>11</sub> \*, 6, 2, 10; 1998 BX, 3, 1, 0; 1998 BH<sub>7</sub>, 3, 1, 0; 1998 BX<sub>7</sub>, 6, 2, 2; 1998 BD<sub>8</sub>, 6, 2, 3; 1998 BP<sub>9</sub>, 3, 1, 0; 1998 BJ<sub>10</sub>, 2, 1, 0; 1998 BC<sub>15</sub>, 3, 1, 0; 1998 BV<sub>18</sub>, 9, 3, 5; 1998 BC<sub>22</sub>, 8, 3, 34; 1998 BD<sub>30</sub>, 6, 2, 6; 1998 BC<sub>35</sub>, 3, 1, 0; 1998 BF<sub>41</sub>, 3, 1, 0; 1998 BJ<sub>42</sub>, 3, 1, 0; 1998 BR<sub>44</sub>, 3, 1, 0; 1998 BS<sub>44</sub>, 3, 1, 0; 1998 BT<sub>44</sub>, 3, 1, 0; 1998 BU<sub>44</sub> \*, 5, 2, 7; 1998 BV<sub>44</sub> \*, 5, 2, 7; 1998 BW<sub>44</sub> \*, 5, 2, 7; 1998 BX<sub>44</sub> \*, 5, 2, 7; 1998 BY<sub>44</sub> \*, 5, 2, 6; 1998 BZ<sub>44</sub> \*, 5, 2, 6; 1998 BA<sub>45</sub> \*, 6, 2, 6; 1998 BB<sub>45</sub> \*, 5, 2, 6; 1998 BC<sub>45</sub> \*, 3, 1, 0; 1998 BD<sub>45</sub> \*, 6, 2, 7; 1998 BE<sub>45</sub> \*, 6, 2, 6; 1998 BF<sub>45</sub> \*, 5, 2, 7; 1998 BG<sub>45</sub> \*, 5, 2, 6; 1998 BH<sub>45</sub> \*, 5, 2, 7; 1998 BJ<sub>45</sub> \*, 5, 2, 6; 1998 BK<sub>45</sub> \*, 6, 2, 6; 1998 BL<sub>45</sub> \*, 5, 2, 6; 1998 BM<sub>45</sub> \*, 5, 2, 6; 1998 BP<sub>45</sub>, 3, 1, 0; 1998 BQ<sub>45</sub>, 3, 1, 0; 1998 BR<sub>45</sub>, 3, 1, 0; 1998 BS<sub>45</sub> \*, 5, 2, 5; 1998 BT<sub>45</sub> \*, 5, 2, 5; 1998 BU<sub>45</sub> \*, 5, 2, 5; 1998 BV<sub>45</sub> \*, 3, 1, 0; 1998 BW<sub>45</sub> \*, 5, 2, 5; 1998 BX<sub>45</sub>, 3, 1, 0; 1998 BZ<sub>45</sub> \*, 5, 2, 3; 1998 BA<sub>46</sub> \*, 3, 1, 0; 1998 BB<sub>46</sub> \*, 5, 2, 3; 1998 BC<sub>46</sub> \*, 3, 1, 0; 1998 BD<sub>46</sub> \*, 3, 1, 0; 1998 BF<sub>46</sub> \*, 6, 2, 2; 1998 BG<sub>46</sub> \*, 5, 2, 2; 1998 BH<sub>46</sub> \*, 5, 2, 2; 1998 BJ<sub>46</sub> \*, 5, 2, 2; 1998 BK<sub>46</sub> \*, 3, 1, 0; 1998 BL<sub>46</sub> \*, 3, 1, 0; 1998 BM<sub>46</sub>, 3, 1, 0; 1998 BN<sub>46</sub>, 3, 1, 0; 1998 BO<sub>46</sub>, 3, 1, 0; 1998 BP<sub>46</sub>, 3, 1, 0; 1998 BQ<sub>46</sub>, 3, 1, 0; 1998 BR<sub>46</sub>, 3, 1, 0; 1998 BS<sub>46</sub>, 2, 1, 0; 1998 BT<sub>46</sub>, 3, 1, 0; 1998 BU<sub>46</sub>, 3, 1, 0; 1998 BV<sub>46</sub>, 3, 1, 0; 1998 BW<sub>46</sub> \*, 5, 2, 1; 1998 BX<sub>46</sub> \*, 5, 2, 8; 1998 BA<sub>47</sub> \*, 5, 2, 8; 1998 BD<sub>47</sub>, 2, 1, 0; 1998 BE<sub>47</sub>, 2, 1, 0; 1998 CU, 6, 2, 29; 1998 CS<sub>2</sub>, 3, 1, 0; 1998 CW<sub>2</sub>, 6, 2, 10; 1998 CH<sub>3</sub>, 3, 1, 0; 1998 CK<sub>3</sub>, 6, 2, 4; 1998 CQ<sub>3</sub>, 3, 1, 0; 1998 DF, 3, 1, 0; 1998 DR<sub>1</sub>, 3, 1, 0; 1998 DE<sub>2</sub> \*, 8, 3, 11; 1998 DZ<sub>2</sub>, 2, 1, 0; 1998 DA<sub>3</sub>, 3, 1, 0; 1998 DQ<sub>3</sub>, 6, 2, 1; 1998 DV<sub>3</sub>, 6, 2, 3; 1998 DO<sub>6</sub> \*, 6, 2, 6; 1998 DP<sub>6</sub> \*, 6, 2, 6; 1998 DQ<sub>6</sub> \*, 6, 2, 6; 1998 DR<sub>6</sub> \*, 6, 2, 6; 1998 DS<sub>6</sub> \*, 6, 2, 6; 1998 DT<sub>6</sub> \*, 6, 2, 6; 1998 DU<sub>6</sub> \*, 9, 3, 11; 1998 DV<sub>6</sub> \*, 12, 4, 14; 1998 DW<sub>6</sub> \*, 6, 2, 6; 1998 DX<sub>6</sub> \*, 6, 2, 6; 1998 DY<sub>6</sub> \*, 9, 3, 13; 1998 DZ<sub>6</sub> \*, 6, 2, 6; 1998 DA<sub>7</sub> \*, 6, 2, 6; 1998 DB<sub>7</sub> \*, 12, 4, 14; 1998 DC<sub>7</sub> \*, 6, 2, 6; 1998 DD<sub>7</sub> \*, 11, 4, 14; 1998 DE<sub>7</sub> \*, 6, 2, 6; 1998 DF<sub>7</sub> \*, 5, 2, 2; 1998 DG<sub>7</sub> \*, 5, 2, 2; 1998 DH<sub>7</sub> \*, 5, 2, 2; 1998 DJ<sub>7</sub> \*, 5, 2, 2; 1998 DK<sub>7</sub> \*, 6, 2, 1; 1998 DL<sub>7</sub> \*, 6, 2, 1; 1998 DM<sub>7</sub> \*, 9, 3, 7; 1998 DN<sub>7</sub> \*, 6, 2, 1; 1998 DO<sub>7</sub> \*, 9, 3, 8; 1998 DP<sub>7</sub> \*, 8, 3, 10; 1998 DT<sub>8</sub> \*, 9, 3, 5; 1998 DU<sub>8</sub> \*, 9, 3, 5; 1998 DV<sub>8</sub> \*, 9, 3, 5; 1998 DW<sub>8</sub> \*, 12, 4, 9; 1998 DX<sub>8</sub> \*, 9, 3, 9; 1998 DY<sub>8</sub> \*, 9, 3, 7; 1998 DZ<sub>8</sub> \*, 6, 2, 1; 1998 DA<sub>9</sub> \*, 9, 3, 5; 1998 DB<sub>9</sub> \*, 9, 3, 7; 1998 DC<sub>9</sub> \*, 6, 2, 1; 1998 DD<sub>11</sub>, 3, 1, 0; 1998 DX<sub>11</sub> \*, 16, 3, 3; 1998 DZ<sub>11</sub> \*, 5, 2, 3; 1998 DA<sub>12</sub> \*, 5, 2, 3; 1998 DB<sub>12</sub> \*, 8, 3, 8; 1998 DC<sub>12</sub> \*, 8, 3, 8; 1998 DD<sub>12</sub> \*, 8, 3, 8; 1998 DE<sub>12</sub> \*, 5, 2, 3; 1998 DF<sub>12</sub> \*, 11, 4, 8; 1998 DG<sub>12</sub> \*, 8, 3, 8; 1998 DH<sub>12</sub> \*, 8, 3, 8; 1998 DJ<sub>12</sub> \*, 11, 4, 9; 1998 DK<sub>12</sub> \*, 8, 3, 8; 1998 DL<sub>12</sub> \*, 8, 3, 8; 1998 DM<sub>12</sub> \*, 8, 3, 8; 1998 DN<sub>12</sub> \*, 8, 3, 8; 1998 DO<sub>12</sub> \*, 9, 3, 6; 1998 DP<sub>12</sub> \*, 9, 3, 6; 1998 DQ<sub>12</sub> \*, 9, 3, 6; 1998 DR<sub>12</sub> \*, 6, 2, 2; 1998 DS<sub>12</sub> \*, 6, 2, 2; 1998 DT<sub>12</sub> \*, 6, 2, 2; 1998 DH<sub>16</sub> \*, 6, 2, 11; 1998 DJ<sub>16</sub> \*, 6, 2, 11; 1998 DK<sub>16</sub> \*, 6, 2, 6; 1998 DL<sub>16</sub> \*, 6, 2, 6; 1998 DM<sub>16</sub> \*, 8, 3, 9; 1998 DN<sub>16</sub> \*, 6, 2, 6; 1998 DO<sub>16</sub> \*, 6, 2, 6; 1998 DP<sub>16</sub> \*, 9, 3, 9; 1998 DQ<sub>16</sub> \*, 6, 2, 6; 1998 DR<sub>16</sub> \*, 6, 2, 6; 1998 DS<sub>16</sub> \*, 9, 3, 9; 1998 DT<sub>16</sub> \*, 6, 2, 6; 1998 DU<sub>16</sub> \*, 6, 2, 6; 1998 DV<sub>16</sub> \*, 6, 2, 6; 1998 DW<sub>16</sub> \*, 6, 2, 6; 1998 DX<sub>16</sub> \*, 6, 2, 6; 1998 DY<sub>16</sub> \*, 6, 2, 6; 1998 DZ<sub>16</sub> \*, 5, 2, 6; 1998 DA<sub>17</sub> \*, 6, 2, 6; 1998 DB<sub>17</sub> \*, 6, 2, 6; 1998 DC<sub>17</sub> \*, 6, 2, 6; 1998 DD<sub>17</sub> \*, 6, 2, 5; 1998 DE<sub>17</sub> \*, 6, 2, 5; 1998 DF<sub>17</sub> \*, 9, 3, 8; 1998 DG<sub>17</sub> \*, 9, 3, 8; 1998 DH<sub>17</sub> \*, 6, 2, 5; 1998 DJ<sub>17</sub> \*, 6, 2, 5; 1998 DK<sub>17</sub> \*, 6, 2, 5; 1998 DL<sub>17</sub> \*, 6, 2, 5; 1998 DM<sub>17</sub> \*, 9, 3, 8; 1998 DN<sub>17</sub> \*, 8, 3, 8; 1998 DO<sub>17</sub> \*, 9, 3, 8; 1998 DP<sub>17</sub> \*, 5, 2, 5; 1998 DQ<sub>17</sub> \*, 6, 2, 5; 1998 DR<sub>17</sub> \*, 6, 2, 5; 1998 DS<sub>17</sub> \*, 5, 2, 5; 1998 DT<sub>17</sub> \*, 6, 2, 5; 1998 DU<sub>17</sub> \*, 8, 3, 9; 1998 DV<sub>17</sub> \*, 4, 2, 5; 1998 DW<sub>17</sub> \*, 5, 2, 5; 1998 DX<sub>17</sub> \*, 5, 2, 5; 1998 DY<sub>17</sub> \*, 5, 2, 5; 1998 DZ<sub>17</sub> \*, 5, 2, 5; 1998 DA<sub>18</sub> \*, 5, 2, 5; 1998 DB<sub>18</sub> \*, 5, 2, 5; 1998 DC<sub>18</sub> \*, 5, 2, 5; 1998 DD<sub>18</sub> \*, 8, 3, 8; 1998 DE<sub>18</sub> \*, 5, 2, 5; 1998 DF<sub>18</sub> \*, 8, 3, 8; 1998 DG<sub>18</sub> \*, 6, 2, 4; 1998 DH<sub>18</sub> \*, 6, 2, 4; 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(3965), 3, 1, 0; (4049), 9, 3, 9; (4175), 6, 2, 1; (4228), 3, 1, 0; (4250), 3, 1, 0; (4470), 3, 1, 0; (5072), 6, 2, 4; (5102), 3, 1, 0; (5132), 6, 2, 1; (5140), 3, 1, 0; (5528), 3, 1, 0; (5540), 3, 1, 0; (5609), 3, 1, 0; (5781), 3, 1, 0; (5840), 3, 1, 0; (5966), 6, 2, 5; (6333), 3, 1, 0; (6622), 9, 3, 8; (7096), 9, 3, 10; (7123), 3, 1, 0; (7221), 3, 1, 0; (7340), 3, 1, 0; (7371), 3, 1, 0; (7422), 9, 3, 8; (7605), 6, 2, 3; (8116), 3, 1, 0; (8306), 3, 1, 0; [4362, 772, 590\*, 1992/02/24-1998/03/07]

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1.2-m  $f/8$  reflector + CCD

USNO-A1.0

1997 WD<sub>56</sub> \*, 3, 1, 0; 1997 WE<sub>56</sub> \*, 3, 1, 0; 1998 BD<sub>47</sub> \*, 3, 1, 0; 1998 BE<sub>47</sub> \*, 3, 1, 0; 1998 EP<sub>8</sub>, 3, 1, 0; [15, 5, 4\*, 1997/11/28-1998/03/08]

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Measurers B. W. Koehn, L. H. Wasserman, E. Bowell

0.6-m LONEOS Schmidt + CCD

USNO-A1.0

1977 RR<sub>6</sub>, 3, 1, 0; 1978 VE<sub>15</sub>, 3, 1, 0; 1979 TH<sub>2</sub>, 3, 1, 0; 1981 EM<sub>1</sub>, 3, 1, 0; 1981 EO<sub>8</sub>, 3, 1, 0; 1981 EB<sub>9</sub>, 3, 1, 0; 1981 EG<sub>23</sub>, 6, 1, 0; 1981 GG, 3, 1, 0; 1981 JE<sub>2</sub>, 3, 1, 0; 1981 JS<sub>2</sub>, 2, 1, 0; 1981 JE<sub>3</sub>, 3, 1, 0; 1981 UV<sub>23</sub>, 3, 1, 0; 1981 UE<sub>26</sub>, 3, 1, 0; 1983 RL, 3, 1, 0; 1984 DZ, 3, 1, 0; 1985 RJ<sub>5</sub>, 2, 1, 0; 1986 QC<sub>1</sub>, 3, 1, 0; 1987 DW<sub>6</sub>, 3, 1, 0; 1987 RD<sub>1</sub>, 3, 1, 0; 1989 CH<sub>3</sub>, 3, 1, 0; 1989 KF, 3, 1, 0; 1989 SQ, 6, 1, 0; 1989 VN<sub>5</sub>, 3, 1, 0; 1990 EA<sub>7</sub>, 6, 2, 2; 1990 HW<sub>1</sub>, 3, 1, 0; 1990 RE<sub>5</sub>, 3, 1, 0; 1990 UL<sub>2</sub>, 6, 2, 2; 1991 CN, 3, 1, 0; 1991 ED, 3, 1, 0; 1991 GW, 3, 1, 0; 1991 GK<sub>5</sub>, 5, 2, 2; 1991 RN<sub>5</sub>, 3, 1, 0; 1991 TJ<sub>14</sub>, 3, 1, 0; 1992 BB<sub>5</sub>, 3, 1, 0; 1992 CU<sub>2</sub>, 3, 1, 0; 1992 EB<sub>5</sub>, 3, 1, 0; 1992 SW<sub>10</sub>, 6, 2, 2; 1992 SQ<sub>26</sub>, 3, 1, 0; 1992 WX<sub>2</sub>, 3, 1, 0; 1992 WN<sub>3</sub>, 3, 1, 0; 1992 YU<sub>1</sub>, 6, 2, 2; 1993 DO, 3, 1, 0; 1993 FM<sub>16</sub>, 3, 1, 0; 1993 HH<sub>3</sub>, 3, 1, 0; 1993 QO<sub>8</sub>, 3, 1, 0; 1993 RL<sub>5</sub>, 3, 1, 0; 1993 TM<sub>12</sub>, 3, 1, 0; 1993 XY, 3, 1, 0; 1994 AE<sub>11</sub>, 3, 1, 0; 1994 ER<sub>3</sub>, 3, 1, 0; 1994 FS, 3, 1, 0; 1995 AN, 3, 1, 0; 1995 WB<sub>43</sub>, 3, 1, 0; 1996 PK, 3, 1, 0; 1996 TR<sub>41</sub>, 3, 1, 0; 1996 UX, 3, 1, 0; 1996 VB<sub>9</sub>, 3, 1, 0; 1996 VK<sub>38</sub>, 6, 2, 2; 1996 WQ, 3, 1, 0; 1996 YO<sub>2</sub>, 3, 1, 0; 1997 AU<sub>3</sub>, 3, 1, 0; 1997 VZ<sub>5</sub>, 3, 1, 0; 1997 WV<sub>1</sub>, 3, 1, 0; 1997 WJ<sub>2</sub>, 3, 1, 0; 1997 WR<sub>2</sub>, 3, 1, 0; 1997 WW<sub>7</sub>, 3, 1, 0; 1997 WF<sub>43</sub>, 3, 1, 0; 1997 WL<sub>44</sub>, 3, 1, 0; 1997 XL<sub>10</sub>, 3, 1, 0; 1997 YD, 3, 1, 0; 1997 YB<sub>5</sub>, 3, 1, 0; 1997 YN<sub>7</sub>, 3, 1, 0; 1997 YQ<sub>7</sub>, 3, 1, 0; 1997 YN<sub>10</sub>, 3, 1, 0; 1998 AQ, 3, 1, 0; 1998 AY, 3, 1, 0; 1998 AZ, 3, 1, 0; 1998 AA<sub>1</sub>, 3, 1, 0; 1998 AS<sub>8</sub>, 3, 1, 0; 1998 BV, 3, 1, 0; 1998 BD<sub>1</sub>, 3, 1, 0; 1998 BL<sub>1</sub>, 3, 1, 0; 1998 BQ<sub>1</sub>, 3, 1, 0; 1998 BG<sub>4</sub>, 3, 1, 0; 1998 BJ<sub>4</sub>, 3, 1, 0; 1998 BW<sub>6</sub>, 3, 1, 0; 1998 BX<sub>6</sub>, 3, 1, 0; 1998 BA<sub>7</sub>, 6, 2, 2; 1998 BB<sub>7</sub>, 3, 1, 0; 1998 BL<sub>8</sub>, 3, 1, 0; 1998 BN<sub>8</sub>, 3, 1, 0; 1998 BP<sub>8</sub>, 3, 1, 0; 1998 BQ<sub>8</sub>, 3, 1, 0; 1998 BR<sub>8</sub>, 3, 1, 0; 1998 BE<sub>25</sub>, 3, 1, 0; 1998 BH<sub>25</sub>, 3, 1, 0; 1998 BM<sub>25</sub>, 6, 2, 2; 1998 BB<sub>26</sub>, 3, 1, 0; 1998 BS<sub>33</sub>, 3, 1, 0; 1998 BV<sub>33</sub>, 3, 1, 0; 1998 BF<sub>47</sub>, 3, 1, 0; 1998 DT<sub>10</sub>, 3, 1, 0; 1998 DV<sub>32</sub>, 3, 1, 0; 2604 P-L, 3, 1, 0; 6114 P-L, 3, 1, 0; 6643 P-L, 3, 1, 0; 9057 P-L, 3, 1, 0; 1198 T-1, 3, 1, 0; 2149 T-1, 3, 1, 0; 3196 T-1, 3, 1, 0; 3233 T-1, 3, 1, 0; 4825 T-1, 3, 1, 0; 1298 T-2, 3, 1, 0; (88), 3, 1, 0; (120), 3, 1, 0; (151), 3, 1, 0; (172), 3, 1, 0; (192), 3, 1, 0; (211), 3, 1, 0; (244), 3, 1, 0; (262), 3, 1, 0; (279), 3, 1, 0; (388), 3, 1, 0; (401), 3, 1, 0; (436), 6, 2, 9; (455), 6, 2, 2; (516), 3, 1, 0; (613), 6, 2, 2; (615), 3, 1, 0; (641), 3, 1, 0; (653), 3, 1, 0; (706), 3, 1, 0; (738), 3, 1, 0; (761), 3, 1, 0; (917), 5, 2, 2; (974), 2, 1, 0; (987), 3, 1, 0; (990), 3, 1, 0; (1019), 3, 1, 0; (1044), 3, 1, 0; (1086), 3, 1, 0; (1099), 3, 1, 0; (1125), 3, 1, 0; (1132), 9, 3, 9; (1142), 3, 1, 0; (1204), 3, 1, 0; (1229), 3, 1, 0; (1279), 6, 2, 2; (1302), 3, 1, 0; (1333), 3, 1, 0; (1359), 3, 1, 0; (1378), 6, 2, 2; (1417), 3, 1, 0; (1432), 3, 1, 0; (1457), 3, 1, 0; (1467), 3, 1, 0; (1522), 3, 1, 0; (1532), 3, 1, 0; (1545), 3, 1, 0; (1563), 9, 3, 9; (1578), 3, 1, 0; (1638), 3, 1, 0; (1640), 3, 1, 0; (1653), 3, 1, 0; (1662), 3, 1, 0; (1671), 3, 1, 0; (1675), 3, 1, 0; (1676), 3, 1, 0; (1683), 3, 1, 0; (1684), 6, 2, 2; (1703), 3, 1, 0; (1711), 3, 1, 0; (1754), 3, 1, 0; (1836), 3, 1, 0; (1840), 3, 1, 0; (1854), 3, 1, 0; (1962), 3, 1, 0; (1982), 3, 1, 0; (1988), 9, 3, 3; (2011), 3, 1, 0; (2082), 3, 1, 0; (2114), 3, 1, 0; (2116), 6, 2, 2; (2164), 3, 1, 0; (2176), 3, 1, 0; (2232), 3, 1, 0; (2276), 3, 1, 0; (2285), 2, 1, 0; (2317), 3, 1, 0; (2394), 6, 2, 2; (2407), 3, 1, 0; (2409), 3, 1, 0; (2416), 3, 1, 0; (2541), 3, 1, 0; (2618), 3, 1, 0; (2667), 3, 1, 0; (2688), 3, 1, 0; (2701), 3, 1, 0; (2705), 3, 1, 0; (2717), 3, 1, 0; (2764), 3, 1, 0; (2770), 3, 1, 0; (2773), 3, 1, 0; (2870), 6, 2, 2; (2873), 3, 1, 0; (2877), 3, 1, 0; (2973), 3, 1, 0; (2989), 3, 1, 0; (3059), 3, 1, 0; (3074), 3, 1, 0; (3132), 3, 1, 0; (3

(4049), 3, 1, 0; (4067), 3, 1, 0; (4093), 3, 1, 0; (4119), 6, 2, 2; (4123), 3, 1, 0; (4176), 3, 1, 0; (4206), 3, 1, 0; (4304), 3, 1, 0; (4322), 3, 1, 0; (4328), 2, 1, 0; (4335), 3, 1, 0; (4387), 3, 1, 0; (4390), 3, 1, 0; (4391), 2, 1, 0; (4400), 3, 1, 0; (4409), 2, 1, 0; (4426), 3, 1, 0; (4446), 3, 1, 0; (4470), 3, 1, 0; (4571), 3, 1, 0; (4616), 3, 1, 0; (4627), 3, 1, 0; (4642), 3, 1, 0; (4657), 3, 1, 0; (4664), 3, 1, 0; (4677), 3, 1, 0; (4681), 3, 1, 0; (4724), 3, 1, 0; (4758), 3, 1, 0; (4807), 3, 1, 0; (4837), 3, 1, 0; (4926), 3, 1, 0; (4927), 3, 1, 0; (4945), 3, 1, 0; (4963), 3, 1, 0; (4982), 6, 2, 2; (5013), 3, 1, 0; (5070), 3, 1, 0; (5072), 3, 1, 0; (5102), 2, 1, 0; (5103), 2, 1, 0; (5117), 6, 2, 2; (5219), 3, 1, 0; (5245), 3, 1, 0; (5344), 3, 1, 0; (5379), 6, 1, 0; (5442), 3, 1, 0; (5468), 3, 1, 0; (5494), 6, 2, 7; (5505), 3, 1, 0; (5548), 6, 2, 2; (5698), 6, 2, 2; (5710), 6, 2, 2; (5744), 3, 1, 0; (5781), 3, 1, 0; (5792), 3, 1, 0; (5822), 3, 1, 0; (5827), 3, 1, 0; (5977), 3, 1, 0; (5996), 6, 2, 2; (5997), 3, 1, 0; (6051), 3, 1, 0; (6406), 3, 1, 0; (6426), 3, 1, 0; (6438), 3, 1, 0; (6440), 3, 1, 0; (6483), 3, 1, 0; (6495), 3, 1, 0; (6502), 3, 1, 0; (6520), 3, 1, 0; (6639), 3, 1, 0; (6668), 6, 2, 2; (6697), 3, 1, 0; (6770), 3, 1, 0; (7101), 3, 1, 0; (7153), 3, 1, 0; (7159), 3, 1, 0; (7166), 3, 1, 0; (7234), 6, 2, 2; (7260), 3, 1, 0; (7263), 3, 1, 0; (7295), 3, 1, 0; (7302), 3, 1, 0; (7303), 3, 1, 0; (7307), 3, 1, 0; (7334), 3, 1, 0; (7340), 3, 1, 0; (7343), 3, 1, 0; (7346), 3, 1, 0; (7348), 3, 1, 0; (7411), 6, 2, 7; (7457), 3, 1, 0; (7466), 3, 1, 0; (7502), 3, 1, 0; (7529), 6, 2, 2; (7582), 3, 1, 0; (7593), 3, 1, 0; (7605), 3, 1, 0; (7615), 3, 1, 0; (8228), 3, 1, 0; (8257), 6, 2, 2; (8304), 3, 1, 0; [1141, 339, 0\*, 1998/01/07-1998/03/01]

#### 704 Lincoln Laboratory Experimental Test System, New Mexico

H. Viggh, MIT Lincoln Laboratory, 244 Wood Street, Lexington, MA 02173,  
U.S.A. [viggh@ll.mit.edu]

Observers M. Blythe, F. Shelly, M. Bezpalko

Measurers J. Stuart, H. Viggh

1.0-m  $f/2.15$  reflector + CCD

USNO-SA1.0

1980 KK, 7, 2, 20; 1982 KK<sub>1</sub>, 5, 1, 0; 1985 FE<sub>3</sub>, 5, 1, 0; 1985 RM<sub>6</sub>, 4, 1, 0; 1987 HK, 5, 1, 0; 1988 BN<sub>4</sub>, 5, 1, 0; 1989 GC<sub>4</sub>, 5, 1, 0; 1989 SH<sub>3</sub>, 4, 1, 0; 1990 FD<sub>1</sub>, 5, 1, 0; 1990 UL<sub>1</sub>, 5, 1, 0; 1991 DM, 5, 1, 0; 1992 SW<sub>17</sub>, 5, 1, 0; 1992 YS<sub>2</sub>, 5, 1, 0; 1993 OP, 5, 1, 0; 1994 AC<sub>17</sub>, 5, 1, 0; 1996 QZ<sub>1</sub>, 4, 1, 0; 1997 SG<sub>35</sub>, 3, 1, 0; 1997 TM<sub>27</sub>, 5, 1, 0; 1997 UC<sub>25</sub>, 5, 1, 0; 1997 VE<sub>6</sub>, 14, 3, 27; 1997 WV<sub>1</sub>, 5, 1, 0; 1997 WR<sub>21</sub>, 5, 1, 0; 1997 WQ<sub>34</sub>, 5, 1, 0; 1997 WG<sub>44</sub>, 4, 1, 0; 1997 WT<sub>44</sub>, 4, 1, 0; 1997 WJ<sub>46</sub>, 9, 2, 29; 1997 WB<sub>56</sub>, 5, 1, 0; 1997 WC<sub>56</sub>, 5, 1, 0; 1997 WG<sub>56</sub> \*, 4, 1, 0; 1997 XQ, 10, 1, 0; 1997 XM<sub>5</sub>, 5, 1, 0; 1997 YB<sub>5</sub>, 4, 1, 0; 1997 YF<sub>7</sub>, 4, 1, 0; 1997 YA<sub>11</sub>, 4, 1, 0; 1997 YK<sub>20</sub>, 5, 1, 0; 1997 YL<sub>20</sub>, 4, 1, 0; 1997 YM<sub>20</sub>, 4, 1, 0; 1997 YN<sub>20</sub>, 9, 2, 22; 1997 YQ<sub>20</sub>, 5, 1, 0; 1997 YR<sub>20</sub>, 5, 1, 0; 1997 YS<sub>20</sub>, 4, 1, 0; 1997 YT<sub>20</sub>, 4, 1, 0; 1997 YU<sub>20</sub>, 4, 1, 0; 1997 YX<sub>20</sub>, 4, 1, 0; 1997 YA<sub>21</sub>, 4, 1, 0; 1997 YB<sub>21</sub>, 4, 1, 0; 1997 YC<sub>21</sub>, 5, 1, 0; 1997 YD<sub>21</sub>, 4, 1, 0; 1998 AH<sub>4</sub>, 4, 1, 0; 1998 AC<sub>8</sub>, 11, 2, 18; 1998 AX<sub>8</sub>, 20, 4, 12; 1998 BP<sub>9</sub>, 5, 1, 0; 1998 BB<sub>13</sub>, 5, 1, 0; 1998 BC<sub>35</sub>, 5, 1, 0; 1998 BA<sub>38</sub>, 5, 1, 0; 1998 BG<sub>42</sub>, 5, 1, 0; 1998 BJ<sub>42</sub>, 14, 3, 31; 1998 BH<sub>44</sub> \*, 9, 2, 3; 1998 BJ<sub>44</sub> \*, 8, 2, 2; 1998 BM<sub>44</sub> \*, 5, 1, 0; 1998 BN<sub>44</sub> \*, 5, 1, 0; 1998 BO<sub>44</sub> \*, 5, 1, 0; 1998 BP<sub>44</sub> \*, 5, 1, 0; 1998 BQ<sub>44</sub> \*, 5, 1, 0; 1998 BR<sub>44</sub> \*, 4, 1, 0; 1998 BS<sub>44</sub> \*, 4, 1, 0; 1998 BT<sub>44</sub> \*, 4, 1, 0; 1998 CU, 3, 1, 0; 1998 CS<sub>2</sub>, 5, 1, 0; 1998 DR<sub>8</sub>, 25, 4, 15; 4030 P-L, 5, 1, 0; 4283 T-2, 5, 1, 0; 4008 T-3, 5, 1, 0; (296), 10, 1, 0; (431), 5, 1, 0; (440), 5, 1, 0; (1128), 5, 1, 0; (1156), 5, 1, 0; (1195), 5, 1, 0; (1259), 5, 1, 0; (1525), 9, 1, 0; (2058), 5, 1, 0; (2697), 5, 1, 0; (2721), 5, 1, 0; (2877), 5, 1, 0; (3563), 4, 1, 0; (3566), 4, 1, 0; (3765), 5, 1, 0; (3871), 5, 1, 0; (4013), 4, 1, 0; (4051), 10, 1, 0; (4089), 5, 1, 0; (4206), 5, 1, 0; (4261), 10, 1, 0; (4281), 5, 1, 0; (4526), 5, 1, 0; (4669), 5, 1, 0; (4926), 4, 1, 0; (5036), 4, 1, 0; (5457), 5, 1, 0; (5684), 5, 1, 0; (5713), 5, 1, 0; (5821), 5, 1, 0; (6025), 5, 1, 0; (6027), 5, 1, 0; (6317), 5, 1, 0; (7276), 4, 1, 0; [603, 107, 11\*, 1997/10/22-1998/01/26]

#### 706 Salinas

J. Hall, 10180 County Rd. 190, Salida, CO 81201, U.S.A. [teila@rmi.net]

0.25-m  $f/6$  Newtonian reflector + CCD

GSC

(1786), 2, 1, 0; (6005), 1, 1, 0; [3, 2, 0\*, 1998/02/26-1998/02/27]

#### 710 Florissant

B. D. Warner, Box 818, Florissant, CO 80816, U.S.A.

[71511.515@compuserve.com]

0.25-m  $f/6.3$  Schmidt-Cassegrain + focal reducer + CCD

GSC, USNO SA-1.0

1998 CW<sub>3</sub>, 6, 2, 1; [6, 1, 0\*, 1998/02/22-1998/02/23]

#### 711 McDonald Observatory

P. J. Shelus, McDonald Observatory, University of Texas, Austin, TX 78712,

U.S.A. [pjs@astro.as.utexas.edu]

Observers J. G. Reis, P. J. Shelus

0.76-m  $f/3.0$  reflector + CCD

GSC

1995 GO, 2, 1, 0; 1996 DH, 1, 1, 0; 1996 EN, 4, 2, 1; 1996 FG<sub>3</sub>, 4, 2, 1; 1997 CU<sub>26</sub>, 2, 1, 0; 1997 US<sub>9</sub>, 3, 2, 1; 1997 WT<sub>22</sub>, 4, 3, 2; 1997 XF<sub>11</sub>, 4, 2, 1; 1997 YL<sub>11</sub>, 4, 2, 1; 1997 YQ<sub>13</sub>, 3, 2, 1; 1998 AK<sub>8</sub>, 4, 2, 1; 1998 BX<sub>7</sub>, 4, 2, 1; 1998 BZ<sub>7</sub>, 4, 2, 1; 1998 BP<sub>26</sub>, 4, 2, 1; 1998 EC<sub>3</sub>, 4, 2, 2; (664), 2, 1, 0; (887), 2, 1, 0; (1862), 4, 2, 1; (2430), 4, 2, 1; (2576), 2, 1, 0; (2941), 4, 2, 1; (3757), 6, 3, 2; (3758), 5, 3, 2; (3800), 4, 2, 1; (3840), 4, 2, 1; (5145), 2, 1, 0; (6037), 6, 3, 2; [96, 27, 0\*, 1998/01/28-1998/03/05]

#### 713 Thornton

R. A. Koff, 1915 W. 101st Ave., Thornton, CO 80221, U.S.A.

[Bob.Koff@worldnet.att.net]

0.20-m  $f/10$  Schmidt-Cassegrain + CCD

GSC, USNO-SA1.0

1993 FR<sub>44</sub>, 6, 2, 6; 1993 HH<sub>3</sub>, 6, 2, 7; (5548), 5, 2, 7; [17, 3, 0\*, 1998/02/13-1998/02/27]

#### 721 Lime Creek

R. Linderholm, R2 Box 79, Cambridge, NE 69022, U.S.A.

[lindh@csb.cambridge.ne.us]

0.25-m  $f/3.3$  Schmidt-Cassegrain + CCD

GSC

1998 DA, 2, 1, 0; [2, 1, 0\*, 1998/02/21]

#### 725 Fair Oaks Ranch

J. V. McClusky, McClusky Observatory, 31789 Sunland, Fair Oaks Ranch, TX

78015, U.S.A. [mcclusky@lonestar.utsa.edu]

0.46-m  $f/4.5$  Newtonian reflector + CCD

GSC

1982 FP<sub>3</sub>, 3, 2, 1; 1982 FX<sub>3</sub>, 4, 2, 1; 1982 JE<sub>1</sub>, 2, 1, 0; 1985 FE<sub>3</sub>, 3, 2, 3; 1990 JN<sub>1</sub>, 4, 2, 3; 1993 TJ<sub>1</sub>, 5, 3, 3; 1996 UT, 4, 2, 2; 1997 YP<sub>7</sub>, 1, 1, 0; 1997 YQ<sub>13</sub>, 4, 2, 3; 1998 BT<sub>6</sub>, 4, 2, 3; 1998 BK<sub>10</sub>, 2, 1, 0; 1998 DA<sub>2</sub>, 2, 1, 0; (2827), 2, 1, 0; [40, 13, 0\*, 1998/02/20-1998/02/23]

#### 727 Zeno Observatory, Edmond

T. Stafford, 2947 Village Circle, Edmond, OK 73013, U.S.A.

[tstaffor@aig.vialink.com]

0.15m  $f/6$  refractor + CCD

GSC

1993 FR<sub>44</sub>, 3, 1, 0; 1995 KH, 3, 1, 0; 1998 BB<sub>4</sub>, 17, 6, 24; 1998 BV<sub>25</sub>, 19, 7, 26; 1998 DZ<sub>12</sub> \*, 12, 4, 8; (2296), 2, 1, 0; (2461), 3, 1, 0; (3280), 3, 1, 0; (4194), 3, 1, 0; (4683), 3, 1, 0; (5013), 2, 1, 0; (6684), 2, 1, 0; [72, 12, 1\*, 1998/02/06-1998/03/04]

#### 732 Oaxaca

J. Roe, Apdo. No. 221, MX-68000 Oaxaca, Mexico [jamesroe@antequera.com]

0.20-m  $f/3.3$  reflector + CCD

GSC

1989 CE<sub>8</sub>, 6, 2, 1; 1990 EA<sub>7</sub>, 5, 2, 1; 1991 CU<sub>1</sub>, 5, 2, 1; 1992 AP<sub>1</sub>, 6, 2, 1; 1992 EB<sub>5</sub>, 4, 2, 1; 1992 TM<sub>1</sub>, 6, 2, 1; 1992 UX<sub>4</sub>, 6, 2, 2; 1993 CO, 6, 2, 1; 1993 UU, 5, 2, 1; 1994 EJ<sub>1</sub>, 5, 2, 1; 1994 HD, 4, 2, 2; 1996 TY<sub>9</sub>, 4, 2, 2; 1996 VE<sub>9</sub>, 18, 6, 8; 1998 DU \*, 16, 6, 7; 1998 DU<sub>7</sub> \*, 18, 6, 8; 1998 DD<sub>24</sub> \*, 5, 2, 1; 2149 T-1, 9, 3, 2; (898), 6, 2, 1; (3057), 5, 2, 1; [139, 19, 3\*, 1998/02/15-1998/03/03]

#### 735 George Observatory, Needville

W. G. Dillon, 4703 Birkenhead Circle, Missouri City, TX 77459, U.S.A.

[bdillon@houston.geoquest.slb.com]

Observers W. G. Dillon, R. Pepper, M. Eastman, W. Cavignac, M. Cavignac

Measurer W. G. Dillon

0.46-m reflector + CCD

USNO-SA1.0

1998 MAR. 13

M.P.C. 31345

1998 AA, 3, 1, 0; (6037), 8, 1, 0; [11, 2, 0\*, 1998/02/18–1998/03/01]

### 755 Optec Observatory

G. Persha, Optec, Inc., 199 Smith St., Lowell, MI 49331, U.S.A.

[71267.476@compuserve.com]

0.25-m  $f/6.3$  Schmidt-Cassegrain + CCD + focal reducer + Wratten 21A filter  
GSC

1998 BZ<sub>7</sub>, 3, 1, 0; (370), 4, 2, 6; (496), 4, 2, 6; (1605), 4, 2, 6; (2084), 4, 2, 6; [19, 5, 0\*, 1998/02/22–1998/02/28]

### 757 High Point

D. K. Chesney, 4210 Lauren Pl, High Point, NC 27265, U.S.A.

[Dkchesney@aol.com]

0.25-m Schmidt-Cassegrain + CCD  
USNO-A1.0

(1003), 4, 2, 1; (1888), 4, 2, 2; [8, 2, 0\*, 1998/02/25–1998/03/04]

### 758 BCC Observatory, Cocoa

I. P. Griffin, BCC Observatory, 1519 Clearlake Road, Cocoa, FL 32922, U.S.A.

[GRIFFIN.I@a1.brevard.cc.fl.us]

0.30-m  $f/5$  Maksutov + CCD  
GSC

1985 TS<sub>1</sub>, 2, 1, 0; 1987 BO<sub>1</sub>, 4, 2, 1; 1989 AG, 4, 2, 2; 1989 WD, 4, 2, 2; 1990 RE<sub>5</sub>, 4, 2, 1; 1990 UL<sub>2</sub>, 6, 3, 5; 1992 SN<sub>1</sub>, 4, 2, 1; 1992 WX<sub>2</sub>, 18, 7, 6; 1992 WG<sub>5</sub>, 6, 3, 5; 1993 CO, 4, 2, 1; 1993 FS<sub>14</sub>, 2, 1, 0; 1993 FR<sub>44</sub>, 6, 3, 5; 1993 TQ<sub>23</sub>, 6, 3, 5; 1994 ER<sub>3</sub>, 4, 2, 1; 1995 AN, 3, 2, 1; 1998 BU<sub>25</sub>, 21, 8, 18; 1998 DV<sub>1</sub> \*, 17, 6, 6; 1998 DT<sub>10</sub> \*, 23, 9, 8; (1854), 7, 3, 2; (2576), 6, 3, 5; [151, 20, 2\*, 1998/02/13–1998/03/05]

### 809 European Southern Observatory

E. W. Elst, Observatoire Royal de Belgique, Avenue Circulaire 3, B-1180 Brussels, Belgium [elst@atmos.oma.be] (4)

C.-I. Lagerkvist, Uppsala Observatory, Box 515, S-75120 Uppsala, Sweden

[classe@laban.uu.se] (8)

Observers G. Pizarro, O. Pizarro

Measurers E. W. Elst, M. Lundström, C.-I. Lagerkvist, O. Hernius, J. Lagerros

1.0-m Schmidt

(4) 1979 TH<sub>2</sub>, 6, 2, 1; 1981 DK<sub>2</sub>, 6, 2, 1; 1981 EJ<sub>19</sub>, 6, 2, 1; 1981 EG<sub>23</sub>, 6, 2, 1; 1981 JE<sub>3</sub>, 6, 2, 1; 1987 DW<sub>6</sub>, 6, 2, 1; 1988 EA<sub>2</sub>, 6, 2, 1; 1989 CE<sub>6</sub>, 6, 2, 1; 1989 EH<sub>1</sub>, 6, 2, 1; 1989 SC<sub>1</sub>, 6, 2, 1; 1989 VN<sub>5</sub>, 6, 2, 1; 1991 RE<sub>20</sub>, 3, 1, 0; 1992 SM<sub>12</sub>, 6, 2, 1; 1993 DO, 6, 2, 1; 1993 FD<sub>22</sub>, 6, 2, 1; 1993 FH<sub>22</sub>, 6, 2, 1; 1993 FT<sub>37</sub>, 6, 2, 1; 1993 FE<sub>48</sub>, 12, 2, 1; 1993 WB, 6, 2, 1; 1996 VB<sub>8</sub>, 6, 2, 1; 1997 EF<sub>59</sub>, 3, 1, 0; 1997 EK<sub>59</sub>, 3, 1, 0; 1997 EO<sub>59</sub> \*, 6, 2, 3; 1997 GW<sub>26</sub>, 3, 1, 0; 1997 XV<sub>4</sub>, 6, 2, 1; 1997 XW<sub>4</sub>, 6, 2, 1; 1998 AP<sub>5</sub>, 6, 2, 1; 1998 CR, 6, 2, 1; 1998 CL<sub>1</sub>, 6, 2, 1; 1998 CU<sub>2</sub> \*, 6, 2, 1; 1998 CV<sub>2</sub> \*, 6, 2, 1; 1998 CW<sub>2</sub> \*, 6, 2, 1; 1998 CX<sub>2</sub> \*, 6, 2, 1; 1998 CY<sub>2</sub> \*, 6, 2, 1; 1998 CZ<sub>2</sub> \*, 6, 2, 1; 1998 CA<sub>3</sub> \*, 6, 2, 1; 1998 CB<sub>3</sub> \*, 6, 2, 1; 1998 CC<sub>3</sub> \*, 6, 2, 1; 1998 CD<sub>3</sub> \*, 6, 2, 1; 1998 CE<sub>3</sub> \*, 6, 2, 1; 1998 CF<sub>3</sub> \*, 6, 2, 1; 1998 CG<sub>3</sub> \*, 6, 2, 1; 1998 CH<sub>3</sub> \*, 6, 2, 1; 1998 CJ<sub>3</sub> \*, 6, 2, 1; 1998 CK<sub>3</sub> \*, 6, 2, 1; 1998 CL<sub>3</sub> \*, 6, 2, 1; 1998 CM<sub>3</sub> \*, 6, 2, 1; 1998 CN<sub>3</sub> \*, 6, 2, 1; 1998 CO<sub>3</sub> \*, 6, 2, 1; 1998 CP<sub>3</sub> \*, 6, 2, 1; 1998 CQ<sub>3</sub> \*, 6, 2, 1; 1998 CR<sub>3</sub> \*, 6, 2, 1; 1998 CS<sub>3</sub> \*, 6, 2, 1; 1998 CT<sub>3</sub> \*, 6, 2, 1; 1998 CU<sub>3</sub> \*, 6, 2, 1; 1998 CV<sub>3</sub> \*, 6, 2, 1; 1998 CW<sub>3</sub> \*, 6, 2, 1; 1998 CX<sub>3</sub> \*, 6, 2, 1; 1998 CY<sub>3</sub> \*, 6, 2, 1; 1998 CZ<sub>3</sub> \*, 6, 2, 1; 1998 CA<sub>4</sub> \*, 6, 2, 1; 1998 CF<sub>4</sub> \*, 6, 2, 1; 1998 CG<sub>4</sub> \*, 6, 2, 1; 1998 CH<sub>4</sub> \*, 6, 2, 1; 1998 CJ<sub>4</sub> \*, 6, 2, 1; 1998 CK<sub>4</sub> \*, 6, 2, 1; 1998 CL<sub>4</sub> \*, 6, 2, 1; 1998 CM<sub>4</sub> \*, 6, 2, 1; 1998 CN<sub>4</sub> \*, 6, 2, 1; 1998 CO<sub>4</sub> \*, 6, 2, 1; 1998 CP<sub>4</sub> \*, 6, 2, 1; 1998 CQ<sub>4</sub> \*, 6, 2, 1; 1998 CR<sub>4</sub> \*, 6, 2, 1; 1998 CS<sub>4</sub> \*, 6, 2, 1; 1998 CT<sub>4</sub> \*, 6, 2, 1; 1998 CU<sub>4</sub> \*, 6, 2, 1; 1998 CV<sub>4</sub> \*, 6, 2, 1; 1998 CW<sub>4</sub> \*, 6, 2, 1; 1998 CX<sub>4</sub> \*, 6, 2, 1; 1998 CY<sub>4</sub> \*, 6, 2, 1; 1998 CZ<sub>4</sub> \*, 6, 2, 1; 1998 CA<sub>5</sub> \*, 6, 2, 1; 1998 CB<sub>5</sub> \*, 6, 2, 1; 1998 CC<sub>5</sub> \*, 6, 2, 1; 1998 CD<sub>5</sub> \*, 6, 2, 1; 1998 CE<sub>5</sub> \*, 6, 2, 1; 1998 CF<sub>5</sub> \*, 6, 2, 1; 1998 DW<sub>5</sub>, 6, 2, 1; 1998 DZ<sub>5</sub>, 3, 1, 0; 1998 DA<sub>6</sub>, 6, 2, 1; 6571 P-L, 6, 2, 1; 3224 T-3, 6, 2, 1; (84), 9, 2, 1; (158), 6, 2, 1; (516), 6, 2, 1; (545), 6, 2, 1; (706), 6, 2, 1; (1045), 6, 2, 1; (1142), 6, 2, 1; (1204), 6, 2, 1; (1285), 6, 2, 1; (1467), 6, 2, 1; (1532), 6, 2, 1; (1638), 12, 2, 1; (1945), 6, 2, 1; (1962), 6, 2, 1; (2409), 6, 2, 1; (2416), 6, 2, 1; (2803), 6, 2, 1; (3027), 6, 2, 1; (3060), 6, 2, 1; (3389), 6, 2, 1; (3433), 6, 2, 1; (3436), 6, 2, 1; (3639), 6, 2, 1; (3798), 6, 2, 1; (4550), 6, 2, 1; (4712), 3, 1, 0; (4807), 6, 2, 1; (4963), 6, 2, 1; (5072), 6, 2, 1; (5245), 6, 2, 1; (5609), 6, 2, 1; (5860), 6, 2, 1; (5885), 6, 2, 1; (5972), 6, 2,

1; (6770), 6, 2, 1; (7101), 6, 2, 1; (7220), 6, 2, 1; (7224), 6, 2, 1; (7303), 6, 2, 1; (7431), 6, 2, 1; (7499), 6, 2, 1; [795, 133, 59\*, 1997/03/05–1998/02/07]

(8) 1964 VZ<sub>2</sub>, 10, 8, 34; 1977 EL<sub>1</sub>, 16, 14, 31; 1978 SC<sub>7</sub>, 9, 7, 30; 1978 SB<sub>8</sub>, 1, 1, 0; 1981 EG<sub>1</sub>, 1, 1, 0; 1981 ES<sub>23</sub>, 2, 2, 1; 1981 ES<sub>35</sub>, 1, 1, 0; 1981 EA<sub>36</sub>, 3, 3, 3; 1981 QQ<sub>2</sub>, 9, 7, 33; 1981 TZ, 15, 12, 34; 1982 FF<sub>3</sub>, 4, 4, 4; 1982 FX<sub>3</sub>, 1, 1, 0; 1982 UQ<sub>10</sub>, 9, 7, 27; 1984 DD<sub>1</sub>, 4, 4, 18; 1988 RN<sub>3</sub>, 9, 7, 23; 1989 BE<sub>1</sub>, 4, 4, 4; 1990 HJ, 5, 5, 6; 1990 QV<sub>1</sub>, 17, 13, 36; 1991 PE<sub>3</sub>, 5, 5, 26; 1991 PW<sub>16</sub>, 17, 13, 36; 1991 VJ<sub>1</sub>, 1, 1, 0; 1992 YB, 8, 6, 5; 1993 FT<sub>14</sub>, 7, 6, 5; 1993 FT<sub>37</sub>, 14, 12, 34; 1993 FH<sub>49</sub>, 10, 9, 31; 1993 FR<sub>58</sub>, 2, 2, 1; 1993 FK<sub>81</sub>, 4, 4, 29; 1995 QL<sub>10</sub> \*, 5, 5, 34; 1995 QM<sub>10</sub> \*, 13, 11, 41; 1995 QN<sub>10</sub> \*, 9, 8, 30; 1995 QO<sub>10</sub> \*, 11, 10, 41; 1995 SX<sub>2</sub>, 1, 1, 0; 1995 SR<sub>9</sub>, 1, 1, 0; 1995 SX<sub>12</sub>, 5, 4, 8; 1995 SH<sub>55</sub> \*, 4, 3, 2; 1995 SJ<sub>55</sub> \*, 3, 3, 4; 1996 YB<sub>1</sub>, 2, 2, 1; 1996 YV<sub>1</sub>, 8, 6, 26; 1996 YH<sub>2</sub>, 3, 3, 29; 1997 AP<sub>4</sub>, 5, 4, 19; 1997 AM<sub>5</sub>, 10, 8, 28; 1997 AP<sub>14</sub>, 13, 10, 31; 1997 AO<sub>22</sub>, 11, 10, 41; 1997 BB<sub>2</sub>, 11, 9, 30; 1997 CP, 17, 14, 36; 1997 CW<sub>11</sub>, 8, 6, 26; 1997 CU<sub>19</sub>, 4, 4, 4; 1997 CJ<sub>29</sub>, 20, 15, 36; 1997 YK<sub>4</sub>, 14, 11, 34; 2665 P-L, 5, 5, 23; 4087 P-L, 9, 7, 30; 2186 T-1, 2, 2, 1; 1052 T-2, 3, 3, 19; 1277 T-2, 14, 10, 31; 1335 T-2, 7, 5, 26; 2076 T-2, 3, 3, 3; 2097 T-2, 9, 9, 32; 2275 T-2, 1, 1, 0; 3270 T-2, 2, 2, 1; 2191 T-3, 2, 2, 1; 4237 T-3, 2, 2, 1; [425, 61, 6\*, 1995/08/19–1995/09/29]

### 824 Lake Clear

K. A. Williams, RD #1 Box 277, Forest Home Road, Lake Clear, NY 12945,

U.S.A. [kenwill@NorthNet.org]

0.41-m  $f/5.0$  reflector + CCD

GSC

1997 SO<sub>34</sub> \*, 3, 1, 0; [3, 1, 1\*, 1997/09/28]

### 827 Saint-Félicien

C. Boivin, 1265 Des Cormiers, Saint-Félicien, Canada [cboivin@destination.ca]

0.25-m  $f/6.3$  Schmidt-Cassegrain + CCD

GSC

(6037), 7, 1, 0; [7, 1, 0\*, 1998/03/06–1998/03/07]

### 861 Barão Geraldo

P. R. Holvorcem, Departamento de Matematica/IMECC, Universidade Estadual de  
Campiñas, Campiñas, SP, BR-13081-970, Brazil [holvorcem@ime.unicamp.br]

0.20-m  $f/6.3$  Schmidt-Cassegrain + CCD

GSC

1994 TF<sub>2</sub>, 2, 1, 0; 1994 XK, 6, 2, 5; 1997 PK<sub>2</sub>, 2, 1, 0; 1997 RD<sub>1</sub>, 3, 1, 0; 1997 RM<sub>1</sub>, 6, 2, 1; (215), 5, 1, 0; (4283), 3, 1, 0; (5479), 3, 1, 0; (8034), 3, 1, 0; [33, 9, 0\*, 1997/10/04–1997/10/28]

### 864 Kumamoto Civil Astronomical Observatory

J. Kobayashi, 2016 Tukahara, Jhonan, Shimomashiki-Gun, Kumamoto-Ken, 861-42

Japan [nag00633@niftyserve.or.jp]

0.41-m  $f/5.0$  reflector + CCD

GSC

1997 CU<sub>26</sub>, 3, 1, 0; 1997 VX<sub>5</sub>, 3, 1, 0; 1998 EC<sub>3</sub>, 3, 1, 0; (7605), 3, 1, 0; [12, 4, 0\*, 1998/03/01–1998/03/02]

### 867 Saji Observatory

M. Yamanishi, 1071-1 Takayama, Saji, Yazu-Gun, Tottori-Ken, 689-13 Japan

[KYI03040@niftyserve.or.jp]

Observers M. Yamanishi, A. Miyamoto, M. Aimoto, T. Oribe

1.03-m  $f/4.2$  reflector + CCD

GSC

1997 YF<sub>7</sub>, 3, 1, 0; 1998 BJ<sub>24</sub>, 3, 1, 0; 1998 CL, 9, 3, 12; 1998 DB<sub>13</sub>, 2, 1, 0; 1998 EC<sub>3</sub>, 4, 1, 0; 1998 EN<sub>8</sub> \*, 6, 2, 1; [27, 6, 1\*, 1998/02/01–1998/03/03]

### 886 Susono

M. Akiyama, 1655-23, Chabatake, Susono, Shizuoka-Ken, 410-11 Japan

0.25-m  $f/6.3$  reflector + CCD

GSC

1986 WB<sub>2</sub>, 2, 1, 0; 1988 DH<sub>1</sub>, 2, 1, 0; 1996 TL<sub>12</sub>, 2, 1, 0; 1996 VO<sub>1</sub>, 2, 1, 0; 1996 XT<sub>30</sub>, 2, 1, 0; 1998 BJ<sub>4</sub>, 4, 2, 14; 1998 BH<sub>33</sub>, 4, 2, 14; 1998 BU<sub>41</sub>, 2, 1, 0; 1998 CQ<sub>2</sub>, 2, 1, 0; 1998 DA<sub>24</sub>, 2, 1, 0; 1998 DB<sub>24</sub>, 2, 1, 0; 1998 EC<sub>3</sub>, 2, 1, 0; [28, 12, 0\*, 1998/02/17–1998/03/06]

### 888 Gekko Observatory

T. Urata, 1-8, Dobayashi 1 Chome, Shimizu, Shizuoka-Ken 424, Japan

[urata@sannet.ne.jp]

Observer T. Kagawa

Measurer T. Urata

0.50-m  $f/4.0$  reflector

GSC

1981 ET<sub>17</sub>, 3, 1, 0; 1988 DH<sub>1</sub>, 3, 1, 0; 1997 XM<sub>5</sub>, 2, 1, 0; 1998 BH<sub>4</sub>, 6, 2, 3; 1998 BD<sub>30</sub>, 7, 3, 17; 1998 BU<sub>41</sub>, 10, 4, 26; 1998 CQ<sub>2</sub> \*, 8, 3, 24; 1998 DR<sub>5</sub>, 3, 1, 0; 1998 DA<sub>24</sub>, 6, 2, 1; 1998 DB<sub>24</sub>, 6, 2, 1; 1998 EF<sub>6</sub>, 3, 1, 0; 1998 EK<sub>8</sub>, 3, 1, 0; 1998 EL<sub>8</sub>, 3, 1, 0; 1998 EO<sub>8</sub>, 3, 1, 0; [66, 14, 1\*, 1998/02/05–1998/03/07]

### 894 Otomo

S. Otomo, Kiyosato 3545-3902, Takane, Kitakoma-Gun, Yamanashi-Ken, 407-03

Japan

0.25-m  $f/3.4$  reflector

PPM

1997 TM<sub>27</sub> \*, 6, 3, 18; 1997 UC<sub>25</sub> \*, 6, 3, 4; (5884), 4, 2, 1; [16, 3, 2\*, 1997/10/08–1997/10/29]

### 897 YGCO Chiyoda Station

T. Kojima, 45 Shimonakamori, Chiyoda, Ohra-Gun, Gunma-Ken, 370-07 Japan

[kojitaku@scorpius.bekkoame.or.jp]

0.25-m  $f/6.0$  reflector + CCD

GSC

1998 DM<sub>20</sub>, 4, 1, 0; 1998 EC<sub>3</sub>, 5, 2, 1; [9, 2, 0\*, 1998/03/01–1998/03/02]

### 900 Moriyama

Y. Ikari, Katube-Cho 626, Moriyama, Shiga-Ken 524, Japan

[ikari@gold.ocn.ne.jp]

0.25-m  $f/6.3$  Schmidt-Cassegrain + CCD

GSC

1977 RK<sub>2</sub>, 2, 1, 0; 1990 EA<sub>7</sub>, 2, 1, 0; 1991 GO<sub>1</sub>, 4, 2, 8; 1994 BW<sub>2</sub>, 2, 1, 0; 1995 TG<sub>2</sub>, 2, 1, 0; 1998 AF<sub>2</sub>, 2, 1, 0; 1998 DF<sub>11</sub>, 2, 1, 0; 1998 EC<sub>3</sub>, 2, 1, 0; [18, 8, 0\*, 1998/01/30–1998/03/02]

### 905 Nachi-Katsuura Observatory

T. Urata, 1-8, Dobayashi 1 Chome, Shimizu, Shizuoka-Ken 424, Japan

[urata@sannet.ne.jp]

Observer Y. Shimizu

Measurer T. Urata

0.40-m  $f/3.3$  Baker-Schmidt

GSC

1998 BC<sub>41</sub>, 3, 2, 1; 1998 DR<sub>5</sub>, 2, 1, 0; 1998 DZ<sub>23</sub> \*, 4, 2, 12; 1998 DA<sub>24</sub> \*, 2, 1, 0; 1998 DB<sub>24</sub> \*, 2, 1, 0; 1998 DC<sub>24</sub> \*, 4, 2, 12; 1998 ED<sub>6</sub> \*, 4, 2, 1; 1998 EE<sub>6</sub> \*, 4, 2, 1; 1998 EF<sub>6</sub> \*, 4, 2, 1; 1998 EK<sub>8</sub> \*, 2, 1, 0; 1998 EL<sub>8</sub> \*, 2, 1, 0; [33, 11, 9\*, 1998/02/17–1998/03/03]

### 910 Caussols-ODAS

A. Maury, Observatoire de la Côte d'Azur, B.P. 229, F-06304 Nice, France

[maury@obs-azur.fr]

G. Hahn, DLR Institute of Planetary Exploration, Rudower Chaussee 5, D-12489

Berlin, Germany [Gerhard.Hahn@DLR.de]

Observers A. Maury, D. Albanese, G. Hahn, M. Hoffmann

Measurers A. Maury, G. Hahn, M. Hoffmann

0.90-m Schmidt + CCD

GSC

1977 PP<sub>1</sub>, 9, 3, 2; 1978 RL<sub>1</sub>, 3, 1, 0; 1981 EG<sub>1</sub>, 6, 2, 1; 1981 EQ<sub>16</sub>, 3, 1, 0; 1981 EQ<sub>18</sub>, 3, 1, 0; 1981 EP<sub>19</sub>, 3, 1, 0; 1981 ED<sub>22</sub>, 3, 1, 0; 1981 EM<sub>26</sub>, 6, 2, 1; 1981 EV<sub>34</sub>, 6, 2, 1; 1981 EO<sub>44</sub>, 6, 2, 3; 1986 RE<sub>11</sub>, 6, 2, 4; 1989 QV<sub>3</sub>, 3, 1, 0; 1990 UZ<sub>1</sub>, 3, 1, 0; 1991 GR<sub>2</sub>, 6, 2, 1; 1991 UC<sub>3</sub>, 1, 0; 1992 DB<sub>10</sub>, 6, 2, 1; 1992 SW<sub>3</sub>, 3, 1, 0; 1992 UJ<sub>3</sub>, 3, 1, 0; 1993 AN<sub>6</sub>, 2, 1; 1993 FN<sub>8</sub>, 3, 1, 0; 1993 FT<sub>41</sub>, 3, 1, 0; 1993 TE<sub>34</sub>, 6, 2, 8; 1995 OT<sub>3</sub>, 1, 0; 1995 SX<sub>12</sub>, 3, 1, 0; 1995 SO<sub>29</sub>, 3, 1, 0; 1995 WB<sub>6</sub>, 6, 2, 1; 1996 RC<sub>1</sub>, 6, 2, 3; 1996 TO<sub>3</sub>, 1, 0; 1996 VG<sub>2</sub>, 3, 1, 0; 1996 VD<sub>6</sub>, 3, 1, 0; 1997 AU<sub>6</sub>, 6, 2, 1; 1997 AK<sub>6</sub>, 3, 1, 0; 1997 TK<sub>27</sub> \*, 3, 1, 0; 1997 TL<sub>27</sub> \*, 3, 1, 0; 1997 VW<sub>6</sub>, 6, 2, 1; 1997 WL<sub>7</sub>, 6, 2, 1; 1997 WQ<sub>22</sub>, 3, 1, 0; 1997 WQ<sub>31</sub>, 3, 1, 0; 1997 WQ<sub>34</sub>, 9, 3, 24; 1997 WE<sub>47</sub>, 6, 2, 1; 1997 WK<sub>47</sub>, 3, 1, 0; 1997 WZ<sub>55</sub>, 3, 1, 0; 1997 WA<sub>56</sub>, 3, 1, 0; 1997 XG<sub>3</sub>, 1, 0; 1997 XN<sub>8</sub>, 3, 1, 0; 1997 XY<sub>8</sub>, 9, 3, 29; 1997 YR<sub>13</sub>, 6, 2, 2; 1997 YH<sub>14</sub>, 6, 2, 2; 1997 YK<sub>14</sub>, 6, 2, 1; 1997 YQ<sub>18</sub>, 6, 2, 3; 1997 YF<sub>20</sub>, 3, 1, 0; 1997 YE<sub>21</sub> \*, 3, 1, 0; 1997 YF<sub>21</sub> \*, 3, 1, 0; 1997 YG<sub>21</sub> \*, 3, 1, 0; 1997 YH<sub>21</sub> \*, 3, 1, 0; 1997 YJ<sub>21</sub> \*, 3, 1, 0; 1997 YK<sub>21</sub> \*, 3, 1, 0; 1998 AB<sub>6</sub>, 3, 1, 0; 1998 AK<sub>8</sub>, 3, 1, 0; 1998 BD<sub>4</sub>, 3, 1, 0; 1998 BK<sub>4</sub>, 3, 1, 0; 1998 BR<sub>6</sub>, 3, 1, 0; 1998 BH<sub>7</sub>, 3, 1, 0; 1998 BC<sub>15</sub>, 3, 1, 0; 1998 BN<sub>15</sub>, 3, 1, 0; 1998 BN<sub>19</sub>, 6, 2, 3; 1998 BT<sub>23</sub>, 3, 1, 0; 1998 BU<sub>23</sub>, 9, 3, 3; 1998 BL<sub>26</sub>, 3, 1, 0; 1998 BL<sub>27</sub>, 3, 1, 0; 1998 BP<sub>29</sub>, 6, 2, 3; 1998 BK<sub>30</sub>, 3, 1, 0; 1998 BG<sub>31</sub>, 3, 1, 0; 1998 BS<sub>33</sub>, 3, 1, 0; 1998 BF<sub>41</sub>, 3, 1, 0; 1998 BF<sub>44</sub>, 3, 1, 0; 1998 BO<sub>45</sub> \*, 3, 1, 0; 1998 BO<sub>45</sub>, 9, 3, 84; 1998 BX<sub>45</sub>, 6, 2, 3; 1998 BA<sub>46</sub>, 3, 1, 0; 1998 BE<sub>46</sub>, 3, 1, 0; 1998 BN<sub>46</sub>, 3, 1, 0; 1998 BF<sub>46</sub> \*, 3, 1, 0; 1998 BQ<sub>46</sub> \*, 3, 1, 0; 1998 BR<sub>46</sub> \*, 3, 1, 0; 1998 BS<sub>46</sub> \*, 3, 1, 0; 1998 BT<sub>46</sub> \*, 3, 1, 0; 1998 BU<sub>46</sub> \*, 3, 1, 0; 1998 BV<sub>46</sub> \*, 3, 1, 0; 1998 CC<sub>1</sub>, 6, 2, 8; 1998 CW<sub>1</sub>, 3, 1, 0; 1998 CO<sub>2</sub>, 2, 1, 0; 1998 DF<sub>2</sub> \*, 6, 2, 1; 1998 DG<sub>2</sub> \*, 6, 2, 1; 1998 DH<sub>2</sub> \*, 6, 2, 1; 1998 DJ<sub>2</sub> \*, 6, 2, 1; 1998 DK<sub>2</sub> \*, 6, 2, 1; 1998 DL<sub>2</sub> \*, 6, 2, 1; 1998 DM<sub>2</sub> \*, 6, 2, 1; 1998 DN<sub>2</sub> \*, 6, 2, 1; 1998 DO<sub>2</sub> \*, 6, 2, 1; 1998 DP<sub>2</sub> \*, 6, 2, 1; 1998 DQ<sub>2</sub> \*, 6, 2, 1; 1998 DA<sub>3</sub>, 3, 1, 0; 1998 DR<sub>8</sub>, 3, 1, 0; 1998 DA<sub>13</sub> \*, 9, 3, 10; 1998 BQ<sub>13</sub>, 3, 1, 0; 1998 DT<sub>13</sub> \*, 6, 2, 1; 1998 DU<sub>13</sub> \*, 6, 2, 1; 1998 DV<sub>13</sub> \*, 6, 2, 1; 1998 DW<sub>13</sub> \*, 6, 2, 1; 1998 DX<sub>13</sub> \*, 6, 2, 1; 1998 DY<sub>13</sub> \*, 6, 2, 1; 1998 DZ<sub>13</sub> \*, 6, 2, 1; 1998 DA<sub>14</sub> \*, 6, 2, 1; 1998 DB<sub>14</sub> \*, 6, 2, 1; 1998 DC<sub>14</sub> \*, 6, 2, 1; 1998 DD<sub>14</sub> \*, 6, 2, 1; 1998 DE<sub>14</sub> \*, 6, 2, 1; 1998 DF<sub>14</sub> \*, 6, 2, 1; 1998 DG<sub>14</sub> \*, 6, 2, 1; 1998 DH<sub>14</sub>, 3, 1, 0; 1998 DJ<sub>14</sub>, 3, 1, 0; 1998 DW<sub>19</sub> \*, 6, 2, 8; 1998 DX<sub>19</sub> \*, 6, 2, 8; 1998 DY<sub>19</sub> \*, 6, 2, 8; 1998 DZ<sub>19</sub> \*, 6, 2, 8; 1998 DA<sub>20</sub> \*, 6, 2, 8; 1998 DB<sub>20</sub> \*, 12, 3, 3; 1998 DK<sub>23</sub>, 6, 2, 3; 1998 DN<sub>23</sub> \*, 9, 3, 4; 1998 DO<sub>23</sub> \*, 12, 4, 7; 1998 DP<sub>23</sub> \*, 9, 3, 3; 1998 DQ<sub>23</sub> \*, 9, 3, 3; 1998 DV<sub>23</sub> \*, 6, 2, 4; 1998 DW<sub>23</sub> \*, 6, 2, 3; 1998 DX<sub>23</sub> \*, 6, 2, 3; 1998 EG \*, 6, 2, 1; 1998 EH \*, 6, 2, 1; 1998 EJ \*, 6, 2, 1; 1998 EK \*, 6, 2, 1; 1998 EL \*, 6, 2, 1; 1998 EM \*, 6, 2, 1; 1998 EN \*, 6, 2, 1; 1998 EO \*, 6, 2, 1; 1998 EP \*, 6, 2, 1; 1998 EQ \*, 6, 2, 1; 1998 ER \*, 6, 2, 1; 1998 ES \*, 6, 2, 1; 1998 ET \*, 6, 2, 1; 1998 EU \*, 6, 2, 1; 1998 EV \*, 6, 2, 1; 1998 EW \*, 6, 2, 1; 1998 EX \*, 6, 2, 1; 1998 EY \*, 6, 2, 1; 1998 EZ \*, 6, 2, 1; 1998 EA<sub>1</sub> \*, 6, 2, 1; 1998 EB<sub>1</sub> \*, 6, 2, 1; 1998 EC<sub>1</sub> \*, 6, 2, 1; 1998 ED<sub>1</sub> \*, 6, 2, 1; 1998 EE<sub>1</sub> \*, 6, 2, 1; 1998 EF<sub>1</sub> \*, 6, 2, 1; 1998 EG<sub>1</sub> \*, 6, 2, 1; 1998 EH<sub>1</sub> \*, 6, 2, 1; 1998 EJ<sub>1</sub> \*, 6, 2, 1; 1998 EK<sub>1</sub> \*, 6, 2, 1; 1998 EL<sub>1</sub> \*, 6, 2, 1; 1998 EM<sub>1</sub> \*, 6, 2, 1; 1998 EN<sub>1</sub> \*, 6, 2, 1; 1998 EO<sub>1</sub> \*, 4, 2, 1; 1998 EP<sub>1</sub> \*, 6, 2, 1; 1998 EQ<sub>1</sub> \*, 6, 2, 1; 1998 ER<sub>1</sub> \*, 6, 2, 1; 1998 ES<sub>1</sub> \*, 6, 2, 1; 1998 ET<sub>1</sub> \*, 6, 2, 1; 1998 EU<sub>1</sub> \*, 6, 2, 1; 1998 EV<sub>1</sub> \*, 6, 2, 1; 1998 EW<sub>1</sub> \*, 6, 2, 1; 1998 EX<sub>1</sub> \*, 6, 2, 1; 1998 EY<sub>1</sub> \*, 6, 2, 1; 1998 EZ<sub>1</sub> \*, 6, 2, 1; 1998 EA<sub>2</sub> \*, 6, 2, 1; 1998 EB<sub>2</sub> \*, 6, 2, 1; 1998 EC<sub>2</sub> \*, 6, 2, 1; 1998 ED<sub>2</sub> \*, 6, 2, 1; 1998 EE<sub>2</sub> \*, 6, 2, 1; 1998 EF<sub>2</sub> \*, 6, 2, 1; 1998 EG<sub>2</sub> \*, 6, 2, 1; 1998 EH<sub>2</sub> \*, 6, 2, 1; 1998 EJ<sub>2</sub> \*, 6, 2, 1; 1998 EK<sub>2</sub> \*, 6, 2, 1; 1998 EL<sub>2</sub> \*, 6, 2, 1; 1998 EM<sub>2</sub> \*, 6, 2, 1; 1998 EN<sub>2</sub> \*, 6, 2, 1; 1998 EO<sub>2</sub> \*, 6, 2, 1; 1998 EP<sub>2</sub> \*, 6, 2, 1; 1998 EQ<sub>2</sub> \*, 6, 2, 1; 1998 ER<sub>2</sub> \*, 6, 2, 1; 1998 ES<sub>2</sub> \*, 6, 2, 1; 1998 ET<sub>2</sub> \*, 6, 2, 1; 1998 EU<sub>2</sub> \*, 6, 2, 1; 1998 EV<sub>2</sub> \*, 6, 2, 1; 1998 EW<sub>2</sub> \*, 6, 2, 1; 1998 EX<sub>2</sub> \*, 6, 2, 1; 1998 EP<sub>3</sub> \*, 6, 2, 1; 1998 EQ<sub>3</sub> \*, 6, 2, 1; 1998 ER<sub>3</sub> \*, 6, 2, 1; 1998 EG<sub>6</sub> \*, 6, 2, 4; 1998 EH<sub>6</sub> \*, 6, 2, 4; 1998 EJ<sub>6</sub> \*, 6, 2, 4; 1998 EK<sub>6</sub> \*, 6, 2, 4; 1998 EL<sub>6</sub> \*, 6, 2, 4; 1998 EM<sub>6</sub> \*, 6, 2, 4; 1998 EN<sub>6</sub> \*, 6, 2, 4; 1998 EO<sub>6</sub> \*, 6, 2, 4; 1998 EP<sub>6</sub> \*, 6, 2, 4; 1998 EQ<sub>6</sub> \*, 6, 2, 4; 1998 ER<sub>6</sub> \*, 6, 2, 4; 1998 ES<sub>6</sub> \*, 6, 2, 4; 1998 ET<sub>6</sub> \*, 6, 2, 4; 1998 EU<sub>6</sub> \*, 6, 2, 4; 1998 EV<sub>6</sub> \*, 6, 2, 4; 1998 EW<sub>6</sub> \*, 6, 2, 3; 1998 EP<sub>8</sub> \*, 3, 1, 0; 2508 P-L, 3, 1, 0; 6055 P-L, 3, 1, 0; 6543 P-L, 3, 1, 0; 9057 P-L, 6, 2, 1; 1279 T-2, 3, 1, 0; 1304 T-2, 3, 1, 0; 3176 T-2, 3, 1, 0; (50), 6, 2, 1; (144), 3, 1, 0; (274), 3, 1, 0; (656), 3, 1, 0; (757), 12, 4, 5; (988), 3, 1, 0; (1003), 3, 1, 0; (1061), 6, 2, 1; (1295), 3, 1, 0; (1653), 9, 3, 2; (1774), 3, 1, 0; (1784), 3, 1, 0; (2281), 6, 2, 1; (2297), 3, 1, 0; (2597), 3, 1, 0; (2619), 3, 1, 0; (2722), 6, 2, 3; (2738), 3, 1, 0; (2884), 3, 1, 0; (2914), 6, 2, 1; (3279), 6, 2, 4; (3280), 6, 2, 1; (3429), 3, 1, 0; (3484), 3, 1, 0; (3524), 3, 1, 0; (3652), 6, 2, 2; (3722), 3, 1, 0; (3868), 3, 1, 0; (4078), 3, 1, 0; (4345), 6, 2, 2; (4371), 3, 1, 0; (4651), 6, 2, 1; (4658), 3, 1, 0; (4759), 3, 1, 0; (4799), 6, 2, 1; (4814), 6, 2, 2; (4945), 6, 2, 1; (4966), 6, 2, 4; (5033), 3, 1, 0; (5103), 3, 1, 0; (5194), 6, 2, 8; (5282), 3, 1, 0; (5576), 3, 1, 0; (5817), 6, 2, 1; (6030), 6, 2, 1; (6468), 3, 1, 0; (6503), 3, 1, 0; (6816), 6, 2, 3; (7240), 6, 2, 1; (7286), 6, 2, 8; (7295), 6, 2, 4; (7544), 3, 1, 0; (8156), 3, 1, 0; (8239), 3, 1, 0; (8247), 6, 2, 1; (8280), 3, 1, 0; [1443, 287, 142\*, 1997/10/01–1998/03/06]

### 947 Saint-Sulpice

B. Christophe, 63 rue Belliard, F-75018 Paris, France

[bernard.christophe@hol.fr]

0.60-m  $f/5.6$  relector + CCD

GSC, USNO-SA1.0

(1012), 6, 4, 8; (1073), 4, 2, 8; (1841), 6, 3, 8; (2293), 4, 2, 1; (2635), 6, 3, 8; (2648), 6, 3, 8; (2665), 6, 3, 8; (3249), 6, 3, 8; (3724), 5, 3, 8; (4076), 6, 3, 8; [55, 10, 0\*, 1998/02/06–1998/02/14]

**954 Teide Observatory**

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Observers N. Gonzalez, J. Licandro, R. Casas, A. Oscoz

Measurers R. Casas, J. Licandro

0.8-m  $f/11.3$  Cassegrain + CCD

GSC 1.2, APM

1995 GO, 3, 1, 0; 1996 TL<sub>66</sub>, 2, 2, 1; 1996 TO<sub>66</sub>, 2, 2, 1; 1998 BX<sub>7</sub>, 5, 1, 0; 1998 DX<sub>12</sub>, 2, 1, 0;  
1998 DN<sub>20</sub>, 2, 1, 0; 1998 EO<sub>4</sub> \*, 16, 2, 2; (5145), 3, 1, 0; [35, 8, 1\*, 1997/12/21–1998/03/05]

**955 Sasseoires**

R. Goncalves, Rua Augusto Jose Vieira, 10-3, P-1170 Lisbon, Portugal

[m13406@correio.cc.fc.ul.pt]

0.25-m  $f/10$  Schmidt-Cassegrain + CCD

GSC, SA-1.0

(5247), 2, 1, 0; (6037), 4, 1, 0; [6, 2, 0\*, 1998/03/01–1998/03/07]

**958 Observatoire de Dax**

P. Dupouy, Observatoire de Dax, F-40100 Dax, France

[DUPOUY\_Philippe@compuserve.com]

Observers P. Dupouy, F. Marechal, F. Soulu

Measurers J.-F. Lahitte, P. Dupouy, F. Marechal

0.254-m  $f/6.7$  reflector + CCD

GSC, USNO-SA1.0

1955 RV, 5, 2, 4; 1977 EX, 3, 2, 3; 1977 RR<sub>6</sub>, 3, 1, 0; 1986 QQ, 3, 2, 2; 1990 RE<sub>5</sub>, 5, 2, 6; 1993 OB,  
2, 1, 0; 1993 UD<sub>3</sub>, 3, 1, 0; 1997 VV, 2, 1, 0; 1998 BP<sub>6</sub>, 2, 1, 0; 1998 BJ<sub>30</sub>, 3, 1, 0; 1998 BB<sub>42</sub>,  
5, 2, 3; 1998 BN<sub>45</sub> \*, 4, 1, 0; 1998 DE, 3, 1, 0; 1998 DF, 3, 1, 0; (4314), 5, 2, 3; (4440), 4, 1, 0;  
(8295), 2, 1, 0; [57, 17, 1\*, 1998/01/23–1998/02/21]

**960 Rolvenden**

M. Armstrong, Butterfly Cottage, Hastings Road, Rolvenden, Kent TN17 4PN,  
England [fw04@dia1.pipex.com]

0.26-m Schmidt-Cassegrain + CCD

GSC

1990 UZ, 2, 1, 0; 1998 DX<sub>12</sub> \*, 9, 3, 6; 1998 DN<sub>20</sub> \*, 8, 3, 9; [19, 3, 2\*, 1998/02/23–1998/03/05]

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**P/1997 G1 (Montani)**

Epoch 1997 Apr. 22.0 TT = JDT 2450560.5

| <i>T</i> | 1997 Apr. 6.7366 TT |                   |            | Nakano |            |
|----------|---------------------|-------------------|------------|--------|------------|
| <i>q</i> | 4.214270            | (2000.0)          | <b>P</b>   |        | <b>Q</b>   |
| <i>n</i> | 0.0507654           | $\omega$ 213.4885 | −0.5191388 |        | −0.8518571 |
| <i>a</i> | 7.223664            | $\Omega$ 267.8756 | +0.7986424 |        | −0.4545131 |
| <i>e</i> | 0.416602            | <i>i</i> 3.9898   | +0.3044098 |        | −0.2603025 |
| <i>P</i> | 19.4                |                   |            |        |            |

From 65 observations 1997 Apr. 9–1998 Mar. 2, mean residual 0<sup>''</sup>.7.

**C/1997 G2 (Montani)**

Epoch 1998 Apr. 17.0 TT = JDT 2450920.5

| <i>T</i> | 1998 Apr. 16.3457 TT |                   |            | Marsden |            |
|----------|----------------------|-------------------|------------|---------|------------|
| <i>q</i> | 3.084746             | (2000.0)          | <b>P</b>   |         | <b>Q</b>   |
| <i>z</i> | +0.001870            | $\omega$ 239.8561 | −0.0357056 |         | +0.6291831 |
|          | ±0.000004            | $\Omega$ 55.8039  | −0.2118702 |         | +0.7545054 |
| <i>e</i> | 0.994233             | <i>i</i> 69.8384  | −0.9766453 |         | −0.1866825 |

From 156 observations 1997 Apr. 12–1998 Feb. 27, mean residual 0<sup>''</sup>.7.

**C/1997 U1 (SOHO)**

*T* 1997 Oct. 29.05 TT

| <i>q</i> | 0.0050 | (2000.0)        | <b>P</b> | Marsden | <b>Q</b> |
|----------|--------|-----------------|----------|---------|----------|
|          |        | $\omega$ 49.48  | +0.14611 |         | −0.84808 |
|          |        | $\Omega$ 317.70 | −0.96721 |         | −0.01433 |
| <i>e</i> | 1.0    | <i>i</i> 130.82 | +0.20776 |         | +0.52968 |

From 22 observations 1997 Oct. 28.

**80P/Peters-Hartley**

Epoch 1998 Aug. 15.0 TT = JDT 2451040.5

| <i>T</i> | 1998 Aug. 11.6391 TT |                   |            | Marsden |            |
|----------|----------------------|-------------------|------------|---------|------------|
| <i>q</i> | 1.623921             | (2000.0)          | <b>P</b>   |         | <b>Q</b>   |
| <i>n</i> | 0.1213869            | $\omega$ 338.4045 | −0.4757150 |         | +0.7303034 |
| <i>a</i> | 4.039752             | $\Omega$ 260.0067 | −0.7164346 |         | −0.6450659 |
| <i>e</i> | 0.598015             | <i>i</i> 29.8552  | −0.5103104 |         | +0.2248263 |
| <i>P</i> | 8.12                 |                   |            |         |            |

From 29 observations 1982–1998, mean residual 0<sup>''</sup>.9. Nongravitational parameters  
 $A_1 = +0.31$ ,  $A_2 = -0.0750$ .

Marsden

|     |           |          |          |            |            |
|-----|-----------|----------|----------|------------|------------|
| $q$ | 2.021132  |          | (2000.0) | <b>P</b>   | <b>Q</b>   |
| $n$ | 0.1513138 | $\omega$ | 301.9799 | -0.0754156 | -0.9947649 |
| $a$ | 3.487790  | $\Omega$ | 152.0963 | +0.9573712 | -0.0915720 |
| $e$ | 0.420512  | $i$      | 8.4734   | +0.2788421 | +0.0453576 |
| $P$ | 6.51      |          |          |            |            |

From 221 observations 1991–1998, mean residual  $0''.7$ .

(8320)\* 1955 RV = 1974 WD = 1978 YX = 1983 AN<sub>5</sub> = 1989 RZ<sub>5</sub>  
= 1991 FR<sub>6</sub> = 1995 FP<sub>11</sub>

Discovered 1955 Sept. 13 at the Goethe Link Observatory, Indiana University.

Id. K. Kinoshita (*MPC* 26393)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

|     |            |          |           |              |              |
|-----|------------|----------|-----------|--------------|--------------|
| $M$ | 34.41842   |          | (2000.0)  | $\mathbf{P}$ | $\mathbf{Q}$ |
| $n$ | 0.26020711 | $\omega$ | 220.95781 | +0.77275433  | -0.63470419  |
| $a$ | 2.4299086  | $\Omega$ | 178.43887 | +0.59282949  | +0.72111914  |
| $e$ | 0.1944210  | $i$      | 2.43052   | +0.22672436  | +0.27773689  |
| $P$ | 3.79       | $H$      | 13.6      | $G$ 0.15     | $U$ 2        |

Residuals in seconds of arc

|            |     |             |      |            |     |             |      |            |     |      |      |
|------------|-----|-------------|------|------------|-----|-------------|------|------------|-----|------|------|
| 1955 09 13 | 760 | 2.3+        | 0.7+ | 1989 09 29 | 675 | 1.2+        | 0.4- | 1995 03 29 | 691 | 0.3- | 0.1- |
| 1955 09 13 | 760 | 1.3+        | 0.5- | 1989 09 29 | 675 | 0.7+        | 0.1- | 1995 03 29 | 691 | 0.4- | 0.3- |
| 1955 09 16 | 760 | 1.6-        | 1.9+ | 1991 03 09 | 675 | 1.7+        | 0.1+ | 1995 04 01 | 691 | 0.4+ | 0.1- |
| 1955 09 16 | 760 | 0.8-        | 1.4- | 1991 03 09 | 675 | 1.9+        | 0.5+ | 1995 04 01 | 691 | 0.4+ | 0.2+ |
| 1955 09 18 | 760 | 0.7-        | 1.1+ | 1991 03 20 | 809 | (4.4+ 0.4+) |      | 1995 04 01 | 691 | 0.1- | 0.2+ |
| 1955 09 18 | 760 | 0.7-        | 1.6+ | 1991 03 20 | 809 | 1.3+        | 0.9+ | 1997 12 24 | 104 | 0.3+ | 0.5- |
| 1974 11 16 | 095 | (2.1+ 3.5-) |      | 1991 03 20 | 809 | 1.9-        | 1.1+ | 1997 12 24 | 104 | 0.6+ | 0.7- |
| 1978 12 22 | 095 | 1.3-        | 0.7- | 1995 03 27 | 691 | 0.1-        | 0.4+ | 1998 02 13 | 958 | 0.6+ | 0.9- |
| 1978 12 31 | 095 | 1.0-        | 0.3+ | 1995 03 27 | 691 | 0.1-        | 0.1+ | 1998 02 13 | 958 | 1.6- | 0.9+ |
| 1983 01 14 | 095 | 0.6+        | 1.5+ | 1995 03 27 | 691 | 0.2-        | 0.3+ | 1998 02 13 | 958 | 1.0+ | 0.3- |
| 1989 09 04 | 675 | 0.4+        | 0.4- | 1995 03 28 | 691 | 0.4-        | 0.2- | 1998 02 17 | 958 | 0.3+ | 0.5- |
| 1989 09 04 | 675 | 0.4+        | 1.0- | 1995 03 28 | 691 | 0.5-        | 0.4- | 1998 02 17 | 958 | 0.2+ | 0.3- |
| 1989 09 07 | 400 | 1.7-        | 0.8+ | 1995 03 28 | 691 | 0.5-        | 0.1- |            |     |      |      |
| 1989 09 07 | 400 | 1.0-        | 0.4+ | 1995 03 29 | 691 | 0.2-        | 0.2- |            |     |      |      |

**(8321)\* 1977 EX = 1988 XM<sub>3</sub> = 1991 NO<sub>7</sub>**

Discovered 1977 Mar. 13 by N. S. Chernykh at the Crimean Astrophysical Observatory.

Id. G. V. Williams (*MPC* 19856, *MPC* 23120)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

|     |            |          |           |             |             |
|-----|------------|----------|-----------|-------------|-------------|
| $M$ | 287.52944  |          | (2000.0)  | $P$         | $Q$         |
| $n$ | 0.22811630 | $\omega$ | 229.33031 | -0.98119903 | -0.08746714 |
| $a$ | 2.6527633  | $\Omega$ | 304.96687 | +0.16339616 | -0.85088245 |
| $e$ | 0.1060801  | $i$      | 12.11871  | -0.10271392 | -0.51802370 |
| $P$ | 4.32       | $H$      | 12.4      | $G$         | 0.15        |
|     |            |          |           |             | $U$         |
|     |            |          |           |             | 1           |

Residuals in seconds of arc

|            |     |      |      |            |     |       |       |            |     |       |       |
|------------|-----|------|------|------------|-----|-------|-------|------------|-----|-------|-------|
| 1977 03 13 | 095 | 0.2- | 0.8+ | 1991 07 16 | 809 | 0.1-  | 0.1+  | 1996 09 16 | 689 | 0.6-  | 0.3+  |
| 1977 03 22 | 095 | 0.9- | 0.9- | 1994 01 07 | 868 | (2.7- | 0.9-) | 1996 09 29 | 689 | (0.5- | 2.6-) |
| 1977 03 25 | 095 | 1.2+ | 0.6- | 1994 01 07 | 868 | 1.4-  | 0.2-  | 1996 09 30 | 689 | 0.5-  | 0.9-  |
| 1988 12 01 | 054 | 0.5- | 0.4- | 1994 01 08 | 868 | 0.4+  | 0.2-  | 1998 01 06 | 470 | 0.5+  | 0.4-  |
| 1991 07 15 | 809 | 0.7+ | 0.2- | 1994 01 08 | 868 | 0.3+  | 0.3-  | 1998 01 06 | 470 | 0.8+  | 0.4-  |
| 1991 07 15 | 809 | 0.6+ | 0.4- | 1994 02 11 | 675 | 0.9-  | 0.5+  | 1998 01 06 | 470 | 0.7+  | 0.2-  |
| 1991 07 15 | 809 | 0.9+ | 0.4- | 1994 02 11 | 675 | 0.7-  | 0.1-  | 1998 02 15 | 958 | 0.2+  | 0.1-  |
| 1991 07 16 | 809 | 0.6- | 0.1+ | 1994 02 14 | 675 | 0.1+  | 0.4+  | 1998 02 15 | 958 | 0.0   | 0.0   |
| 1991 07 16 | 809 | 0.4- | 0.1+ | 1994 02 14 | 675 | 0.1+  | 0.5+  | 1998 02 18 | 958 | 0.4+  | 0.4+  |

(8322)\* 1978 RL<sub>1</sub> = 1977 LU

Discovered 1978 Sept. 5 by N. S. Chernykh at the Crimean Astrophysical Observatory.

Id. E. Bowell (*MPC* 11051)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

|     |            |          |           |              |              |
|-----|------------|----------|-----------|--------------|--------------|
| $M$ | 125.96105  |          | (2000.0)  | $\mathbf{P}$ | $\mathbf{Q}$ |
| $n$ | 0.17024326 | $\omega$ | 198.71287 | +0.97683752  | +0.21336900  |
| $a$ | 3.2242059  | $\Omega$ | 148.95315 | -0.19210122  | +0.90776582  |
| $e$ | 0.1518173  | $i$      | 1.79894   | -0.09426333  | +0.36115771  |
| $P$ | 5.79       | $H$      | 12.9      | $G$ 0.15     | $U$ 2        |

Residuals in seconds of arc

|            |     |       |       |            |     |       |       |            |     |       |       |
|------------|-----|-------|-------|------------|-----|-------|-------|------------|-----|-------|-------|
| 1977 06 12 | 675 | 0.2-  | 0.2-  | 1987 04 03 | 675 | 1.7-  | 0.4-  | 1998 01 29 | 132 | (2.8- | 0.4+) |
| 1977 06 13 | 675 | 0.2-  | 0.2-  | 1987 04 03 | 675 | 1.3-  | 1.0-  | 1998 01 31 | 691 | 0.5-  | 0.4+  |
| 1978 09 01 | 095 | 1.0-  | 0.9-  | 1990 11 10 | 372 | 0.4+  | 0.9-  | 1998 01 31 | 691 | 0.5-  | 0.3+  |
| 1978 09 05 | 095 | 1.4+  | 1.0-  | 1990 11 10 | 372 | 0.7+  | 0.4+  | 1998 01 31 | 691 | 0.3-  | 0.1+  |
| 1978 09 07 | 095 | 1.4+  | 0.0   | 1990 11 11 | 675 | (1.1- | 0.3-) | 1998 02 04 | 132 | 1.3+  | 0.8+  |
| 1978 09 28 | 095 | 0.7-  | 0.8+  | 1990 11 11 | 675 | 1.2-  | 0.6-  | 1998 02 04 | 132 | 0.6-  | 0.7-  |
| 1978 10 04 | 095 | 1.0+  | 0.0   | 1990 11 14 | 675 | 1.6-  | 0.7-  | 1998 02 28 | 910 | 0.3+  | 0.2-  |
| 1978 10 09 | 095 | 0.5-  | 1.0+  | 1992 02 09 | 691 | 0.5+  | 0.4+  | 1998 02 28 | 910 | 1.1+  | 0.5-  |
| 1987 04 01 | 675 | (7.8- | 0.4-) | 1992 02 09 | 691 | (1.2+ | 2.5+) | 1998 02 28 | 910 | 1.2+  | 0.0   |
| 1987 04 01 | 675 | (7.2- | 0.8-) | 1998 01 29 | 132 | 0.9+  | 0.4-  |            |     |       |       |

**(8323)\* 1979 UH = 1927 BG = 1952 SF**

Discovered 1979 Oct. 17 by E. Bowell at the Anderson Mesa Station of the Lowell Observatory.

Id. C. M. Bardwell (*MPC* 15877), S. Nakano (*ibid.*)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Bardwell

|     |            |          |           |             |             |
|-----|------------|----------|-----------|-------------|-------------|
| $M$ | 14.13742   |          | (2000.0)  | <b>P</b>    | <b>Q</b>    |
| $n$ | 0.22239130 | $\omega$ | 307.81823 | +0.16478294 | -0.97823485 |
| $a$ | 2.6980968  | $\Omega$ | 132.20059 | +0.94998143 | +0.12301810 |
| $e$ | 0.2987377  | $i$      | 9.80133   | +0.26529582 | +0.16710214 |
| $P$ | 4.43       | $H$      | 13.4      | $G$ 0.15    | $U$ 2       |

Residuals in seconds of arc

|            |           |       |      |            |     |      |      |            |     |      |      |
|------------|-----------|-------|------|------------|-----|------|------|------------|-----|------|------|
| 1927 01 26 | 389(18.6− | 6.8−) | Y    | 1997 11 29 | 688 | 0.0  | 0.6+ | 1998 01 26 | 610 | 0.2+ | 0.3− |
| 1927 01 28 | 389(30.7− | 0.2+) |      | 1997 12 27 | 688 | 0.2− | 0.3+ | 1998 01 27 | 610 | 0.1+ | 0.1+ |
| 1927 01 29 | 389 (3.6− | 5.5−) | Y    | 1997 12 27 | 688 | 0.1− | 0.2+ | 1998 01 27 | 610 | 0.2− | 0.2+ |
| 1952 09 16 | 760       | 0.5+  | 1.0− | 1998 01 18 | 910 | 0.7+ | 0.1− | 1998 01 27 | 610 | 0.4− | 0.3+ |
| 1979 10 17 | 688       | 0.1−  | 0.5− | 1998 01 18 | 910 | 0.7+ | 0.1− | 1998 01 28 | 566 | 0.5− | 0.3+ |
| 1979 10 28 | 688       | 0.2+  | 0.4+ | 1998 01 18 | 910 | 0.5+ | 0.2− | 1998 01 28 | 566 | 0.5− | 0.3+ |
| 1979 11 22 | 688       | 1.4−  | 0.5+ | 1998 01 25 | 127 | 0.2− | 0.2+ | 1998 01 28 | 566 | 0.7− | 0.2+ |
| 1979 12 08 | 688       | 1.1+  | 1.1− | 1998 01 25 | 127 | 0.2− | 0.1+ | 1998 03 02 | 470 | 0.3− | 0.4− |
| 1996 08 09 | 566       | 0.1−  | 0.4+ | 1998 01 26 | 127 | 0.0  | 0.3+ | 1998 03 02 | 470 | 0.1− | 0.3− |
| 1996 08 09 | 566       | 0.2−  | 0.4+ | 1998 01 26 | 127 | 0.2− | 0.2+ | 1998 03 02 | 470 | 0.2+ | 0.4− |
| 1996 08 09 | 566       | 0.1+  | 0.6+ | 1998 01 26 | 610 | 0.8+ | 0.2− | 1998 03 03 | 470 | 0.0  | 0.6− |
| 1997 11 29 | 688       | 0.2+  | 0.7+ | 1998 01 26 | 610 | 0.4+ | 0.3− | 1998 03 03 | 470 | 0.0  | 0.4− |

(8324)\* 1981 DF<sub>2</sub>

Discovered 1981 Feb. 28 by S. J. Bus at Siding Spring in the course of the U.K. Schmidt-Caltech Asteroid Survey.

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

|     |            |          |           |              |              |
|-----|------------|----------|-----------|--------------|--------------|
| $M$ | 63.67573   |          | (2000.0)  | $\mathbf{P}$ | $\mathbf{Q}$ |
| $n$ | 0.27944605 | $\omega$ | 126.33666 | +0.91818596  | -0.37647263  |
| $a$ | 2.3170607  | $\Omega$ | 256.06717 | +0.31041715  | +0.87711256  |
| $e$ | 0.2016679  | $i$      | 7.29844   | +0.24612137  | +0.29823132  |
| $P$ | 3.53       | $H$      | 14.4      | $G$ 0.15     | $U$ 2        |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1954 07 04 | 675 | 0.4- | 0.8- | 1981 04 08 | 413 | 1.7+ | 0.9- | 1993 09 13 | 801 | 0.6- | 0.2+ |
| 1954 07 04 | 675 | 0.5- | 1.2- | 1981 04 09 | 413 | 2.3- | 0.7+ | 1993 09 19 | 801 | 0.1+ | 0.2- |
| 1954 07 05 | 675 | 1.7+ | 0.8- | 1981 04 09 | 413 | 0.7+ | 0.1- | 1998 01 20 | 426 | 0.1- | 0.4- |
| 1981 02 09 | 413 | 0.0  | 0.2- | 1981 05 01 | 413 | 0.2+ | 1.1+ | 1998 01 20 | 426 | 0.1- | 0.2- |

|            |     |       |       |            |     |       |       |            |     |      |      |
|------------|-----|-------|-------|------------|-----|-------|-------|------------|-----|------|------|
| 1981 02 12 | 413 | 0.5-  | 1.3+  | 1981 05 03 | 413 | 1.4+  | 0.5+  | 1998 01 24 | 426 | 0.0  | 0.7- |
| 1981 02 28 | 413 | 0.7-  | 0.8-  | 1986 10 03 | 095 | (4.0- | 0.8-) | 1998 01 24 | 426 | 0.1+ | 0.1- |
| 1981 02 28 | 413 | 0.5-  | 0.4-  | 1986 10 07 | 095 | (4.1- | 2.1+) | 1998 01 24 | 426 | 0.1- | 0.1- |
| 1981 03 06 | 413 | (3.0- | 1.9+) | 1986 10 11 | 095 | 0.1+  | 1.5+  | 1998 02 23 | 557 | 0.3- | 0.4- |
| 1981 03 08 | 413 | 1.1-  | 0.7+  | 1991 01 18 | 675 | 0.2-  | 0.6-  | 1998 02 23 | 557 | 0.2- | 0.7- |
| 1981 03 08 | 413 | 1.5+  | 0.0   | 1991 01 18 | 675 | 0.3-  | 0.3-  | 1998 03 04 | 557 | 0.8- | 0.9+ |
| 1981 03 12 | 413 | 0.5-  | 0.4+  | 1993 08 14 | 801 | 0.1+  | 0.2+  | 1998 03 04 | 557 | 0.0  | 0.1+ |
| 1981 03 12 | 413 | 1.8+  | 0.6-  | 1993 08 14 | 801 | 0.2-  | 0.0   | 1998 03 04 | 557 | 0.3+ | 0.1- |
| 1981 04 08 | 413 | 0.2-  | 0.7+  | 1993 09 13 | 801 | 0.2+  | 0.5+  |            |     |      |      |

**(8325)\* 1981 EM<sub>26</sub>**

Discovered 1981 Mar. 2 by S. J. Bus at Siding Spring in the course of the U.K. Schmidt-Caltech Asteroid Survey.

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> |  | 267.09534  |          | (2000.0)  |  | <b>P</b>    |      | <b>Q</b>    |   |
|----------|--|------------|----------|-----------|--|-------------|------|-------------|---|
| <i>n</i> |  | 0.17429503 | $\omega$ | 257.51747 |  | -0.10083932 |      | +0.99480055 |   |
| <i>a</i> |  | 3.1740424  | $\Omega$ | 6.74387   |  | -0.85914806 |      | -0.07984426 |   |
| <i>e</i> |  | 0.0280605  | <i>i</i> | 6.97378   |  | -0.50169318 |      | -0.06321987 |   |
| <i>P</i> |  | 5.65       | <i>H</i> | 14.6      |  | <i>G</i>    | 0.15 | <i>U</i>    | 2 |

Residuals in seconds of arc

|            |     |       |       |            |     |       |       |            |     |      |      |
|------------|-----|-------|-------|------------|-----|-------|-------|------------|-----|------|------|
| 1981 02 09 | 413 | 0.2-  | 2.0-  | 1981 04 06 | 413 | (3.2- | 1.9+) | 1992 04 06 | 809 | 0.5+ | 0.8+ |
| 1981 02 12 | 413 | 0.3+  | 1.2-  | 1981 04 06 | 413 | (3.1+ | 1.1-) | 1998 01 31 | 910 | 0.3- | 0.5+ |
| 1981 02 13 | 413 | 1.1-  | 0.1-  | 1981 04 26 | 413 | 2.5+  | 1.0-  | 1998 01 31 | 910 | 0.2- | 0.7+ |
| 1981 03 02 | 413 | (3.0- | 0.8+) | 1981 05 01 | 413 | 0.7+  | 0.6-  | 1998 01 31 | 910 | 0.4- | 0.6+ |
| 1981 03 02 | 413 | 1.0+  | 0.4-  | 1981 05 01 | 413 | 2.2-  | 0.5-  | 1998 02 27 | 910 | 0.2+ | 0.1+ |
| 1981 03 06 | 413 | 1.8-  | 1.1-  | 1981 05 03 | 413 | 0.8-  | 0.7-  | 1998 02 27 | 910 | 0.3+ | 0.1+ |
| 1981 03 11 | 413 | 0.8-  | 0.1-  | 1989 10 02 | 807 | 0.4+  | 0.6-  | 1998 02 27 | 910 | 0.3+ | 0.0  |
| 1981 03 11 | 413 | 2.2+  | 0.7-  | 1989 10 04 | 807 | 0.9+  | 0.7-  | 1998 02 27 | 910 | 0.4+ | 0.2+ |
| 1981 03 15 | 413 | 1.3-  | 0.0   | 1989 10 28 | 807 | 0.1-  | 0.3-  | 1998 02 27 | 910 | 0.1+ | 0.0  |
| 1981 04 05 | 413 | 1.9-  | 2.2+  | 1989 10 31 | 807 | 0.1+  | 0.7-  | 1998 02 27 | 910 | 0.5+ | 0.2- |
| 1981 04 05 | 413 | (6.0+ | 0.9-) | 1992 03 07 | 809 | 0.7+  | 1.2+  |            |     |      |      |

**(8326)\* 1981 JS<sub>2</sub> = 1989 SH<sub>9</sub>**

Discovered 1981 May 6 by C. S. Shoemaker at Palomar.

Id. C. M. Bardwell (*MPC* 16230)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> |  | 129.47451  |          | (2000.0)  |  | <b>P</b>    |      | <b>Q</b>    |   |
|----------|--|------------|----------|-----------|--|-------------|------|-------------|---|
| <i>n</i> |  | 0.26653021 | $\omega$ | 295.09317 |  | +0.42640689 |      | +0.90453146 |   |
| <i>a</i> |  | 2.3913240  | $\Omega$ | 0.14668   |  | -0.81581507 |      | +0.38463071 |   |
| <i>e</i> |  | 0.2002577  | <i>i</i> | 2.14652   |  | -0.39066986 |      | +0.18407081 |   |
| <i>P</i> |  | 3.70       | <i>H</i> | 14.5      |  | <i>G</i>    | 0.15 | <i>U</i>    | 1 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1978 10 27 | 675 | 0.3- | 0.4+ | 1989 09 24 | 809 | 0.1- | 0.4+ | 1995 01 31 | 691 | 0.7- | 0.1+ |
| 1978 10 28 | 675 | 0.1- | 0.3- | 1989 09 25 | 809 | 0.0  | 0.5- | 1995 01 31 | 691 | 0.8- | 0.1+ |
| 1978 10 29 | 675 | 0.6- | 0.1- | 1989 09 25 | 809 | 0.3+ | 0.4- | 1995 01 31 | 691 | 0.8- | 0.1- |
| 1978 11 28 | 675 | 0.2+ | 0.2- | 1989 09 25 | 809 | 0.6+ | 0.3- | 1995 01 31 | 691 | 1.2- | 1.2- |
| 1978 11 29 | 675 | 0.3- | 0.2- | 1989 09 26 | 809 | 0.7- | 0.5- | 1995 01 31 | 691 | 0.9- | 0.0  |
| 1981 04 11 | 675 | 0.4- | 0.7+ | 1989 09 26 | 809 | 0.3- | 0.4- | 1997 12 05 | 704 | 1.1+ | 0.9- |
| 1981 04 11 | 675 | 1.8- | 0.2+ | 1989 09 26 | 809 | 0.4+ | 0.4- | 1997 12 05 | 704 | 0.5+ | 1.1+ |
| 1981 05 05 | 675 | 0.3+ | 0.5+ | 1989 09 29 | 809 | 0.5- | 0.2- | 1997 12 05 | 704 | 0.3+ | 0.0  |
| 1981 05 06 | 675 | 0.0  | 0.8+ | 1989 09 29 | 809 | 0.3+ | 0.1+ | 1997 12 05 | 704 | 0.5+ | 0.7+ |
| 1981 05 08 | 675 | 1.4+ | 0.0  | 1989 09 29 | 809 | 0.7+ | 0.4+ | 1997 12 05 | 704 | 0.2+ | 0.1- |
| 1981 05 11 | 675 | 1.4+ | 1.2- | 1991 01 19 | 675 | 1.5+ | 0.3+ | 1998 01 07 | 699 | 1.2- | 0.9+ |
| 1989 09 24 | 809 | 0.4- | 0.3+ | 1991 01 19 | 675 | 1.8+ | 0.7+ | 1998 01 07 | 699 | 0.2- | 0.6+ |
| 1989 09 24 | 809 | 0.1- | 0.4+ | 1995 01 31 | 691 | 0.8- | 0.7- |            |     |      |      |

**(8327)\* 1981 JE<sub>3</sub> = 1972 GB<sub>2</sub>**

Discovered 1981 May 6 by C. S. Shoemaker at Palomar.

Id. H. Oishi (*MPC* 12122)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> |  | 281.97180  |          | (2000.0)  |  | <b>P</b>    |      | <b>Q</b>    |   |
|----------|--|------------|----------|-----------|--|-------------|------|-------------|---|
| <i>n</i> |  | 0.22530447 | $\omega$ | 30.94616  |  | -0.59807521 |      | +0.80138508 |   |
| <i>a</i> |  | 2.6747889  | $\Omega$ | 202.32593 |  | -0.74026557 |      | -0.55687097 |   |
| <i>e</i> |  | 0.1457355  | <i>i</i> | 1.41498   |  | -0.30710411 |      | -0.21834989 |   |
| <i>P</i> |  | 4.37       | <i>H</i> | 13.9      |  | <i>G</i>    | 0.15 | <i>U</i>    | 1 |

Residuals in seconds of arc

|            |     |      |      |            |     |       |       |            |     |      |      |
|------------|-----|------|------|------------|-----|-------|-------|------------|-----|------|------|
| 1972 04 09 | 805 | 0.1- | 0.3+ | 1989 01 08 | 675 | 0.6-  | 0.6+  | 1998 02 07 | 809 | 0.7- | 1.1- |
| 1972 04 09 | 805 | 0.6+ | 1.3- | 1989 01 10 | 413 | 1.0+  | 0.4-  | 1998 02 07 | 809 | 0.2- | 1.3- |
| 1972 04 10 | 805 | 0.4- | 1.6+ | 1989 01 10 | 413 | 0.1-  | 1.2-  | 1998 02 19 | 699 | 0.4- | 0.5+ |
| 1972 04 10 | 805 | 0.6- | 0.0  | 1995 09 02 | 010 | 0.8-  | 0.7-  | 1998 02 19 | 699 | 0.2- | 0.0  |
| 1981 04 11 | 675 | 1.6+ | 0.2- | 1995 09 02 | 010 | 0.4-  | 0.4-  | 1998 02 19 | 699 | 0.2- | 0.1- |
| 1981 04 11 | 675 | 1.0+ | 1.9- | 1995 09 02 | 010 | 1.6+  | 0.7-  | 1998 02 22 | 566 | 0.5- | 0.0  |
| 1981 05 05 | 675 | 0.1+ | 0.2+ | 1998 01 26 | 566 | 0.1-  | 0.4+  | 1998 02 22 | 566 | 0.5- | 0.1- |
| 1981 05 06 | 675 | 0.8- | 0.5+ | 1998 01 26 | 566 | 0.0   | 0.6+  | 1998 02 22 | 566 | 0.3- | 0.2+ |
| 1981 05 06 | 675 | 0.4+ | 0.9- | 1998 01 26 | 566 | 0.5+  | 0.6+  | 1998 02 23 | 566 | 0.3- | 0.4- |
| 1981 05 08 | 675 | 1.0- | 0.6+ | 1998 02 02 | 360 | 0.0   | 0.4-  | 1998 02 23 | 566 | 0.5- | 0.3- |
| 1981 05 09 | 675 | 0.6- | 0.1+ | 1998 02 02 | 360 | 0.0   | 0.5-  | 1998 02 23 | 566 | 0.0  | 0.5- |
| 1981 05 11 | 675 | 0.3+ | 1.1+ | 1998 02 06 | 809 | (3.0+ | 1.7-) | 1998 02 27 | 566 | 0.1+ | 0.6+ |
| 1989 01 04 | 413 | 0.4+ | 0.6+ | 1998 02 06 | 809 | (2.1+ | 0.8-) | 1998 02 27 | 566 | 0.1+ | 0.5+ |
| 1989 01 04 | 413 | 0.6+ | 0.6+ | 1998 02 06 | 809 | (3.3+ | 2.0-) | 1998 02 27 | 566 | 0.3+ | 0.4+ |
| 1989 01 08 | 675 | 0.2- | 0.3+ | 1998 02 07 | 809 | 1.3+  | 1.2-  |            |     |      |      |

**(8328)\* 1981 QQ<sub>2</sub> = 1991 LZ<sub>4</sub>**

Discovered 1981 Aug. 23 by H. Debehogne at the European Southern Observatory.

Id. G. V. Williams (*MPC* 19015)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> |  | 243.74288  |          | (2000.0)  |  | <b>P</b>    |      | <b>Q</b>    |   |
|----------|--|------------|----------|-----------|--|-------------|------|-------------|---|
| <i>n</i> |  | 0.28358287 | $\omega$ | 199.63246 |  | +0.93673936 |      | +0.34450592 |   |
| <i>a</i> |  | 2.2944718  | $\Omega$ | 140.04377 |  | -0.30687778 |      | +0.89340511 |   |
| <i>e</i> |  | 0.1082371  | <i>i</i> | 5.53365   |  | -0.16836092 |      | +0.28834526 |   |
| <i>P</i> |  | 3.48       | <i>H</i> | 14.9      |  | <i>G</i>    | 0.15 | <i>U</i>    | 2 |

Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| 1981 08 23 | 809 | 0.8-  | 1.2-  | 1981 09 02 | 809 | 1.4+ | 0.6+ | 1981 09 07 | 809 | 0.9- | 0.8+ |
| 1981 08 23 | 809 | 0.5-  | 1.2-  | 1981 09 02 | 809 | 2.0+ | 0.2+ | 1981 09 07 | 809 | 0.9- | 0.8+ |
| 1981 08 23 | 809 | 0.3-  | 1.0-  | 1981 09 02 | 809 | 2.3+ | 0.3- | 1981 09 07 | 809 | 0.5- | 1.3+ |
| 1981 08 24 | 809 | 0.3-  | 2.5-  | 1981 09 02 | 809 | 0.3+ | 0.5+ | 1988 09 13 | 675 | 0.3- | 1.9- |
| 1981 08 24 | 809 | (0.2+ | 2.6-) | 1981 09 02 | 809 | 0.0  | 0.2+ | 1988 09 13 | 675 | 0.8- | 1.0- |
| 1981 08 24 | 809 | 1.2+  | 2.1-  | 1981 09 02 | 809 | 0.5- | 0.0  | 1988 09 16 | 675 | 0.7- | 0.6- |
| 1981 08 25 | 809 | 0.5+  | 1.1-  | 1981 09 02 | 809 | 0.7+ | 0.4+ | 1988 09 16 | 675 | 0.6+ | 0.5- |
| 1981 08 25 | 809 | 0.8+  | 0.9-  | 1981 09 02 | 809 | 0.5+ | 0.2+ | 1991 06 06 | 809 | 0.0  | 0.3- |
| 1981 08 25 | 809 | 0.9+  | 0.7-  | 1981 09 02 | 809 | 0.0  | 0.3- | 1991 06 06 | 809 | 0.1- | 0.4- |
| 1981 08 26 | 809 | 0.6+  | 1.1-  | 1981 09 02 | 675 | 0.7- | 0.2- | 1991 06 06 | 809 | 1.0- | 0.7- |
| 1981 08 26 | 809 | 1.0+  | 1.0-  | 1981 09 05 | 809 | 0.6- | 0.2- | 1991 06 08 | 809 | 0.4+ | 1.1+ |
| 1981 08 26 | 809 | 1.6+  | 0.5-  | 1981 09 05 | 809 | 0.6+ | 0.6+ | 1991 06 08 | 809 | 0.6+ | 0.5+ |
| 1981 08 27 | 809 | 0.8-  | 1.5-  | 1981 09 05 | 809 | 1.7+ | 1.5+ | 1991 06 08 | 809 | 0.1+ | 0.8+ |
| 1981 08 27 | 809 | 0.0   | 1.1-  | 1981 09 05 | 809 | 0.4+ | 1.3+ | 1995 08 27 | 809 | 0.8+ | 0.1+ |
| 1981 08 27 | 809 | 1.3+  | 1.2-  | 1981 09 05 | 809 | 0.2- | 1.0+ | 1995 08 28 | 809 | 0.3+ | 0.4+ |
| 1981 08 27 | 809 | 2.0-  | 0.0   | 1981 09 05 | 809 | 1.3- | 0.5+ | 1995 08 28 | 809 | 0.2+ | 0.5- |
| 1981 08 27 | 809 | 1.1-  | 0.8+  | 1981 09 05 | 809 | 0.9- | 0.0  | 1995 08 29 | 809 | 0.7+ | 0.1+ |
| 1981 08 27 | 809 | 0.9+  | 1.4+  | 1981 09 05 | 809 | 0.7- | 0.5+ | 1995 08 30 | 809 | 0.9+ | 0.5+ |
| 1981 08 28 | 809 | 0.5+  | 1.4-  | 1981 09 05 | 809 | 0.8- | 1.0+ | 1995 08 31 | 809 | 0.5+ | 0.7+ |
| 1981 08 28 | 809 | 0.9+  | 1.3-  | 1981 09 06 | 809 | 1.4- | 0.5+ | 1995 08 31 | 809 | 0.0  | 0.0  |
| 1981 08 28 | 809 | 1.3+  | 1.5-  | 1981 09 06 | 809 | 0.7- | 1.0+ | 1995 09 01 | 809 | 0.9- | 1.1- |
| 1981 08 28 | 809 | 0.9-  | 0.8-  | 1981 09 06 | 809 | 0.7- | 1.5+ | 1995 09 29 | 809 | 1.8- | 1.5+ |
| 1981 08 28 | 809 | 0.7-  | 1.1-  | 1981 09 06 | 809 | 1.6- | 0.4+ | 1997 02 17 | 327 | 0.9- | 0.1+ |
| 1981 08 28 | 809 | 0.6-  | 1.6-  | 1981 09 06 | 809 | 1.1- | 0.3+ | 1997 02 17 | 327 | 1.1- | 0.3- |
| 1981 09 01 | 809 | 0.0   | 0.2+  | 1981 09 06 | 809 | 0.8- | 0.6+ | 1997 02 17 | 327 | 1.3- | 0.1- |
| 1981 09 01 | 809 | 0.9+  | 0.4+  | 1981 09 06 | 809 | 0.9- | 0.8- | 1997 03 04 | 704 | 1.5+ | 1.2- |
| 1981 09 01 | 809 | 0.8+  | 0.7+  | 1981 09 06 | 809 | 1.1- | 0.3- | 1997 03 04 | 704 | 0.9+ | 1.7- |
| 1981 09 01 | 809 | 0.9+  | 0.9+  | 1981 09 07 | 809 | 0.4- | 2.1+ | 1997 03 05 | 704 | 0.7+ | 0.5- |

1981 09 01 809 1.0+ 0.9+ 1981 09 07 809 0.3+ 1.6+ 1997 03 05 704 0.0 0.1+  
 1981 09 01 675 (3.0+ 2.6+) 1981 09 07 809 0.7+ 1.8+

**(8329)\* 1982 FP<sub>3</sub> = 1982 HW<sub>2</sub> = 1977 LO<sub>1</sub>**

Discovered 1982 Mar. 22 by H. Debehogne at the European Southern Observatory.

Id. E. Bowell (d, *MPC* 7360; *MPC* 11052)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            | Williams |           |             |                 |
|----------|------------|----------|-----------|-------------|-----------------|
| <i>M</i> | 270.70706  | (2000.0) | <b>P</b>  | <b>Q</b>    |                 |
| <i>n</i> | 0.17428989 | $\omega$ | 142.57312 | -0.86406029 | +0.50200868     |
| <i>a</i> | 3.1741047  | $\Omega$ | 67.59935  | -0.47104174 | -0.78022783     |
| <i>e</i> | 0.1330958  | <i>i</i> | 2.30871   | -0.17753733 | -0.37313781     |
| <i>P</i> | 5.65       | <i>H</i> | 12.3      | <i>G</i>    | 0.15 <i>U</i> 1 |

Residuals in seconds of arc

|            |     |      |      |            |     |       |       |            |     |       |       |
|------------|-----|------|------|------------|-----|-------|-------|------------|-----|-------|-------|
| 1977 06 13 | 675 | 0.0  | 0.7+ | 1982 03 29 | 809 | 0.4-  | 0.3+  | 1990 10 22 | 399 | 1.1+  | 0.2-  |
| 1977 06 14 | 675 | 0.4- | 1.0+ | 1982 03 29 | 809 | 0.4-  | 0.3+  | 1990 10 22 | 399 | 1.6+  | 0.2-  |
| 1982 03 22 | 809 | 0.2+ | 0.4- | 1982 03 29 | 809 | 0.2-  | 0.1+  | 1990 10 22 | 399 | (2.3- | 0.3-) |
| 1982 03 22 | 809 | 0.4+ | 0.3- | 1982 03 29 | 809 | 1.0+  | 0.4-  | 1995 08 26 | 809 | 1.0+  | 0.1-  |
| 1982 03 22 | 809 | 0.5+ | 0.3- | 1982 03 29 | 809 | 1.7+  | 1.2-  | 1995 08 27 | 809 | 0.6+  | 0.0   |
| 1982 03 23 | 809 | 0.4- | 0.5- | 1982 03 29 | 809 | 1.3+  | 1.7-  | 1995 08 29 | 809 | 0.7-  | 0.1+  |
| 1982 03 23 | 809 | 0.6- | 0.6- | 1982 04 01 | 809 | 1.1-  | 0.1+  | 1995 08 30 | 809 | 0.0   | 0.4-  |
| 1982 03 23 | 809 | 0.5- | 0.5- | 1982 04 01 | 809 | 1.1-  | 0.0   | 1996 10 08 | 691 | 1.0-  | 0.0   |
| 1982 03 24 | 809 | 0.5- | 0.3+ | 1982 04 01 | 809 | 1.1-  | 0.2-  | 1996 10 08 | 691 | 1.0-  | 0.2-  |
| 1982 03 24 | 809 | 0.4- | 0.4+ | 1982 04 25 | 033 | 0.7-  | 0.8+  | 1996 10 08 | 691 | 1.0-  | 0.1+  |
| 1982 03 24 | 809 | 0.2- | 0.4+ | 1982 04 25 | 033 | 0.5-  | 0.6+  | 1998 01 07 | 327 | 0.3-  | 0.3+  |
| 1982 03 26 | 809 | 1.0+ | 0.1+ | 1982 04 27 | 033 | 1.7+  | 0.1-  | 1998 01 07 | 327 | 0.1+  | 0.5+  |
| 1982 03 26 | 809 | 0.1+ | 0.7- | 1982 04 27 | 033 | 1.7+  | 0.2-  | 1998 01 07 | 327 | 1.8-  | 0.8-  |
| 1982 03 26 | 809 | 0.1- | 1.0- | 1984 09 21 | 010 | 0.8-  | 0.9+  | 1998 01 10 | 725 | 0.2-  | 1.4+  |
| 1982 03 27 | 809 | 0.5- | 0.1+ | 1987 01 27 | 033 | 0.1-  | 1.5+  | 1998 01 10 | 725 | 0.3+  | 0.3+  |
| 1982 03 27 | 809 | 0.1- | 0.0  | 1987 01 28 | 033 | 0.1+  | 1.1+  | 1998 02 20 | 725 | 0.6+  | 0.3-  |
| 1982 03 27 | 809 | 0.0  | 0.1- | 1987 01 31 | 046 | (2.8+ | 1.1-) | 1998 02 20 | 725 | 0.5+  | 0.1-  |
| 1982 03 28 | 809 | 0.5- | 1.2+ | 1987 01 31 | 046 | 0.2+  | 1.4-  | 1998 02 21 | 725 | 1.7+  | 0.2-  |
| 1982 03 28 | 809 | 0.3- | 1.5+ | 1987 02 01 | 046 | 0.2+  | 0.5-  |            |     |       |       |
| 1982 03 28 | 809 | 0.4- | 0.8+ | 1987 02 01 | 046 | (3.7+ | 1.4-) |            |     |       |       |

**(8330)\* 1982 FX<sub>3</sub> = 1987 CM**

Discovered 1982 Mar. 28 by H. Debehogne at the European Southern Observatory.

Id. T. Kobayashi (*MPC* 13856)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            | Williams |           |             |                 |
|----------|------------|----------|-----------|-------------|-----------------|
| <i>M</i> | 241.49438  | (2000.0) | <b>P</b>  | <b>Q</b>    |                 |
| <i>n</i> | 0.17449468 | $\omega$ | 226.38570 | -0.51824678 | +0.85499427     |
| <i>a</i> | 3.1716207  | $\Omega$ | 12.44525  | -0.75530752 | -0.44653038     |
| <i>e</i> | 0.1129882  | <i>i</i> | 5.35869   | -0.40116185 | -0.26380942     |
| <i>P</i> | 5.65       | <i>H</i> | 12.1      | <i>G</i>    | 0.15 <i>U</i> 1 |

Residuals in seconds of arc

|            |     |      |      |            |     |       |       |            |     |      |      |
|------------|-----|------|------|------------|-----|-------|-------|------------|-----|------|------|
| 1951 11 30 | 675 | 0.6- | 0.0  | 1982 04 01 | 809 | 0.3+  | 0.6-  | 1995 10 12 | 104 | 0.3- | 0.8- |
| 1951 11 30 | 675 | 0.2- | 0.7- | 1982 04 01 | 809 | 0.2+  | 0.5-  | 1995 10 12 | 104 | 0.5- | 0.9- |
| 1954 05 23 | 675 | 0.4+ | 0.3+ | 1982 04 01 | 809 | 0.0   | 0.2-  | 1995 10 12 | 104 | 0.3- | 0.9- |
| 1954 05 23 | 675 | 0.2- | 0.2+ | 1987 01 31 | 046 | 0.6+  | 0.0   | 1996 10 30 | 689 | 1.1- | 0.1- |
| 1982 03 28 | 809 | 0.2+ | 0.1+ | 1987 02 01 | 046 | 1.0+  | 1.2-  | 1996 11 09 | 966 | 1.3+ | 0.1+ |
| 1982 03 28 | 809 | 0.2- | 0.3+ | 1987 02 01 | 046 | 2.3+  | 0.1-  | 1996 11 09 | 966 | 0.5+ | 0.4+ |
| 1982 03 28 | 809 | 0.3- | 0.2- | 1987 02 02 | 046 | (0.8+ | 2.8-) | 1998 01 17 | 560 | 0.2- | 0.0  |
| 1982 03 29 | 809 | 0.3- | 0.2+ | 1987 02 02 | 046 | 0.7-  | 0.9-  | 1998 01 17 | 560 | 0.7- | 0.2+ |
| 1982 03 29 | 809 | 0.2+ | 0.1+ | 1987 02 03 | 046 | 1.4+  | 0.6+  | 1998 01 17 | 560 | 0.4- | 0.0  |
| 1982 03 29 | 809 | 0.1- | 0.0  | 1987 02 03 | 046 | 0.4+  | 0.8+  | 1998 01 25 | 566 | 0.1+ | 0.8- |
| 1982 03 30 | 809 | 0.6- | 0.8- | 1995 08 26 | 809 | 1.3+  | 1.0-  | 1998 01 25 | 566 | 1.3- | 0.4- |
| 1982 03 30 | 809 | 0.3- | 0.9- | 1995 08 27 | 809 | 0.5+  | 1.0-  | 1998 01 25 | 566 | 1.0- | 0.8- |
| 1982 03 30 | 809 | 0.6- | 1.1- | 1995 08 29 | 809 | 0.5+  | 0.1-  | 1998 02 20 | 725 | 0.3- | 0.0  |
| 1982 03 31 | 809 | 0.7- | 0.3- | 1995 08 30 | 809 | 0.6+  | 0.5-  | 1998 02 20 | 725 | 0.2- | 1.0+ |
| 1982 03 31 | 809 | 0.7- | 0.5- | 1995 09 20 | 809 | 0.5+  | 0.4-  | 1998 02 21 | 725 | 0.8- | 0.1- |
| 1982 03 31 | 809 | 0.8- | 0.2- | 1995 09 22 | 809 | 0.7+  | 0.3+  | 1998 02 21 | 725 | 0.0  | 0.6- |

**(8331)\* 1982 KK<sub>1</sub> = 1993 SX<sub>1</sub>**

Discovered 1982 May 27 by C. S. Shoemaker at Palomar.

Id. G. V. Williams (*MPC* 22682)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            | Williams |           |             |                 |
|----------|------------|----------|-----------|-------------|-----------------|
| <i>M</i> | 140.29542  | (2000.0) | <b>P</b>  | <b>Q</b>    |                 |
| <i>n</i> | 0.28743040 | $\omega$ | 204.72127 | +0.51942163 | +0.85016756     |
| <i>a</i> | 2.2739500  | $\Omega$ | 96.67714  | -0.76887512 | +0.50895909     |
| <i>e</i> | 0.0980984  | <i>i</i> | 4.97413   | -0.37287025 | +0.13481752     |
| <i>P</i> | 3.43       | <i>H</i> | 13.7      | <i>G</i>    | 0.15 <i>U</i> 1 |

Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| 1982 05 15 | 675 | 0.8-  | 0.3-  | 1993 09 23 | 675 | 0.2- | 0.3- | 1997 12 29 | 104 | 0.6+ | 0.0  |
| 1982 05 16 | 675 | 0.3-  | 0.3-  | 1993 09 23 | 675 | 0.4- | 1.1+ | 1998 01 06 | 704 | 0.2+ | 0.4- |
| 1982 05 16 | 675 | (2.8- | 0.3-) | 1993 10 10 | 675 | 0.6+ | 0.4+ | 1998 01 06 | 704 | 0.0  | 0.4- |
| 1982 05 17 | 675 | 0.8-  | 1.0-  | 1993 10 10 | 675 | 0.1- | 0.3- | 1998 01 06 | 704 | 0.6+ | 0.7- |
| 1982 05 18 | 675 | 0.4-  | 0.9-  | 1996 06 16 | 566 | 0.2- | 0.0  | 1998 01 26 | 704 | 0.3- | 0.1- |
| 1982 05 27 | 675 | 1.5+  | 0.1+  | 1996 06 16 | 566 | 0.3+ | 0.3- | 1998 01 26 | 704 | 0.6- | 0.3- |
| 1982 05 27 | 675 | (5.0+ | 0.6-) | 1996 06 16 | 566 | 0.3+ | 0.6- | 1998 01 26 | 704 | 0.1- | 0.6- |
| 1990 11 14 | 675 | 0.6+  | 1.2+  | 1996 06 17 | 566 | 0.1+ | 0.1+ | 1998 01 26 | 704 | 0.5- | 0.0  |
| 1990 11 14 | 675 | 0.1-  | 0.6+  | 1996 06 17 | 566 | 0.0  | 0.2- | 1998 01 26 | 704 | 0.4- | 0.0  |
| 1993 09 16 | 400 | (2.8+ | 1.2+) | 1996 06 17 | 566 | 0.0  | 0.1- | 1998 02 20 | 557 | 0.0  | 0.2- |
| 1993 09 16 | 400 | 0.6+  | 0.6-  | 1997 12 27 | 560 | 0.1- | 0.7- | 1998 02 20 | 557 | 0.5- | 0.3- |
| 1993 09 18 | 675 | 0.9-  | 0.1-  | 1997 12 27 | 560 | 0.5- | 0.1- | 1998 03 01 | 557 | 0.3+ | 0.8- |
| 1993 09 18 | 675 | 0.4+  | 0.7-  | 1997 12 27 | 560 | 0.7- | 0.5- | 1998 03 01 | 557 | 0.0  | 1.2- |
| 1993 09 18 | 400 | 0.3+  | 1.5-  | 1997 12 29 | 104 | 1.1+ | 0.2+ |            |     |      |      |
| 1993 09 18 | 400 | 0.4+  | 0.6-  | 1997 12 29 | 104 | 0.9+ | 0.1+ |            |     |      |      |

**(8332)\* 1982 TL<sub>2</sub>**

Discovered 1982 Oct. 14 by L. V. Zhuravleva and L. G. Karachkina at the

Crimean Astrophysical Observatory.

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            | Williams |           |             |                 |
|----------|------------|----------|-----------|-------------|-----------------|
| <i>M</i> | 34.29100   | (2000.0) | <b>P</b>  | <b>Q</b>    |                 |
| <i>n</i> | 0.27082596 | $\omega$ | 176.66672 | +0.26663340 | -0.95962350     |
| <i>a</i> | 2.3659698  | $\Omega$ | 257.85502 | +0.88213398 | +0.28043758     |
| <i>e</i> | 0.1424022  | <i>i</i> | 5.25901   | +0.38826057 | +0.02185172     |
| <i>P</i> | 3.64       | <i>H</i> | 14.0      | <i>G</i>    | 0.15 <i>U</i> 1 |

Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| 1955 03 24 | 675 | 0.3-  | 1.0+  | 1989 09 02 | 675 | 0.2- | 0.3- | 1997 11 25 | 327 | 0.4+ | 0.5- |
| 1955 03 24 | 675 | 0.7+  | 0.8+  | 1989 09 02 | 675 | 0.5+ | 0.7- | 1997 11 25 | 327 | 0.5+ | 0.7- |
| 1955 05 23 | 675 | 0.4-  | 0.2-  | 1989 09 03 | 675 | 0.7- | 0.5+ | 1997 11 25 | 327 | 0.1+ | 0.9- |
| 1982 10 14 | 095 | 0.9-  | 1.9+  | 1989 09 03 | 675 | 0.5+ | 0.1+ | 1998 02 17 | 691 | 0.5- | 0.2- |
| 1982 10 20 | 095 | (3.6- | 0.4+) | 1989 09 30 | 675 | 0.2+ | 0.9- | 1998 02 17 | 691 | 0.4- | 0.2- |
| 1982 10 25 | 095 | 0.8+  | 1.9+  | 1989 09 30 | 675 | 1.6+ | 0.7- | 1998 02 17 | 691 | 0.2- | 0.1- |
| 1982 11 09 | 095 | 1.0-  | 1.2-  | 1989 11 01 | 675 | 0.5- | 1.4- | 1998 03 03 | 691 | 0.1- | 0.4- |
| 1982 11 12 | 675 | 0.9+  | 0.6+  | 1989 11 01 | 675 | 0.5+ | 1.0- | 1998 03 03 | 691 | 0.1- | 0.3- |
| 1982 11 12 | 675 | 0.1-  | 1.5+  | 1994 01 06 | 675 | 1.0- | 0.2- | 1998 03 03 | 691 | 0.1- | 0.6- |

**(8333)\* 1982 VF = 1995 QW**

Discovered 1982 Nov. 7 by A. Mrkos at Kleť.

Id. T. Urata (*MPC* 25636)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            | Nakano   |           |             |                 |
|----------|------------|----------|-----------|-------------|-----------------|
| <i>M</i> | 188.12710  | (2000.0) | <b>P</b>  | <b>Q</b>    |                 |
| <i>n</i> | 0.21728869 | $\omega$ | 309.13387 | +0.77887836 | +0.62636894     |
| <i>a</i> | 2.7401729  | $\Omega$ | 12.19490  | -0.51893753 | +0.67209488     |
| <i>e</i> | 0.1059342  | <i>i</i> | 8.65490   | -0.35221064 | +0.39490560     |
| <i>P</i> | 4.54       | <i>H</i> | 12.8      | <i>G</i>    | 0.15 <i>U</i> 1 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1982 10 22 | 095 | 0.6+ | 1.4- | 1995 09 24 | 046 | 0.1+ | 0.1- | 1996 12 03 | 046 | 0.1+ | 0.3+ |
| 1982 11 07 | 046 | 2.1- | 0.3+ | 1995 09 24 | 046 | 0.1+ | 0.1- | 1996 12 03 | 046 | 0.3+ | 0.3+ |
| 1982 11 07 | 046 | 0.5- | 0.8- | 1995 09 28 | 046 | 0.6+ | 0.5+ | 1996 12 03 | 046 | 0.2+ | 0.3+ |
| 1982 11 11 | 046 | 2.0+ | 2.1- | 1995 09 28 | 046 | 0.3+ | 0.3+ | 1997 01 10 | 689 | 0.7- | 0.9- |

|            |     |             |            |     |           |            |     |           |
|------------|-----|-------------|------------|-----|-----------|------------|-----|-----------|
| 1982 11 11 | 046 | (0.9+ 3.4-) | 1995 09 28 | 046 | 0.6+ 0.4- | 1998 02 04 | 046 | 0.1- 0.4- |
| 1982 11 11 | 095 | 0.6+ 1.9+   | 1995 11 26 | 046 | 0.0 0.3+  | 1998 02 04 | 046 | 0.1- 0.4- |
| 1982 11 12 | 046 | (3.7+ 1.4-) | 1995 11 26 | 046 | 0.3- 0.5+ | 1998 02 04 | 046 | 0.3- 0.4- |
| 1982 11 12 | 046 | 1.9+ 0.4-   | 1995 11 26 | 046 | 0.3- 0.2- | 1998 02 05 | 046 | 0.1+ 0.3- |
| 1982 11 12 | 095 | 1.9- 0.5+   | 1995 11 27 | 046 | 0.6- 0.0  | 1998 02 05 | 046 | 0.1+ 0.4- |
| 1995 08 16 | 905 | 0.7- 0.3-   | 1995 11 27 | 046 | 0.2+ 0.5+ | 1998 02 05 | 046 | 0.0 0.4-  |
| 1995 08 16 | 905 | 1.1+ 0.6-   | 1995 11 27 | 046 | 0.4+ 0.2- | 1998 02 26 | 566 | 0.3- 0.1+ |
| 1995 08 20 | 905 | 0.2- 0.9-   | 1996 11 30 | 046 | 0.3- 0.1+ | 1998 02 26 | 566 | 0.5- 0.1- |
| 1995 08 20 | 905 | 0.4- 0.3-   | 1996 11 30 | 046 | 0.2+ 0.1- | 1998 02 26 | 566 | 0.3- 0.2- |
| 1995 09 24 | 046 | 0.0 0.3-    | 1996 11 30 | 046 | 0.0 0.3+  |            |     |           |

**(8334)\* 1984 CF = 1991 SK<sub>5</sub>**

Discovered 1984 Feb. 10 by J. Gibson at Palomar.

Id. E. Bowell (*MPC* 22809)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> |            | (2000.0) |          | <b>P</b>    |             | <b>Q</b> |   |
|----------|------------|----------|----------|-------------|-------------|----------|---|
| <i>n</i> | 0.21197091 | $\omega$ | 52.52117 | -0.81742035 | -0.54849761 |          |   |
| <i>a</i> | 2.7858124  | $\Omega$ | 93.56028 | +0.45701280 | -0.80349177 |          |   |
| <i>e</i> | 0.1005791  | <i>i</i> | 10.15639 | +0.35066120 | -0.23141164 |          |   |
| <i>P</i> | 4.65       | <i>H</i> | 12.6     | <i>G</i>    | 0.15        | <i>U</i> | 1 |

Residuals in seconds of arc

|            |     |             |            |     |           |            |     |           |
|------------|-----|-------------|------------|-----|-----------|------------|-----|-----------|
| 1954 11 20 | 675 | 0.4- 1.8-   | 1994 04 14 | 801 | 0.4+ 0.1- | 1994 05 15 | 675 | 0.1+ 0.6- |
| 1954 11 20 | 675 | 1.1+ 0.2-   | 1994 04 14 | 801 | 1.6+ 0.8- | 1994 05 16 | 675 | 0.1- 0.3- |
| 1984 02 10 | 675 | 0.0 0.0     | 1994 04 15 | 801 | 0.2+ 0.3- | 1994 05 16 | 675 | 0.6+ 0.2- |
| 1984 02 11 | 675 | 0.2- 0.2+   | 1994 04 15 | 801 | 0.5+ 0.4- | 1994 06 07 | 675 | 0.6+ 1.3+ |
| 1984 02 21 | 675 | 0.1+ 0.7-   | 1994 05 01 | 691 | 0.4+ 0.2- | 1994 06 07 | 675 | 0.9+ 0.2+ |
| 1984 02 22 | 675 | 0.1+ 0.3-   | 1994 05 01 | 691 | 0.5- 0.7- | 1998 01 24 | 566 | 0.3- 0.3- |
| 1984 02 26 | 095 | 1.4+ 1.6+   | 1994 05 09 | 691 | 1.0- 0.4- | 1998 01 24 | 566 | 0.7- 0.7- |
| 1984 03 05 | 095 | (2.8+ 0.4-) | 1994 05 09 | 691 | 1.2- 0.3- | 1998 01 24 | 566 | 0.2- 0.3- |
| 1984 03 21 | 675 | 0.8- 0.2-   | 1994 05 11 | 801 | 0.0 0.7+  | 1998 02 25 | 566 | 0.1+ 0.0  |
| 1989 03 29 | 675 | 0.1- 0.7+   | 1994 05 11 | 801 | 2.0- 0.4- | 1998 02 25 | 566 | 0.1+ 0.2- |
| 1989 03 29 | 675 | 0.1+ 0.7+   | 1994 05 13 | 801 | 0.4- 0.5+ | 1998 02 25 | 566 | 0.1+ 0.2- |
| 1991 09 17 | 675 | 0.1+ 0.1+   | 1994 05 13 | 801 | 0.6- 0.8- |            |     |           |
| 1991 09 17 | 675 | 0.0 0.1-    | 1994 05 15 | 675 | 0.0 0.3+  |            |     |           |

**(8335)\* 1984 DD<sub>1</sub> = 1985 SV<sub>3</sub> = 1997 AN**

Discovered 1984 Feb. 28 by H. Debehogne at the European Southern

Observatory.

Id. G. V. Williams (*MPC* 28839)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> |            | (2000.0) |           | <b>P</b>    |             | <b>Q</b> |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.29584337 | $\omega$ | 280.05975 | -0.36819488 | +0.92927075 |          |   |
| <i>a</i> | 2.2306332  | $\Omega$ | 328.28459 | -0.82928218 | -0.34273491 |          |   |
| <i>e</i> | 0.1070183  | <i>i</i> | 3.25029   | -0.42038507 | -0.13779932 |          |   |
| <i>P</i> | 3.33       | <i>H</i> | 14.7      | <i>G</i>    | 0.15        | <i>U</i> | 2 |

Residuals in seconds of arc

|            |     |             |            |     |           |            |     |           |
|------------|-----|-------------|------------|-----|-----------|------------|-----|-----------|
| 1984 02 28 | 809 | 1.5- 0.2-   | 1984 03 06 | 809 | 0.6+ 0.1+ | 1996 12 14 | 691 | 0.7- 0.0  |
| 1984 02 28 | 809 | 1.2- 0.1-   | 1984 03 08 | 809 | 0.3+ 0.2- | 1997 01 02 | 411 | 0.7+ 0.1- |
| 1984 02 28 | 809 | 1.0- 0.1+   | 1984 03 08 | 809 | 0.2+ 0.0  | 1997 01 02 | 411 | 0.9+ 1.0- |
| 1984 03 01 | 809 | 0.8- 0.0    | 1984 03 08 | 809 | 0.1+ 0.1- | 1997 01 03 | 411 | 1.2+ 0.7+ |
| 1984 03 01 | 809 | 0.6- 0.2-   | 1984 03 10 | 809 | 0.3- 0.8- | 1997 01 03 | 411 | 0.4+ 0.2- |
| 1984 03 01 | 809 | 0.4- 0.1-   | 1984 03 10 | 809 | 0.4- 0.5- | 1997 02 01 | 732 | 0.1- 0.2+ |
| 1984 03 03 | 809 | 0.3+ 0.6+   | 1984 03 10 | 809 | 0.6- 0.2- | 1997 02 01 | 732 | 0.4- 0.3+ |
| 1984 03 03 | 809 | 0.7+ 0.6+   | 1985 09 20 | 095 | 0.1- 0.5+ | 1997 02 01 | 732 | 0.8+ 0.1+ |
| 1984 03 03 | 809 | 1.0+ 0.4+   | 1995 09 01 | 809 | 1.4+ 0.9- | 1997 02 02 | 732 | 0.1- 0.2+ |
| 1984 03 04 | 809 | (5.2- 0.9+) | 1995 09 17 | 809 | 0.5- 0.2- | 1997 02 02 | 732 | 0.6+ 0.6+ |
| 1984 03 04 | 809 | (4.7- 0.8+) | 1995 09 18 | 809 | 1.4+ 0.9- | 1997 02 02 | 732 | 1.2- 0.4+ |
| 1984 03 04 | 809 | (4.3- 0.7+) | 1995 09 19 | 809 | 1.5+ 1.1- | 1997 02 02 | 732 | 1.2- 0.4- |
| 1984 03 05 | 809 | 0.1+ 0.6-   | 1995 09 19 | 691 | 0.7- 0.1+ | 1997 02 02 | 732 | 0.3+ 0.4- |
| 1984 03 05 | 809 | 0.9+ 0.9-   | 1995 09 19 | 691 | 0.9- 0.1+ | 1997 02 02 | 732 | 0.4+ 0.1+ |
| 1984 03 05 | 809 | 1.0+ 0.8-   | 1995 09 19 | 691 | 0.9- 0.1+ | 1997 02 02 | 732 | 0.6- 0.1+ |
| 1984 03 06 | 809 | 0.3- 0.1+   | 1996 12 14 | 691 | 0.4- 0.1- |            |     |           |
| 1984 03 06 | 809 | 0.4+ 0.1+   | 1996 12 14 | 691 | 0.5- 0.0  |            |     |           |

**(8336)\* 1984 SK<sub>1</sub> = 1984 QB<sub>1</sub> = 1984 UT<sub>2</sub> = 1995 UJ**

Discovered 1984 Sept. 27 by A. Mrkos at Klet.

Id. K. Hurukawa (d, *JAM* 1821), F. N. Bowman (d, *MPC* 9414), T. Urata (*MPC* 25953)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> |            | (2000.0) |           | <b>P</b>    |             | <b>Q</b> |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.18193445 | $\omega$ | 325.01579 | +0.65050628 | +0.75904960 |          |   |
| <i>a</i> | 3.0845567  | $\Omega$ | 345.50465 | -0.67080074 | +0.55802970 |          |   |
| <i>e</i> | 0.2957078  | <i>i</i> | 6.00331   | -0.35618528 | +0.33533053 |          |   |
| <i>P</i> | 5.42       | <i>H</i> | 13.0      | <i>G</i>    | 0.15        | <i>U</i> | 2 |

Residuals in seconds of arc

|            |     |             |            |     |           |            |     |           |
|------------|-----|-------------|------------|-----|-----------|------------|-----|-----------|
| 1984 08 27 | 801 | (4.6- 1.1+) | 1996 01 16 | 046 | 0.2- 0.3+ | 1998 01 13 | 046 | 0.0 1.5+  |
| 1984 09 27 | 046 | 1.0- 1.4+   | 1996 01 16 | 046 | 0.3- 0.8+ | 1998 01 13 | 046 | 1.1+ 1.0+ |
| 1984 09 27 | 046 | 0.3- 0.8+   | 1996 01 16 | 046 | 0.2- 0.5+ | 1998 01 27 | 046 | 0.3+ 0.1+ |
| 1984 09 29 | 046 | 0.9- 0.5+   | 1996 12 12 | 046 | 0.1+ 0.2+ | 1998 01 27 | 046 | 0.5+ 0.5- |
| 1984 09 29 | 046 | (3.5- 1.6+) | 1996 12 12 | 046 | 0.2- 0.1- | 1998 01 27 | 046 | 0.4+ 0.1- |
| 1984 09 30 | 046 | 0.7+ 0.1+   | 1996 12 12 | 046 | 0.2- 0.1- | 1998 01 27 | 046 | 0.1+ 0.5- |
| 1984 09 30 | 046 | 0.1- 0.3-   | 1996 12 12 | 046 | 0.0 0.9+  | 1998 02 19 | 046 | 0.3- 0.9- |
| 1984 10 26 | 688 | 1.6+ 2.1-   | 1996 12 12 | 046 | 0.5+ 0.8+ | 1998 02 19 | 046 | 0.5- 1.1- |
| 1984 10 26 | 688 | 1.2+ 2.4-   | 1997 01 15 | 046 | 0.2+ 0.2+ | 1998 02 19 | 046 | 0.1- 1.0- |
| 1995 10 16 | 905 | 0.1- 0.2+   | 1997 01 15 | 046 | 0.2- 0.4+ | 1998 02 20 | 557 | 0.6- 0.4- |
| 1995 10 16 | 905 | 0.8+ 0.3+   | 1997 01 15 | 046 | 0.2- 0.3- | 1998 02 20 | 557 | 0.0 0.5-  |
| 1995 10 17 | 905 | 0.5- 0.2+   | 1997 01 16 | 046 | 0.3+ 0.1+ | 1998 02 21 | 557 | 1.4- 0.8- |
| 1995 10 17 | 905 | 0.3+ 0.5+   | 1997 01 16 | 046 | 0.5+ 0.2+ | 1998 02 23 | 557 | 0.2- 0.5- |
| 1996 01 15 | 046 | 0.2+ 1.0-   | 1997 01 16 | 046 | 0.4+ 0.1+ | 1998 02 23 | 557 | 0.2- 0.7- |
| 1996 01 15 | 046 | 0.1+ 0.8-   | 1998 01 13 | 046 | 0.4- 1.1+ |            |     |           |
| 1996 01 15 | 046 | 1.0- 1.5-   | 1998 01 13 | 046 | 0.1+ 1.3+ |            |     |           |

**(8337)\* 1984 SF<sub>6</sub> = 1979 YU<sub>5</sub> = 1992 AF<sub>3</sub> = 1994 LV<sub>8</sub>**

Discovered 1984 Sept. 22 by H. Debehogne at the European Southern

Observatory.

Id. B. G. Marsden (*MPC* 20923), G. V. Williams (*MPC* 31225)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> |            | (2000.0) |           | <b>P</b>    |             | <b>Q</b> |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.17188029 | $\omega$ | 310.31377 | +0.50759303 | -0.86044563 |          |   |
| <i>a</i> | 3.2037012  | $\Omega$ | 109.12935 | +0.80410665 | +0.45452933 |          |   |
| <i>e</i> | 0.1512844  | <i>i</i> | 2.70131   | +0.30945407 | +0.23029635 |          |   |
| <i>P</i> | 5.73       | <i>H</i> | 13.4      | <i>G</i>    | 0.15        | <i>U</i> | 1 |

Residuals in seconds of arc

|            |     |             |            |     |             |            |     |           |
|------------|-----|-------------|------------|-----|-------------|------------|-----|-----------|
| 1979 12 18 | 095 | (4.8+ 3.2+) | 1984 09 29 | 809 | 0.5+ 0.3-   | 1994 06 09 | 809 | 0.3- 0.5+ |
| 1984 09 22 | 809 | 1.6- 0.3+   | 1984 09 29 | 809 | 0.7+ 0.3-   | 1997 01 30 | 704 | 0.1+ 0.9+ |
| 1984 09 22 | 809 | 1.0- 0.2+   | 1984 09 29 | 809 | 0.7+ 0.6-   | 1997 01 30 | 704 | 0.2+ 1.1+ |
| 1984 09 22 | 809 | 0.7- 0.7+   | 1984 09 30 | 809 | 0.4+ 0.4-   | 1998 01 22 | 691 | 0.5- 1.0+ |
| 1984 09 23 | 809 | 0.5- 0.4+   | 1984 09 30 | 809 | 0.6+ 0.3-   | 1998 01 22 | 691 | 0.7- 0.6+ |
| 1984 09 23 | 809 | 0.3- 0.3+   | 1984 09 30 | 809 | 0.9+ 0.1-   | 1998 01 22 | 691 | 0.4- 0.6+ |
| 1984 09 23 | 809 | 0.1- 0.3+   | 1984 10 01 | 809 | 0.1+ 0.1-   | 1998 01 28 | 691 | 0.1- 0.8+ |
| 1984 09 24 | 809 | 0.7- 0.2+   | 1984 10 01 | 809 | 0.2+ 0.0    | 1998 01 28 | 691 | 0.0 0.7+  |
| 1984 09 24 | 809 | 0.5- 0.5+   | 1984 10 01 | 809 | 0.0 0.1-    | 1998 01 28 | 691 | 0.0 0.8+  |
| 1984 09 24 | 809 | 0.8- 0.5+   | 1992 01 11 | 303 | (3.3+ 0.9+) | 1998 02 23 | 557 | 0.6- 0.1- |
| 1984 09 26 | 809 | 0.6- 0.3+   | 1992 01 12 | 303 | 0.3+ 0.2-   | 1998 02 23 | 557 | 0.8- 0.1- |
| 1984 09 26 | 809 | 0.5- 0.2+   | 1992 02 09 | 691 | 0.6+ 0.6+   | 1998 02 26 | 566 | 0.4+ 0.5- |
| 1984 09 26 | 809 | 0.5- 0.2+   | 1992 02 09 | 691 | 0.8+ 0.6+   | 1998 02 26 | 566 | 0.6+ 1.2- |
| 1984 09 27 | 809 | 1.0- 0.1+   | 1992 02 09 | 691 | 1.1+ 0.7+   | 1998 02 26 | 566 | 0.3+ 0.9- |
| 1984 09 27 | 809 | 0.8- 0.3+   | 1994 06 08 | 809 | (2.2+ 2.2+) | 1998 02 27 | 557 | 0.0 0.5+  |
| 1984 09 27 | 809 | 0.4- 0.4+   | 1994 06 08 | 809 | 0.4+ 0.7+   | 1998 02 27 | 557 | 0.2- 0.5+ |
| 1984 09 28 | 809 | 1.4+ 0.1+   | 1994 06 08 | 809 | 0.9+ 0.9+   | 1998 02 27 | 557 | 0.0 0.4+  |
| 1984 09 28 | 809 | 1.3+ 0.2+   | 1994 06 09 | 809 | 1.2+ 1.3+   |            |     |           |
| 1984 09 28 | 809 | 1.0+ 0.1+   | 1994 06 09 | 809 | 0.4- 1.1+   |            |     |           |

**(8338)\* 1985 FE<sub>3</sub> = 1985 DG = 1992 KG**

Discovered 1985 Mar. 27 at Brorfelde.

Id. F. N. Bowman (d, *MPC* 10151), G. V. Williams (*MPC* 20331)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 229.16367  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.29071172 | $\omega$ | 139.76747 | -0.61329924   | +0.77765604 |
| <i>a</i> | 2.2568067  | $\Omega$ | 91.95248  | -0.75556387   | -0.52660523 |
| <i>e</i> | 0.1873703  | <i>i</i> | 7.95167   | -0.23018967   | -0.34342105 |
| <i>P</i> | 3.39       | <i>H</i> | 13.4      | <i>G</i> 0.15 | <i>U</i> 2  |

Residuals in seconds of arc

|            |     |              |      |            |     |      |      |            |     |      |      |
|------------|-----|--------------|------|------------|-----|------|------|------------|-----|------|------|
| 1985 02 19 | 054 | 1.7-         | 0.6+ | 1995 01 31 | 033 | 0.3- | 0.5+ | 1997 12 28 | 104 | 1.1+ | 0.4- |
| 1985 03 27 | 054 | 0.7+         | 0.6+ | 1995 01 31 | 033 | 0.4- | 0.2+ | 1997 12 28 | 104 | 0.8+ | 0.1- |
| 1985 04 10 | 054 | 0.1-         | 0.6- | 1995 01 31 | 801 | 0.4+ | 0.8+ | 1998 01 03 | 426 | 0.3- | 0.4- |
| 1985 04 16 | 054 | (4.5+ 10.5+) |      | 1995 01 31 | 801 | 0.3+ | 0.6+ | 1998 01 03 | 426 | 1.2- | 0.2- |
| 1985 04 18 | 054 | 1.7+         | 0.5+ | 1995 02 03 | 033 | 0.2- | 0.1+ | 1998 01 03 | 426 | 0.3- | 0.3- |
| 1992 05 27 | 675 | (1.1- 3.1-)  |      | 1995 02 03 | 801 | 0.2+ | 0.8- | 1998 01 06 | 704 | 0.3- | 0.1- |
| 1992 05 27 | 675 | 0.3-         | 1.3- | 1995 02 03 | 801 | 0.3+ | 1.0- | 1998 01 06 | 704 | 0.3- | 0.1+ |
| 1992 05 30 | 675 | (0.8- 3.0-)  |      | 1995 03 27 | 801 | 0.3+ | 0.3- | 1998 01 06 | 704 | 0.3- | 0.6+ |
| 1992 05 30 | 675 | 1.4-         | 1.1+ | 1995 03 29 | 801 | 0.6+ | 0.4- | 1998 01 26 | 704 | 0.4+ | 0.1+ |
| 1992 06 29 | 801 | 0.4+         | 0.4- | 1995 03 29 | 801 | 0.1+ | 0.5- | 1998 01 26 | 704 | 0.1+ | 0.0  |
| 1992 06 29 | 801 | 0.3+         | 0.4- | 1997 12 21 | 596 | 0.5- | 0.7- | 1998 01 26 | 704 | 0.8+ | 0.4+ |
| 1992 07 02 | 801 | 0.5+         | 0.0  | 1997 12 21 | 596 | 0.0  | 0.1+ | 1998 01 26 | 704 | 0.2- | 0.4- |
| 1992 07 02 | 801 | 0.4+         | 0.0  | 1997 12 21 | 596 | 0.2- | 0.4- | 1998 01 26 | 704 | 0.4- | 0.2- |
| 1995 01 06 | 033 | 0.1+         | 0.0  | 1997 12 25 | 426 | 0.1- | 0.5+ | 1998 02 20 | 725 | 0.5+ | 0.1- |
| 1995 01 06 | 033 | 0.4-         | 0.5+ | 1997 12 25 | 426 | 0.2+ | 0.2+ | 1998 02 23 | 725 | 0.2+ | 0.0  |
| 1995 01 08 | 033 | 0.8-         | 0.2- | 1997 12 25 | 426 | 0.5+ | 0.5+ | 1998 02 23 | 725 | 0.2- | 0.0  |

**(8339)\* 1985 RM<sub>6</sub> = 1979 QD<sub>8</sub> = 1991 WH = 1993 BX<sub>4</sub>**

Discovered 1985 Sept. 15 by N. S. Chernykh at the Crimean Astrophysical Observatory.

Id. B. G. Marsden (*MPC* 21786), G. V. Williams (*MPC* 22683)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Marsden

| <i>M</i> | 60.37611   |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.17376512 | $\omega$ | 147.42384 | +0.99023553   | -0.13939017 |
| <i>a</i> | 3.1804921  | $\Omega$ | 220.58887 | +0.12723657   | +0.90954806 |
| <i>e</i> | 0.1785147  | <i>i</i> | 0.17537   | +0.05696001   | +0.39152612 |
| <i>P</i> | 5.67       | <i>H</i> | 12.9      | <i>G</i> 0.15 | <i>U</i> 2  |

Residuals in seconds of arc

|            |     |             |      |            |     |             |      |            |     |      |      |
|------------|-----|-------------|------|------------|-----|-------------|------|------------|-----|------|------|
| 1951 08 06 | 675 | 1.2+        | 1.6- | 1991 11 27 | 046 | 0.7-        | 1.5+ | 1993 02 22 | 010 | 0.5+ | 1.2- |
| 1951 08 06 | 675 | (1.8+ 4.2-) |      | 1993 01 27 | 010 | 0.5-        | 1.7- | 1993 02 23 | 010 | 0.6+ | 0.2- |
| 1979 08 26 | 095 | 0.0         | 1.7- | 1993 01 27 | 010 | 0.7-        | 1.4- | 1997 12 28 | 104 | 0.2+ | 0.6+ |
| 1985 09 15 | 095 | (1.6+ 2.5-) |      | 1993 01 27 | 010 | (0.4- 2.1-) |      | 1997 12 28 | 104 | 1.6+ | 0.5+ |
| 1985 09 20 | 095 | 1.5+        | 0.1+ | 1993 01 28 | 010 | 0.0         | 1.3- | 1997 12 28 | 104 | 1.6+ | 0.5+ |
| 1985 09 22 | 095 | (2.4+ 1.1-) |      | 1993 01 28 | 010 | 1.2-        | 0.7+ | 1998 01 26 | 704 | 0.3+ | 0.2- |
| 1991 11 11 | 691 | 1.7-        | 1.0- | 1993 01 28 | 010 | 1.0-        | 0.3- | 1998 01 26 | 704 | 0.4- | 1.2+ |
| 1991 11 11 | 691 | 1.9-        | 1.0- | 1993 02 20 | 010 | (3.6+ 0.9-) |      | 1998 01 26 | 704 | 0.6+ | 0.5- |
| 1991 11 11 | 691 | 1.9-        | 0.8- | 1993 02 20 | 010 | (3.0+ 0.9-) |      | 1998 01 26 | 704 | 0.7+ | 0.4+ |
| 1991 11 27 | 046 | 1.7+        | 0.3+ | 1993 02 20 | 010 | (2.7+ 1.2-) |      |            |     |      |      |

**(8340)\* 1985 TS<sub>1</sub> = 1990 SR<sub>10</sub>**

Discovered 1985 Oct. 15 by E. Bowell at the Anderson Mesa Station of the Lowell Observatory.

Id. H. E. Holt (*MPC* 17631)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 240.57041  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.19251995 | $\omega$ | 349.51529 | -0.02094416   | +0.98960764 |
| <i>a</i> | 2.9704270  | $\Omega$ | 279.17716 | -0.90653421   | -0.07880268 |
| <i>e</i> | 0.0089181  | <i>i</i> | 8.28546   | -0.42161246   | +0.12027829 |
| <i>P</i> | 5.12       | <i>H</i> | 12.2      | <i>G</i> 0.15 | <i>U</i> 2  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1985 09 19 | 095 | 2.3- | 0.5+ | 1990 09 20 | 675 | 0.3- | 0.7- | 1997 12 27 | 688 | 0.0  | 0.7- |
| 1985 10 15 | 688 | 0.8+ | 0.2+ | 1990 09 20 | 675 | 0.9- | 0.1+ | 1997 12 27 | 688 | 0.1+ | 0.7- |
| 1985 10 15 | 688 | 0.1+ | 0.5+ | 1990 10 12 | 413 | 0.3+ | 0.3+ | 1998 02 24 | 758 | 0.4- | 0.0  |
| 1985 10 18 | 095 | 0.4- | 1.9+ | 1990 10 12 | 413 | 1.6+ | 0.7+ | 1998 02 24 | 758 | 0.6- | 0.1- |

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1990 09 17 | 675 | 0.7- | 1.2- | 1993 04 14 | 675 | 0.6+ | 0.9+ | 1998 02 27 | 566 | 0.3- | 0.3- |
| 1990 09 17 | 675 | 1.7+ | 1.5- | 1993 04 14 | 675 | 0.5+ | 0.6+ | 1998 02 27 | 566 | 0.2- | 0.1- |
| 1990 09 18 | 675 | 0.5- | 0.7- | 1997 11 29 | 688 | 0.2+ | 0.0  | 1998 02 27 | 566 | 0.2- | 0.3- |
| 1990 09 18 | 675 | 0.7+ | 0.0  | 1997 11 29 | 688 | 0.6+ | 0.0  |            |     |      |      |

**(8341)\* 1986 QQ = 1938 SC = 1976 SH<sub>5</sub> = 1988 JX<sub>1</sub> = 1990 XC**

Discovered 1986 Aug. 26 by H. Debehogne at the European Southern

Observatory.

Id. R. Nagata (*MPC* 17632)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 7.82778    |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.28621067 | $\omega$ | 85.46263  | +0.09518633   | -0.99545872 |
| <i>a</i> | 2.2804060  | $\Omega$ | 359.07268 | +0.88079172   | +0.08479317 |
| <i>e</i> | 0.1485029  | <i>i</i> | 4.32653   | +0.46383781   | +0.04326714 |
| <i>P</i> | 3.44       | <i>H</i> | 13.5      | <i>G</i> 0.15 | <i>U</i> 1  |

Residuals in seconds of arc

|            |                   |            |     |             |      |            |     |             |      |
|------------|-------------------|------------|-----|-------------|------|------------|-----|-------------|------|
| 1938 09 17 | 024(49.6+ 73.2+)X | 1986 09 05 | 809 | 0.8+        | 0.1+ | 1993 09 12 | 801 | 1.3-        | 0.3+ |
| 1950 03 21 | 675 0.3+ 0.6+     | 1986 09 05 | 809 | 0.9+        | 0.3+ | 1993 09 12 | 801 | 1.3-        | 0.6+ |
| 1950 03 21 | 675 0.6- 0.2-     | 1986 09 06 | 809 | 0.1-        | 0.4+ | 1993 09 19 | 010 | (2.9+ 1.8+) |      |
| 1976 09 24 | 095 2.2- 0.6-     | 1986 09 06 | 809 | 0.1-        | 0.2+ | 1993 09 19 | 010 | (2.4+ 1.8+) |      |
| 1986 08 26 | 809 0.9+ 1.3-     | 1986 09 06 | 809 | 0.0         | 0.1+ | 1993 09 20 | 010 | (2.8+ 0.1-) |      |
| 1986 08 26 | 809 1.1+ 1.3-     | 1986 09 08 | 809 | 0.0         | 0.0  | 1993 09 20 | 010 | (2.5+ 0.6+) |      |
| 1986 08 26 | 809 1.4+ 1.4-     | 1986 09 08 | 809 | 0.1+ 0.2-   |      | 1993 09 20 | 010 | (2.0+ 0.7+) |      |
| 1986 08 27 | 809 1.1+ 1.2-     | 1986 09 08 | 809 | 0.3+ 0.3-   |      | 1993 09 20 | 801 | 1.3- 0.3+   |      |
| 1986 08 27 | 809 1.0+ 1.3-     | 1986 09 08 | 809 | 0.1- 0.1+   |      | 1993 09 20 | 801 | 1.6- 0.1+   |      |
| 1986 08 27 | 809 1.8+ 1.3-     | 1986 09 08 | 809 | 0.2- 0.0    |      | 1995 02 26 | 801 | 0.7+ 0.2-   |      |
| 1986 08 28 | 809 0.8+ 1.3-     | 1986 09 08 | 809 | 0.2- 0.3+   |      | 1995 02 26 | 801 | 0.1+ 0.3+   |      |
| 1986 08 28 | 809 0.8+ 1.2-     | 1986 09 11 | 809 | 0.2+ 0.3+   |      | 1995 03 02 | 801 | 1.3- 0.6-   |      |
| 1986 08 28 | 809 0.7+ 1.3-     | 1986 09 11 | 809 | 0.3+ 0.4+   |      | 1995 03 02 | 801 | 1.6- 1.1+   |      |
| 1986 08 29 | 809 0.1+ 0.7-     | 1986 09 11 | 809 | 0.4+ 0.5+   |      | 1995 03 28 | 801 | 0.9+ 1.8-   |      |
| 1986 08 29 | 809 0.2+ 0.7-     | 1986 09 11 | 809 | 0.5- 0.7+   |      | 1995 03 28 | 801 | 0.7- 1.0-   |      |
| 1986 08 29 | 809 0.2+ 1.0-     | 1986 09 11 | 809 | 0.5- 0.7+   |      | 1995 04 17 | 560 | 0.6- 0.5-   |      |
| 1986 08 31 | 809 0.1- 0.1+     | 1986 09 11 | 809 | 0.5- 0.6+   |      | 1995 04 17 | 560 | 0.5- 0.1+   |      |
| 1986 08 31 | 809 0.0 0.1+      | 1986 09 12 | 809 | 0.3- 0.8+   |      | 1995 04 17 | 560 | 0.5- 0.7-   |      |
| 1986 08 31 | 809 0.1- 0.1+     | 1986 09 12 | 809 | 0.3- 0.7+   |      | 1996 07 18 | 689 | 0.3- 0.2-   |      |
| 1986 09 01 | 809 0.3+ 0.0      | 1986 09 12 | 809 | 0.4- 0.6+   |      | 1998 01 01 | 127 | 0.1+ 0.4-   |      |
| 1986 09 01 | 809 0.4+ 0.1-     | 1988 05 11 | 413 | 0.7+ 0.9-   |      | 1998 01 01 | 127 | 0.1+ 0.4-   |      |
| 1986 09 01 | 809 0.6+ 0.2-     | 1988 05 11 | 413 | 0.6+ 0.1-   |      | 1998 01 04 | 127 | 0.1+ 0.8-   |      |
| 1986 09 02 | 809 0.3- 0.1-     | 1990 12 08 | 875 | 0.7+ 0.1+   |      | 1998 01 04 | 127 | 0.1+ 0.8-   |      |
| 1986 09 02 | 809 0.2- 0.1-     | 1990 12 08 | 875 | (2.1- 0.1+) |      | 1998 01 07 | 127 | 0.4+ 0.5-   |      |
| 1986 09 02 | 809 0.1+ 0.1-     | 1990 12 10 | 875 | 0.6+ 0.2+   |      | 1998 01 07 | 127 | 0.2+ 0.5-   |      |
| 1986 09 02 | 809 0.4+ 0.5+     | 1990 12 10 | 875 | 0.1- 0.7+   |      | 1998 01 07 | 127 | 0.2+ 0.6-   |      |
| 1986 09 02 | 809 0.1+ 0.6+     | 1990 12 16 | 875 | 0.3+ 0.5+   |      | 1998 01 07 | 127 | 0.4+ 0.7-   |      |
| 1986 09 02 | 809 0.3+ 0.4+     | 1990 12 16 | 875 | 0.3- 0.1+   |      | 1998 01 08 | 127 | 0.1- 0.0    |      |
| 1986 09 03 | 809 0.4- 0.2+     | 1990 12 21 | 875 | 0.3+ 0.2-   |      | 1998 01 08 | 127 | 0.1+ 0.1-   |      |
| 1986 09 03 | 809 0.2- 0.2+     | 1990 12 21 | 875 | 0.2+ 0.2-   |      | 1998 01 08 | 127 | 0.0 0.4-    |      |
| 1986 09 03 | 809 0.3- 0.2+     | 1992 06 06 | 675 | 0.1- 1.4+   |      | 1998 01 08 | 127 | 0.4- 0.3-   |      |
| 1986 09 03 | 809 0.6- 0.0      | 1993 07 26 | 675 | 0.2- 0.7+   |      | 1998 01 09 | 127 | 0.2- 0.1-   |      |
| 1986 09 03 | 809 0.5- 0.1-     | 1993 07 26 | 675 | 0.4- 0.0    |      | 1998 01 09 | 127 | 0.2- 0.2-   |      |
| 1986 09 03 | 809 0.2- 0.1-     | 1993 08 15 | 809 | (2.1+ 0.4-) |      | 1998 01 09 | 127 | 0.2+ 0.1-   |      |
| 1986 09 04 | 809 0.3+ 0.3+     | 1993 08 15 | 809 | 1.1+ 0.1-   |      | 1998 01 31 | 631 | 0.4+ 0.5+   |      |
| 1986 09 04 | 809 0.5+ 0.3+     | 1993 08 15 | 809 | 0.3+ 0.5-   |      | 1998 01 31 | 631 | 0.3- 0.6+   |      |
| 1986 09 04 | 809 0.8+ 0.2+     | 1993 08 15 | 801 | 1.5- 0.8-   |      | 1998 02 15 | 958 | 0.6- 0.5+   |      |
| 1986 09 04 | 809 0.1+ 0.0      | 1993 08 15 | 801 | 1.3- 0.7-   |      | 1998 02 17 | 958 | 0.2- 0.2+   |      |
| 1986 09 04 | 809 0.2+ 0.2-     | 1993 08 20 | 809 | (2.9- 0.9-) |      | 1998 02 17 | 958 | 0.9- 0.1-   |      |
| 1986 09 04 | 809 0.1+ 0.2-     | 1993 08 20 | 809 | (3.3- 0.2-) |      |            |     |             |      |
| 1986 09 05 | 809 0.7+ 0.4+     | 1993 08 20 | 809 | (3.1- 0.5-) |      |            |     |             |      |

**(8342)\* 1986 QN<sub>3</sub> = 1979 MB<sub>1</sub> = 1981 AV<sub>2</sub>**

Discovered 1986 Aug. 29 by H. Debehogne at the European Southern

Observatory.

Id. D. W. E. Green (*MPC* 12127)

1998 MAR. 13

M.P.C. 31353

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Green

| <i>M</i>                    | 120.57588  |          | (2000.0)  |            | <b>P</b>    |      | <b>Q</b>    |            |     |      |      |
|-----------------------------|------------|----------|-----------|------------|-------------|------|-------------|------------|-----|------|------|
| <i>n</i>                    | 0.29660213 | $\omega$ | 288.55972 |            | +0.97813479 |      | -0.20080695 |            |     |      |      |
| <i>a</i>                    | 2.2268273  | $\Omega$ | 83.05192  |            | +0.20538326 |      | +0.89174996 |            |     |      |      |
| <i>e</i>                    | 0.1443464  | <i>i</i> | 3.12530   |            | +0.03271171 |      | +0.40553494 |            |     |      |      |
| <i>P</i>                    | 3.32       | <i>H</i> | 14.4      |            | <i>G</i>    | 0.15 | <i>U</i>    | 1          |     |      |      |
| Residuals in seconds of arc |            |          |           |            |             |      |             |            |     |      |      |
| 1979 06 22                  | 805        | 1.7-     | 1.6+      | 1986 09 04 | 809         | 1.1+ | 0.3-        | 1993 11 10 | 010 | 0.7- | 1.3+ |
| 1979 06 22                  | 805        | 1.2+     | 0.9+      | 1986 09 07 | 809         | 0.6+ | 0.7+        | 1993 11 18 | 657 | 0.1+ | 0.1+ |
| 1979 06 25                  | 805        | 0.2+     | 0.7+      | 1986 09 07 | 809         | 0.7+ | 0.2+        | 1993 11 18 | 657 | 0.0  | 0.5- |
| 1981 01 08                  | 381        | 1.0+     | 0.5-      | 1986 09 07 | 809         | 1.0+ | 0.1+        | 1993 11 18 | 657 | 0.1+ | 0.5- |
| 1981 01 08                  | 381        | 0.7+     | 0.5-      | 1986 09 07 | 809         | 0.5+ | 0.3+        | 1993 12 17 | 560 | 1.2- | 0.4+ |
| 1986 08 29                  | 809        | 0.5-     | 0.5-      | 1986 09 07 | 809         | 0.4+ | 0.0         | 1993 12 17 | 560 | 0.3- | 1.1- |
| 1986 08 29                  | 809        | 0.2-     | 0.5-      | 1986 09 07 | 809         | 0.4+ | 0.0         | 1993 12 17 | 560 | 0.8- | 1.0- |
| 1986 08 29                  | 809        | 0.1-     | 0.4-      | 1986 09 09 | 809         | 0.7- | 0.3-        | 1993 12 17 | 560 | 0.0  | 1.0- |
| 1986 08 29                  | 809        | 0.1-     | 0.6-      | 1986 09 09 | 809         | 0.7- | 0.3-        | 1996 10 10 | 801 | 0.2- | 0.7- |
| 1986 08 29                  | 809        | 0.1-     | 0.6-      | 1986 09 09 | 809         | 0.5- | 0.1-        | 1996 10 10 | 801 | 1.0+ | 0.7+ |
| 1986 08 29                  | 809        | 0.1+     | 0.5-      | 1986 09 10 | 809         | 1.0- | 0.1+        | 1996 10 12 | 801 | 0.6+ | 0.7- |
| 1986 08 31                  | 809        | 0.2+     | 0.1-      | 1986 09 10 | 809         | 0.9- | 0.1+        | 1996 10 12 | 801 | 1.6+ | 0.3- |
| 1986 08 31                  | 809        | 0.2+     | 0.1+      | 1986 09 10 | 809         | 0.9- | 0.0         | 1996 10 12 | 689 | 0.2- | 0.2- |
| 1986 08 31                  | 809        | 0.1+     | 0.2+      | 1986 09 11 | 809         | 1.1- | 0.3+        | 1996 10 13 | 689 | 0.4- | 0.2- |
| 1986 09 01                  | 809        | 0.2+     | 0.4+      | 1986 09 11 | 809         | 1.1- | 0.1+        | 1998 01 31 | 411 | 1.6+ | 0.3- |
| 1986 09 01                  | 809        | 0.4+     | 0.5+      | 1986 09 11 | 809         | 1.2- | 0.0         | 1998 01 31 | 411 | 0.5- | 0.8- |
| 1986 09 01                  | 809        | 0.3+     | 0.7+      | 1988 02 17 | 675         | 0.5- | 0.1-        | 1998 02 22 | 566 | 0.5+ | 0.2+ |
| 1986 09 02                  | 809        | 0.6+     | 0.4-      | 1988 02 17 | 675         | 0.8- | 1.9-        | 1998 02 22 | 566 | 0.2+ | 0.0  |
| 1986 09 02                  | 809        | 0.3+     | 0.3-      | 1993 11 09 | 010         | 0.2- | 1.5+        | 1998 02 22 | 566 | 0.4- | 0.1- |
| 1986 09 02                  | 809        | 0.7+     | 0.5-      | 1993 11 09 | 010         | 0.7- | 1.7+        | 1998 02 27 | 566 | 0.2- | 0.7+ |
| 1986 09 04                  | 809        | 0.5+     | 0.2-      | 1993 11 10 | 010         | 1.3+ | 0.9+        | 1998 02 27 | 566 | 0.4- | 0.6+ |
| 1986 09 04                  | 809        | 0.9+     | 0.2-      | 1993 11 10 | 010         | 0.4- | 1.8+        | 1998 02 27 | 566 | 0.2- | 0.3+ |

(8343)\* 1986 TG<sub>3</sub> = 1996 VQ<sub>7</sub>

Discovered 1986 Oct. 4 by A. Mrkos at Kleť.

Id. T. Urata (*MPC* 28583)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| $M$                         | 92.61042   |          | (2000.0)  | <b>P</b>    |      |       | <b>Q</b>    |            |     |      |      |
|-----------------------------|------------|----------|-----------|-------------|------|-------|-------------|------------|-----|------|------|
| $n$                         | 0.20613295 | $\omega$ | 225.89810 | +0.62064698 |      |       | -0.78408338 |            |     |      |      |
| $a$                         | 2.8381658  | $\Omega$ | 185.74128 | +0.72835661 |      |       | +0.57806205 |            |     |      |      |
| $e$                         | 0.0699680  | $i$      | 1.86314   | +0.29033426 |      |       | +0.22595910 |            |     |      |      |
| $P$                         | 4.78       | $H$      | 13.2      | $G$         | 0.15 | $U$   | 1           |            |     |      |      |
| Residuals in seconds of arc |            |          |           |             |      |       |             |            |     |      |      |
| 1986 10 04                  | 046        | (4.5+    | 4.4+)     | 1995 07 02  | 691  | 0.1-  | 0.4+        | 1996 12 01 | 385 | 0.0  | 0.3- |
| 1986 10 04                  | 046        | 0.9+     | 1.8+      | 1995 07 02  | 691  | 0.0   | 0.1+        | 1998 02 04 | 046 | 0.2+ | 0.3+ |
| 1986 10 05                  | 046        | (2.9-    | 1.1+)     | 1995 07 02  | 691  | 0.1-  | 0.3+        | 1998 02 04 | 046 | 0.2+ | 0.3+ |
| 1986 10 05                  | 046        | (3.4+    | 5.1+)     | 1996 11 15  | 905  | 1.1-  | 0.4-        | 1998 02 04 | 046 | 0.3+ | 0.3+ |
| 1986 10 09                  | 046        | (2.8-    | 2.7-)     | 1996 11 15  | 905  | 0.2+  | 0.3-        | 1998 02 05 | 046 | 0.0  | 0.2+ |
| 1986 10 09                  | 046        | 1.0-     | 0.8-      | 1996 11 18  | 905  | (2.2+ | 2.2-)       | 1998 02 05 | 046 | 0.1+ | 0.2+ |
| 1986 10 10                  | 046        | (1.7-    | 2.8+)     | 1996 11 21  | 385  | 0.2+  | 0.4-        | 1998 02 05 | 046 | 0.1+ | 0.3+ |
| 1986 10 10                  | 046        | (0.9+    | 4.1+)     | 1996 11 21  | 385  | 0.2+  | 0.6-        | 1998 02 25 | 566 | 0.0  | 0.3+ |
| 1991 11 05                  | 691        | 0.1+     | 0.4+      | 1996 11 21  | 385  | 0.3+  | 0.2+        | 1998 02 25 | 566 | 0.0  | 0.1+ |
| 1991 11 05                  | 691        | 0.3-     | 0.2+      | 1996 12 01  | 385  | 0.5+  | 0.2+        | 1998 02 25 | 566 | 0.1- | 0.1+ |
| 1991 11 05                  | 691        | 0.6-     | 0.5+      | 1996 12 01  | 385  | 0.0   | 0.3+        |            |     |      |      |

(8344)\* 1987 BB = 1991 GZ<sub>2</sub>

Discovered 1987 Jan. 25 by T. Nijima and T. Urata at Ojima.

Id. H. Kaneda (*MPC* 18626)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Nakano

|     |            |          |           |             |             |
|-----|------------|----------|-----------|-------------|-------------|
| $M$ | 341.00774  |          | (2000.0)  | <b>P</b>    | <b>Q</b>    |
| $n$ | 0.26905001 | $\omega$ | 354.93306 | -0.76609820 | -0.64271219 |
| $a$ | 2.3763699  | $\Omega$ | 145.07163 | +0.58992151 | -0.70550766 |
| $e$ | 0.1621130  | $i$      | 0.38234   | +0.25511991 | -0.29863018 |
| $P$ | 3.66       | $H$      | 14.8      | $G$ 0.15    | $U$ 1       |

Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| 1987 01 25 | 887 | 0.4-  | 0.6+  | 1991 04 10 | 809 | 0.2- | 1.1- | 1993 12 09 | 385 | 0.6+ | 0.3- |
| 1987 01 25 | 887 | (3.2- | 2.9+) | 1991 04 15 | 675 | 0.0  | 0.8- | 1993 12 09 | 385 | 0.0  | 0.5- |
| 1987 01 28 | 887 | 0.2+  | 0.6-  | 1991 04 15 | 675 | 0.4- | 0.1- | 1996 09 13 | 566 | 0.3+ | 0.4- |
| 1987 01 28 | 887 | 0.8-  | 0.4+  | 1991 04 19 | 809 | 0.7+ | 0.6- | 1996 09 13 | 566 | 0.1- | 0.6- |
| 1987 01 30 | 887 | 0.2+  | 0.1+  | 1991 04 19 | 809 | 0.8- | 0.4+ | 1996 09 13 | 566 | 0.3+ | 0.6- |
| 1987 02 04 | 887 | 1.4-  | 1.7+  | 1991 04 19 | 809 | 0.5- | 1.0- | 1996 09 14 | 385 | 0.1+ | 1.0- |
| 1987 02 04 | 887 | 0.3+  | 0.4-  | 1993 11 14 | 887 | 0.1+ | 0.6- | 1996 09 14 | 385 | 0.2- | 0.8- |
| 1987 02 04 | 887 | 1.1+  | 0.1+  | 1993 11 14 | 887 | 0.8- | 1.5- | 1996 09 14 | 385 | 0.2- | 0.4- |
| 1991 04 08 | 809 | 0.3-  | 0.5-  | 1993 11 14 | 887 | 0.1+ | 0.4- | 1998 01 19 | 886 | 0.7- | 0.2+ |
| 1991 04 08 | 809 | 0.6-  | 0.3-  | 1993 11 15 | 385 | 1.0+ | 0.8- | 1998 01 19 | 886 | 0.5- | 0.0  |
| 1991 04 08 | 809 | 1.4-  | 1.3-  | 1993 11 15 | 385 | 0.9+ | 0.1- | 1998 01 25 | 886 | 0.7- | 0.6+ |
| 1991 04 08 | 809 | 0.6+  | 0.0   | 1993 11 15 | 385 | 1.1+ | 0.6- | 1998 01 25 | 886 | 0.6- | 0.7+ |
| 1991 04 08 | 809 | 0.2+  | 1.4-  | 1993 11 18 | 657 | 0.6- | 1.5- | 1998 01 28 | 566 | 0.3- | 0.8+ |
| 1991 04 08 | 809 | 0.1-  | 1.2-  | 1993 11 18 | 657 | 0.4- | 1.5- | 1998 01 28 | 566 | 0.5- | 0.8+ |
| 1991 04 10 | 809 | 0.4+  | 0.6-  | 1993 11 18 | 657 | 0.3+ | 1.8- | 1998 01 28 | 566 | 0.0  | 0.6+ |
| 1991 04 10 | 809 | 0.3-  | 1.2-  | 1993 12 05 | 385 | 1.1+ | 0.0  | 1998 02 24 | 566 | 1.4+ | 0.3+ |
| 1991 04 10 | 809 | 0.4-  | 1.0-  | 1993 12 05 | 385 | 0.3+ | 0.2- | 1998 02 24 | 566 | 1.3+ | 0.0  |
| 1991 04 10 | 809 | 0.2-  | 0.5-  | 1993 12 05 | 385 | 0.2- | 0.4- | 1998 02 24 | 566 | 1.2+ | 0.4+ |
| 1991 04 10 | 809 | 0.3-  | 0.5-  | 1993 12 09 | 385 | 0.4+ | 0.0  |            |     |      |      |

(8345)\* 1987 BO<sub>1</sub> = 1968 YB = 1994 AU<sub>2</sub>

Discovered 1987 Jan. 22 by E. W. Elst at the European Southern

Observatory.

Id. G. V. Williams (*MPC* 22950)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

|     |            |          |           |             |             |
|-----|------------|----------|-----------|-------------|-------------|
| $M$ | 44.06495   |          | (2000.0)  | <b>P</b>    | <b>Q</b>    |
| $n$ | 0.27548178 | $\omega$ | 152.74587 | +0.30106062 | -0.86879326 |
| $a$ | 2.3392365  | $\Omega$ | 277.48203 | +0.78667907 | +0.45928744 |
| $e$ | 0.2288903  | $i$      | 23.36070  | +0.53897917 | -0.18507651 |
| $P$ | 3.58       | $H$      | 13.1      | $G$ 0.15    | $U$ 1       |

Residuals in seconds of arc

|            |     |       |       |            |     |       |       |            |     |      |      |
|------------|-----|-------|-------|------------|-----|-------|-------|------------|-----|------|------|
| 1968 12 22 | 095 | (1.8+ | 6.1+) | 1987 02 03 | 809 | 1.4+  | 2.0+  | 1996 10 12 | 801 | 0.5- | 0.5- |
| 1987 01 22 | 809 | 0.1-  | 1.2-  | 1987 02 05 | 809 | 0.6-  | 0.2-  | 1996 10 13 | 801 | 0.0  | 0.0  |
| 1987 01 22 | 809 | 0.1-  | 1.3-  | 1987 02 06 | 809 | 0.1-  | 1.5-  | 1996 10 15 | 801 | 0.1- | 0.2+ |
| 1987 01 22 | 809 | 0.3+  | 1.6-  | 1987 02 06 | 809 | 0.2-  | 1.0-  | 1996 10 15 | 801 | 0.0  | 1.0+ |
| 1987 01 23 | 809 | 0.1-  | 0.3-  | 1993 12 13 | 675 | 0.2+  | 0.6+  | 1998 01 17 | 423 | 0.4- | 0.6- |
| 1987 01 23 | 809 | 0.6+  | 0.1-  | 1993 12 13 | 675 | 0.6+  | 0.7+  | 1998 01 25 | 423 | 1.0- | 0.0  |
| 1987 01 25 | 809 | 0.5+  | 1.7-  | 1994 01 12 | 675 | 0.3-  | 1.0+  | 1998 01 25 | 423 | 0.7- | 0.0  |
| 1987 01 25 | 809 | 0.5+  | 1.6-  | 1994 01 12 | 675 | 0.8-  | 0.0   | 1998 01 25 | 423 | 1.1- | 0.1- |
| 1987 01 26 | 809 | 0.5+  | 1.1+  | 1994 01 13 | 675 | 1.7-  | 1.0-  | 1998 01 25 | 423 | 1.2- | 0.2+ |
| 1987 01 26 | 809 | 0.3+  | 1.3+  | 1994 01 13 | 675 | 0.8-  | 1.2-  | 1998 02 14 | 423 | 0.6+ | 0.5- |
| 1987 01 26 | 809 | 0.9+  | 1.5+  | 1994 01 16 | 675 | 0.3+  | 1.6-  | 1998 02 14 | 423 | 0.7+ | 0.4- |
| 1987 01 27 | 809 | 0.4-  | 0.1+  | 1994 01 16 | 675 | 0.7+  | 1.5-  | 1998 02 14 | 423 | 1.2+ | 0.4- |
| 1987 01 27 | 809 | 0.1+  | 0.6+  | 1996 05 16 | 691 | (2.2- | 0.7+) | 1998 02 14 | 423 | 0.8+ | 0.2+ |
| 1987 01 27 | 809 | 0.2-  | 1.6+  | 1996 05 16 | 691 | 1.8-  | 0.6+  | 1998 02 16 | 423 | 0.6+ | 0.0  |
| 1987 01 28 | 809 | 0.4-  | 1.3+  | 1996 07 14 | 801 | 0.4-  | 0.6+  | 1998 02 16 | 423 | 0.9+ | 0.3+ |
| 1987 01 28 | 809 | 0.3-  | 1.8+  | 1996 07 14 | 801 | 0.7-  | 0.3+  | 1998 02 16 | 423 | 0.3+ | 0.5+ |
| 1987 01 28 | 809 | (0.7- | 2.7+) | 1996 07 18 | 801 | 0.2-  | 0.7+  | 1998 02 16 | 423 | 0.4+ | 0.4+ |
| 1987 01 28 | 809 | 0.8-  | 2.2+  | 1996 07 18 | 801 | 0.1-  | 0.9+  | 1998 02 16 | 423 | 0.3+ | 0.0  |
| 1987 01 28 | 809 | 0.2-  | 2.0+  | 1996 07 19 | 610 | 0.8-  | 0.7+  | 1998 02 17 | 423 | 0.1+ | 0.2- |
| 1987 01 29 | 809 | 0.4+  | 0.5+  | 1996 07 19 | 610 | 0.8-  | 1.0+  | 1998 02 17 | 423 | 0.6+ | 0.1+ |
| 1987 01 29 | 809 | 0.1-  | 1.2+  | 1996 07 19 | 610 | 0.8-  | 1.4+  | 1998 02 17 | 423 | 0.1- | 0.2+ |
| 1987 01 30 | 809 | 0.5+  | 0.6-  | 1996 08 14 | 801 | 0.1+  | 0.1+  | 1998 03 04 | 758 | 0.1+ | 0.0  |
| 1987 01 30 | 809 | 1.1+  | 0.8+  | 1996 08 14 | 801 | 0.4+  | 0.4-  | 1998 03 04 | 758 | 0.6- | 0.0  |
| 1987 02 01 | 809 | 0.1-  | 0.5-  | 1996 08 16 | 801 | 0.4+  | 0.4+  | 1998 03 05 | 758 | 0.1- | 0.1- |
| 1987 02 03 | 809 | 1.4+  | 1.9+  | 1996 08 16 | 801 | 0.1-  | 0.3+  | 1998 03 05 | 758 | 0.7- | 0.2+ |

(8346)\* 1987 DW<sub>6</sub> = 1976 GG<sub>6</sub> = 1982 KS

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 311.28053  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.17600011 | $\omega$ | 180.39825 | -0.92302807   | +0.38459517 |
| <i>a</i> | 3.1535091  | $\Omega$ | 22.22903  | -0.35291008   | -0.83573510 |
| <i>e</i> | 0.1498870  | <i>i</i> | 1.55758   | -0.15321117   | -0.39196096 |
| <i>P</i> | 5.60       | <i>H</i> | 12.7      | <i>G</i> 0.15 | <i>U</i> 1  |

Residuals in seconds of arc

|            |     |        |       |            |     |      |      |            |     |       |       |
|------------|-----|--------|-------|------------|-----|------|------|------------|-----|-------|-------|
| 1951 11 30 | 675 | 0.1+   | 0.0   | 1987 03 03 | 809 | 0.2+ | 0.0  | 1994 08 04 | 675 | 0.5+  | 0.4+  |
| 1951 11 30 | 675 | 1.7-   | 0.8-  | 1987 03 04 | 809 | 0.6- | 0.7+ | 1997 12 13 | 327 | 0.7+  | 0.5+  |
| 1951 12 01 | 675 | 0.4-   | 0.7-  | 1987 03 04 | 809 | 0.4- | 0.7+ | 1997 12 13 | 327 | 0.3+  | 0.6+  |
| 1951 12 01 | 675 | (3.2+  | 0.7+) | 1987 03 04 | 809 | 0.3- | 0.7+ | 1997 12 13 | 327 | 0.4+  | 0.4+  |
| 1965 05 02 | 760 | (1.1-  | 3.1-) | 1987 03 05 | 809 | 0.0  | 0.2+ | 1997 12 15 | 327 | 0.4+  | 0.1+  |
| 1965 05 02 | 760 | (3.3-  | 1.2+) | 1987 03 05 | 809 | 0.3+ | 0.4+ | 1997 12 15 | 327 | 0.3+  | 0.4-  |
| 1976 04 02 | 095 | (11.4+ | 0.2-) | 1987 03 05 | 809 | 0.4+ | 0.4+ | 1997 12 15 | 327 | 0.1+  | 0.4+  |
| 1982 05 21 | 688 | 1.0-   | 1.9-  | 1987 03 06 | 809 | 0.2+ | 0.5- | 1998 02 06 | 809 | (2.8- | 3.7-) |
| 1982 05 21 | 688 | 1.0+   | 2.0-  | 1987 03 06 | 809 | 0.7+ | 0.6- | 1998 02 06 | 809 | (2.9- | 4.3-) |
| 1987 02 26 | 809 | 0.1-   | 0.3+  | 1987 03 06 | 809 | 0.7+ | 0.3- | 1998 02 06 | 809 | (2.9- | 4.4-) |
| 1987 02 26 | 809 | 0.1-   | 0.3+  | 1987 03 08 | 809 | 0.1+ | 0.3+ | 1998 02 07 | 809 | 0.3-  | 1.1-  |
| 1987 02 26 | 809 | 0.1+   | 0.4+  | 1987 03 08 | 809 | 0.1+ | 0.3+ | 1998 02 07 | 809 | 0.3-  | 0.6-  |
| 1987 02 26 | 809 | 0.0    | 0.4-  | 1987 03 08 | 809 | 0.1+ | 0.0  | 1998 02 07 | 809 | 0.4-  | 1.0-  |
| 1987 02 26 | 809 | 0.0    | 0.5-  | 1987 03 11 | 809 | 0.2+ | 0.1- | 1998 02 23 | 691 | 1.2-  | 0.2+  |
| 1987 02 26 | 809 | 0.1-   | 0.5-  | 1987 03 11 | 809 | 0.1- | 0.1- | 1998 02 23 | 691 | 1.3-  | 0.1+  |
| 1987 02 27 | 809 | 0.1-   | 0.3-  | 1987 03 11 | 809 | 0.0  | 0.2- | 1998 02 23 | 691 | 1.2-  | 0.2+  |
| 1987 02 27 | 809 | 0.0    | 0.2-  | 1989 09 29 | 809 | 0.0  | 0.1+ | 1998 02 26 | 699 | 0.5+  | 0.4+  |
| 1987 02 27 | 809 | 0.1+   | 0.3+  | 1989 09 29 | 809 | 0.0  | 0.3- | 1998 02 26 | 699 | 0.3+  | 0.0   |
| 1987 02 28 | 809 | 0.4+   | 0.2+  | 1989 09 29 | 809 | 0.4- | 0.8- | 1998 02 26 | 699 | 0.6+  | 0.3+  |
| 1987 02 28 | 809 | 0.6+   | 0.5+  | 1992 01 24 | 894 | 1.1+ | 0.7- | 1998 02 26 | 610 | 1.8+  | 0.6+  |
| 1987 02 28 | 809 | 0.6+   | 0.3+  | 1992 01 24 | 894 | 0.6+ | 1.9- | 1998 02 26 | 610 | 0.7+  | 0.4+  |
| 1987 03 02 | 809 | 0.6+   | 0.4-  | 1992 01 26 | 894 | 0.0  | 0.5- | 1998 02 26 | 610 | 0.3-  | 0.2+  |
| 1987 03 02 | 809 | 0.7+   | 0.3-  | 1992 01 26 | 894 | 0.5+ | 0.8- | 1998 03 02 | 691 | 1.2-  | 0.2+  |
| 1987 03 02 | 809 | 0.6+   | 0.3-  | 1993 03 23 | 675 | 0.9- | 0.1+ | 1998 03 02 | 691 | 1.2-  | 0.2+  |
| 1987 03 03 | 809 | 0.1-   | 0.4-  | 1993 03 23 | 675 | 2.0- | 0.9+ | 1998 03 02 | 691 | 1.5-  | 0.2+  |
| 1987 03 03 | 809 | 0.0    | 0.0   | 1994 08 04 | 675 | 0.6+ | 0.8+ |            |     |       |       |

**(8347)\* 1987 HK**

Discovered 1987 Apr. 21 by C. S. Shoemaker at Palomar.

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 165.18940  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.24124924 | $\omega$ | 338.40161 | +0.36800116   | +0.92972901 |
| <i>a</i> | 2.5555953  | $\Omega$ | 313.18800 | -0.85038789   | +0.33070584 |
| <i>e</i> | 0.0860020  | <i>i</i> | 1.05176   | -0.37605262   | +0.16198028 |
| <i>P</i> | 4.09       | <i>H</i> | 13.5      | <i>G</i> 0.15 | <i>U</i> 2  |

Residuals in seconds of arc

|            |     |      |      |            |     |       |       |            |     |       |       |
|------------|-----|------|------|------------|-----|-------|-------|------------|-----|-------|-------|
| 1982 01 30 | 675 | 0.6- | 0.5- | 1991 05 15 | 675 | 1.3+  | 0.2-  | 1996 09 30 | 104 | 1.1+  | 0.7+  |
| 1982 01 31 | 675 | 2.3+ | 0.8- | 1991 05 15 | 675 | 1.4+  | 0.4+  | 1996 09 30 | 104 | 1.1+  | 0.0   |
| 1987 04 21 | 675 | 0.4- | 0.9+ | 1994 01 04 | 691 | 0.7-  | 0.0   | 1996 09 30 | 104 | 0.8+  | 0.8-  |
| 1987 04 22 | 675 | 2.0- | 2.2+ | 1994 01 04 | 691 | 1.2-  | 0.2+  | 1998 01 02 | 704 | 0.1+  | 0.3-  |
| 1987 05 29 | 675 | 1.0- | 2.0- | 1994 01 04 | 691 | 0.9-  | 0.1+  | 1998 01 02 | 704 | 0.5+  | 0.1-  |
| 1987 05 30 | 675 | 0.5- | 2.3- | 1994 01 07 | 675 | 0.8-  | 0.9-  | 1998 01 02 | 704 | (2.7+ | 0.9-) |
| 1987 05 30 | 413 | 0.2+ | 0.5+ | 1994 01 07 | 675 | 0.3-  | 0.2-  | 1998 01 02 | 704 | 0.1+  | 0.3-  |
| 1987 05 30 | 413 | 0.1+ | 1.4- | 1996 09 13 | 691 | (2.7- | 0.7-) | 1998 01 02 | 704 | 0.1-  | 0.3-  |
| 1987 06 01 | 675 | 0.2+ | 0.3+ | 1996 09 13 | 691 | 1.3-  | 0.0   | 1998 01 26 | 704 | 0.1+  | 0.2+  |
| 1991 04 17 | 675 | 1.0- | 1.0+ | 1996 09 13 | 691 | 1.2-  | 0.1-  | 1998 01 26 | 704 | 1.8+  | 0.1+  |
| 1991 04 17 | 675 | 1.4- | 1.6- | 1996 09 13 | 566 | 0.5+  | 0.3-  | 1998 01 26 | 704 | 0.4-  | 0.6+  |
| 1991 05 13 | 675 | 1.3+ | 0.8- | 1996 09 13 | 566 | 0.4+  | 0.4-  | 1998 01 26 | 704 | 0.4-  | 0.1+  |
| 1991 05 13 | 675 | 0.7+ | 0.9+ | 1996 09 13 | 566 | 0.2-  | 0.3-  | 1998 01 26 | 704 | 0.3-  | 0.3-  |

**(8348)\* 1988 BX = 1988 CE<sub>7</sub> = 1970 AQ = 1993 BP<sub>2</sub>**

Discovered 1988 Jan. 26 by R. Rajamohan at Vainu Bappu Observatory,

Kavalur.

Id. R. Rajamohan (d, *MPC* 13436), G. V. Williams (*MPC* 21788, unpublished)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 23.12532   |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.38557195 | $\omega$ | 119.24482 | +0.59553476   | -0.74357955 |
| <i>a</i> | 1.8695299  | $\Omega$ | 290.96877 | +0.57641509   | +0.65913203 |
| <i>e</i> | 0.0673890  | <i>i</i> | 19.00077  | +0.55953909   | +0.11240290 |
| <i>P</i> | 2.56       | <i>H</i> | 13.7      | <i>G</i> 0.15 | <i>U</i> 2  |

Residuals in seconds of arc

|            |     |       |       |              |     |       |       |              |     |      |      |
|------------|-----|-------|-------|--------------|-----|-------|-------|--------------|-----|------|------|
| 1970 01 04 | 095 | (7.1+ | 8.7+) | 1988 01 29   | 809 | 0.3-  | 0.1-  | 1994 08 07   | 816 | 0.0  | 0.2+ |
| 1988 01 17 | 809 | 0.3+  | 0.1-  | 1988 01 29   | 809 | 0.1-  | 0.2-  | 1994 08 07   | 816 | 0.0  | 0.1+ |
| 1988 01 17 | 809 | 0.4+  | 0.0   | 1988 01 30   | 809 | 0.9-  | 0.0   | 1994 08 08   | 816 | 0.1- | 0.3- |
| 1988 01 17 | 809 | 0.5+  | 0.0   | 1988 01 30   | 809 | 0.2-  | 0.4+  | 1994 08 08   | 816 | 0.0  | 0.2- |
| 1988 01 18 | 809 | 0.5+  | 0.3-  | 1988 02 10   | 220 | (0.4- | 2.7-) | Y 1994 08 08 | 816 | 0.0  | 0.1+ |
| 1988 01 18 | 809 | 0.4+  | 0.5-  | 1988 02 11   | 220 | (5.0+ | 0.4-) | Y 1994 08 08 | 801 | 0.8+ | 1.5- |
| 1988 01 20 | 809 | 0.2-  | 0.0   | 1993 01 21   | 675 | (1.8+ | 2.6-) | 1994 10 08   | 801 | 0.8+ | 0.6+ |
| 1988 01 20 | 809 | 0.1+  | 0.1-  | 1993 01 21   | 675 | (1.3+ | 2.5-) | 1994 10 08   | 801 | 0.3+ | 0.2+ |
| 1988 01 22 | 809 | 0.7-  | 0.1+  | 1993 01 22   | 675 | 0.1+  | 1.3-  | 1997 11 19   | 900 | 0.3- | 0.0  |
| 1988 01 22 | 809 | 0.1-  | 0.1-  | 1993 01 22   | 675 | (1.1+ | 2.7-) | 1997 11 19   | 900 | 0.4- | 0.0  |
| 1988 01 24 | 809 | 0.2-  | 0.1-  | 1993 03 23   | 801 | 0.5-  | 0.4-  | 1997 11 19   | 631 | 0.8- | 0.3+ |
| 1988 01 24 | 809 | 0.1-  | 0.3-  | 1993 03 23   | 801 | 0.5-  | 1.0-  | 1997 11 19   | 631 | 0.1- | 0.0  |
| 1988 01 24 | 809 | 0.2+  | 0.2-  | 1994 07 03   | 596 | (1.2- | 3.4-) | 1997 11 20   | 631 | 0.4- | 0.4+ |
| 1988 01 26 | 809 | 0.5-  | 0.9+  | 1994 07 03   | 596 | (1.4- | 3.1-) | 1997 11 20   | 631 | 0.4- | 0.0  |
| 1988 01 26 | 809 | 0.2-  | 0.5+  | 1994 07 03   | 596 | 1.7-  | 1.8-  | 1997 12 04   | 355 | 0.7+ | 0.3- |
| 1988 01 26 | 809 | 0.1-  | 0.4+  | 1994 07 05   | 801 | 0.6+  | 0.7+  | 1997 12 04   | 355 | 0.6+ | 0.3- |
| 1988 01 26 | 220 | 0.5+  | 0.6-  | Y 1994 07 05 | 801 | 0.1-  | 0.2+  | 1997 12 04   | 355 | 0.6+ | 0.2- |
| 1988 01 26 | 220 | (7.7+ | 1.3+) | Y 1994 07 07 | 675 | (0.0  | 2.6-) | 1998 01 10   | 470 | 0.2+ | 0.9- |
| 1988 01 27 | 809 | 0.4+  | 0.2+  | 1994 07 07   | 675 | (2.4+ | 0.6+) | 1998 01 10   | 470 | 0.2- | 1.3+ |
| 1988 01 27 | 809 | 0.6+  | 0.2+  | 1994 07 08   | 675 | 0.4-  | 1.2-  | 1998 01 10   | 470 | 0.2- | 0.1- |
| 1988 01 27 | 809 | 0.4+  | 0.1+  | 1994 07 12   | 801 | 0.5+  | 0.2+  | 1998 02 17   | 470 | 0.2- | 0.2+ |
| 1988 01 28 | 809 | 0.4-  | 0.2-  | 1994 07 12   | 801 | 0.3+  | 0.1+  | 1998 02 17   | 470 | 0.0  | 0.0  |
| 1988 01 28 | 809 | 0.3-  | 0.3-  | 1994 07 30   | 816 | 0.0   | 0.3+  | 1998 02 18   | 470 | 0.1+ | 0.8+ |
| 1988 01 28 | 809 | 0.3-  | 0.4-  | 1994 07 30   | 816 | 0.6+  | 0.4+  | 1998 02 18   | 470 | 1.0+ | 0.4+ |
| 1988 01 29 | 809 | 0.3-  | 0.0   | 1994 08 07   | 816 | 0.3-  | 0.3+  |              |     |      |      |

**(8349)\* 1988 DH<sub>1</sub> = 1951 CL = 1992 NG**

Discovered 1988 Feb. 19 by Y. Oshima at the Gekko Observatory.

Id. T. Kobayashi (*MPC* 25328)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 292.59924  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.29353653 | $\omega$ | 50.66181  | -0.92376964   | +0.37901632 |
| <i>a</i> | 2.2423046  | $\Omega$ | 151.48742 | -0.37707451   | -0.87531956 |
| <i>e</i> | 0.1122628  | <i>i</i> | 6.58464   | -0.06681671   | -0.30027036 |
| <i>P</i> | 3.36       | <i>H</i> | 14.1      | <i>G</i> 0.15 | <i>U</i> 2  |

Residuals in seconds of arc

|            |     |       |       |            |     |        |        |            |     |      |      |
|------------|-----|-------|-------|------------|-----|--------|--------|------------|-----|------|------|
| 1951 02 10 | 760 | 0.5-  | 0.7+  | 1988 03 22 | 888 | 1.2+   | 0.3-   | 1998 02 17 | 886 | 0.6+ | 0.1- |
| 1951 02 10 | 760 | 0.7+  | 1.2+  | 1992 07 02 | 675 | (12.6+ | 11.8+) | 1998 02 17 | 886 | 0.1+ | 0.3+ |
| 1988 02 19 | 888 | 0.4+  | 1.8+  | 1992 07 02 | 675 | (19.0+ | 13.5+) | 1998 02 24 | 566 | 0.3- | 0.5+ |
| 1988 02 19 | 888 | 0.2+  | 0.9+  | 1992 07 05 | 675 | (4.8-  | 1.1-)  | 1998 02 24 | 566 | 0.1+ | 0.5+ |
| 1988 03 07 | 888 | (1.6+ | 4.4-) | 1992 07 05 | 675 | 0.1+   | 0.3+   | 1998 02 24 | 566 | 0.3- | 0.6+ |
| 1988 03 07 | 888 | 1.6+  | 1.5-  | 1995 04 03 | 411 | 0.8-   | 0.3+   | 1998 02 26 | 610 | 1.0- | 1.0+ |
| 1988 03 09 | 888 | 1.2-  | 0.8-  | 1995 04 03 | 411 | 0.7+   | 0.3+   | 1998 02 26 | 610 | 0.6- | 0.8+ |
| 1988 03 09 | 888 | 0.5-  | 1.3-  | 1998 01 05 | 888 | 0.7+   | 1.6-   | 1998 02 26 | 610 | 0.1- | 0.5+ |
| 1988 03 10 | 888 | 0.8-  | 1.2-  | 1998 01 05 | 888 | 0.6-   | 1.6-   | 1998 03 06 | 888 | 0.3+ | 0.4+ |
| 1988 03 10 | 888 | 1.4-  | 0.3-  | 1998 01 20 | 886 | 1.7+   | 0.5+   | 1998 03 06 | 888 | 0.1+ | 0.4+ |
| 1988 03 12 | 888 | 0.3-  | 0.2-  | 1998 01 20 | 886 | 0.2-   | 0.1+   | 1998 03 06 | 888 | 0.2+ | 0.4+ |
| 1988 03 12 | 888 | 0.7+  | 0.8-  | 1998 01 25 | 886 | 0.3-   | 0.6-   |            |     |      |      |
| 1988 03 22 | 888 | 0.9+  | 1.0-  | 1998 01 25 | 886 | 0.7-   | 0.1-   |            |     |      |      |

**(8350)\* 1989 AG = 1979 XN<sub>1</sub>**

Discovered 1989 Jan. 2 by T. Hioki and N. Kawasato at Okutama.

Id. T.

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Nakano

| <i>M</i> | 4.71857    | (2000.0)          | <i>P</i>      | <i>Q</i>    |
|----------|------------|-------------------|---------------|-------------|
| <i>n</i> | 0.22630530 | $\omega$ 37.56732 | -0.66263109   | -0.71557389 |
| <i>a</i> | 2.6668970  | $\Omega$ 95.10296 | +0.62200580   | -0.69021680 |
| <i>e</i> | 0.1405978  | <i>i</i> 12.82385 | +0.41716763   | -0.10749314 |
| <i>P</i> | 4.36       | <i>H</i> 12.7     | <i>G</i> 0.15 | <i>U</i> 1  |

Residuals in seconds of arc

|            |     |             |            |     |             |            |     |           |
|------------|-----|-------------|------------|-----|-------------|------------|-----|-----------|
| 1979 12 14 | 095 | (0.8+ 9.0-) | 1989 02 01 | 033 | 0.8- 0.6-   | 1994 04 05 | 376 | 0.5+ 1.0+ |
| 1979 12 18 | 095 | 0.6- 2.1+   | 1989 02 01 | 033 | 0.7- 0.4-   | 1994 04 05 | 376 | 0.8+ 0.2+ |
| 1989 01 02 | 877 | 0.7- 1.8+ Y | 1989 02 02 | 033 | 0.9- 0.3-   | 1994 04 11 | 801 | 0.2- 0.0  |
| 1989 01 02 | 877 | 0.4+ 1.4+ Y | 1989 02 02 | 033 | 0.6- 0.3-   | 1994 04 12 | 801 | 0.5- 0.2+ |
| 1989 01 03 | 877 | (2.3+ 2.6+) | 1991 08 06 | 675 | 0.1- 1.0+   | 1994 04 12 | 801 | 0.1- 0.3+ |
| 1989 01 03 | 877 | 1.9+ 1.9+   | 1991 08 06 | 675 | 0.7- 1.4+   | 1996 10 05 | 376 | 0.4- 0.3+ |
| 1989 01 04 | 400 | 0.2+ 0.9-   | 1992 11 21 | 376 | 1.5+ 0.7+   | 1996 10 05 | 376 | 0.3- 0.0  |
| 1989 01 04 | 400 | 0.7+ 0.5-   | 1992 11 22 | 376 | 0.1- 0.0    | 1996 10 21 | 376 | 0.4- 0.3+ |
| 1989 01 04 | 400 | 1.0+ 0.2+   | 1994 03 12 | 801 | 0.1- 0.1+   | 1996 10 21 | 376 | 0.5- 0.3+ |
| 1989 01 04 | 877 | 1.7- 0.3-   | 1994 03 16 | 801 | 0.0 0.6+    | 1996 10 21 | 376 | 0.4- 0.6+ |
| 1989 01 04 | 877 | 0.8+ 1.5+   | 1994 03 16 | 801 | 0.1- 0.4-   | 1998 01 24 | 566 | 0.1+ 0.0  |
| 1989 01 06 | 400 | (2.5+ 1.1+) | 1994 03 22 | 596 | (3.9- 0.7+) | 1998 01 24 | 566 | 0.2+ 0.0  |
| 1989 01 06 | 400 | 1.4+ 1.8-   | 1994 03 22 | 596 | (2.3- 2.8-) | 1998 01 24 | 566 | 0.2+ 0.0  |
| 1989 01 06 | 400 | 1.0+ 0.5-   | 1994 03 23 | 596 | 1.9+ 1.1+   | 1998 03 03 | 758 | 0.5+ 0.1- |
| 1989 01 12 | 372 | 0.9- 0.1-   | 1994 04 02 | 376 | 0.2+ 0.4-   | 1998 03 03 | 758 | 0.1- 0.8- |
| 1989 01 12 | 372 | 0.7- 0.3+   | 1994 04 02 | 376 | 0.4+ 1.0+   | 1998 03 05 | 758 | 0.4- 0.0  |
| 1989 01 15 | 372 | 0.9+ 0.7-   | 1994 04 02 | 376 | 0.7+ 0.3+   | 1998 03 05 | 758 | 0.4- 0.2+ |
| 1989 01 15 | 372 | 1.9- 0.6-   | 1994 04 05 | 376 | 0.8- 0.9+   |            |     |           |

(8351)\* 1989 EH<sub>1</sub> = 1980 FW<sub>10</sub> = 1991 RK<sub>33</sub> = 1991 RZ<sub>40</sub> = 4861 T-1

Discovered 1989 Mar. 10 by K. Suzuki and T. Furuta at Toyota.

Id. T. Kobayashi (*MPC* 22227), S. Nakano (*ibid.*), G. V. Williams (d, *MPC* 21832)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 349.20960  | (2000.0)           | <i>P</i>      | <i>Q</i>    |
|----------|------------|--------------------|---------------|-------------|
| <i>n</i> | 0.21676919 | $\omega$ 345.46459 | -0.88507269   | -0.46514357 |
| <i>a</i> | 2.7445491  | $\Omega$ 166.77643 | +0.43410685   | -0.83806803 |
| <i>e</i> | 0.0695019  | <i>i</i> 4.25305   | +0.16792135   | -0.28510251 |
| <i>P</i> | 4.55       | <i>H</i> 13.2      | <i>G</i> 0.15 | <i>U</i> 1  |

Residuals in seconds of arc

|            |     |             |            |     |              |            |     |           |
|------------|-----|-------------|------------|-----|--------------|------------|-----|-----------|
| 1971 04 16 | 675 | 0.8- 0.6+   | 1989 03 11 | 881 | (3.2+ 1.4+)Y | 1998 02 06 | 809 | 1.1+ 1.2+ |
| 1971 04 16 | 675 | 0.7+ 0.2+   | 1989 03 11 | 881 | 0.1+ 0.1+    | 1998 02 06 | 809 | 0.7+ 0.8+ |
| 1971 05 13 | 675 | 1.3- 0.1-   | 1989 03 15 | 881 | 1.6+ 0.4- Y  | 1998 02 06 | 809 | 0.2- 1.0+ |
| 1971 05 14 | 675 | 0.7- 0.8-   | 1989 03 15 | 881 | (2.5- 0.1-)  | 1998 02 07 | 809 | 0.3- 0.3+ |
| 1971 05 16 | 675 | 0.0 1.0-    | 1989 03 29 | 881 | (3.0+ 0.6+)  | 1998 02 07 | 809 | 1.5- 0.4- |
| 1980 03 16 | 095 | (1.7+ 2.7-) | 1989 03 29 | 881 | 1.1+ 0.6+    | 1998 02 07 | 809 | 1.7- 0.2- |
| 1985 05 24 | 675 | 1.4+ 0.7+   | 1991 09 10 | 033 | 0.2- 0.5+    | 1998 02 24 | 566 | 0.1- 0.3- |
| 1985 05 24 | 675 | 0.3- 1.1+   | 1991 09 10 | 033 | 0.2+ 0.2+    | 1998 02 24 | 566 | 0.0 0.2-  |
| 1987 11 23 | 675 | 0.8+ 0.4+   | 1991 09 10 | 675 | 1.6+ 0.2-    | 1998 02 24 | 566 | 0.2- 0.1- |
| 1987 11 26 | 675 | 0.2+ 0.4+   | 1991 09 10 | 675 | 0.8- 0.8-    | 1998 03 08 | 327 | 0.0 0.1-  |
| 1987 11 26 | 675 | 0.4- 0.2-   | 1991 09 13 | 033 | 0.4- 0.4+    | 1998 03 08 | 327 | 0.1- 0.0  |
| 1989 03 10 | 881 | 1.1+ 0.8-   | 1991 09 17 | 675 | 0.4- 0.3+    | 1998 03 08 | 327 | 0.0 0.2-  |
| 1989 03 10 | 881 | 0.6- 0.4+   | 1991 09 17 | 675 | 1.1- 0.8+    | 1998 03 08 | 327 | 0.1+ 0.2- |

(8352)\* 1989 GE = 1996 JT<sub>1</sub>

Discovered 1989 Apr. 6 by S. Ueda and H. Kaneda at Kushiro.

Id. S. Nakano (*MPC* 27306)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Nakano

| <i>M</i> | 153.75954  | (2000.0)           | <i>P</i>      | <i>Q</i>    |
|----------|------------|--------------------|---------------|-------------|
| <i>n</i> | 0.28853996 | $\omega$ 205.49271 | -0.20296347   | +0.97302207 |
| <i>a</i> | 2.2681168  | $\Omega$ 52.98759  | -0.87322668   | -0.12917223 |
| <i>e</i> | 0.1881001  | <i>i</i> 7.89630   | -0.44303612   | -0.19116116 |
| <i>P</i> | 3.42       | <i>H</i> 13.5      | <i>G</i> 0.15 | <i>U</i> 2  |

Residuals in seconds of arc

|            |     |             |            |     |             |            |     |             |
|------------|-----|-------------|------------|-----|-------------|------------|-----|-------------|
| 1989 03 30 | 675 | 0.4- 1.4+   | 1989 04 28 | 399 | (2.7+ 1.1+) | 1997 10 30 | 566 | 0.8+ 0.6-   |
| 1989 03 30 | 675 | 0.6- 0.5+   | 1989 05 05 | 399 | 0.3+ 0.7+   | 1997 10 30 | 566 | 0.7+ 0.7-   |
| 1989 04 04 | 399 | 1.9- 1.6+   | 1989 05 05 | 399 | 1.0- 0.1+   | 1997 10 30 | 566 | 0.6+ 0.7-   |
| 1989 04 06 | 399 | 1.5+ 0.5-   | 1989 05 05 | 399 | 0.2+ 0.3+   | 1997 11 30 | 566 | 0.2- 1.8-   |
| 1989 04 06 | 399 | 0.4- 0.6-   | 1989 05 05 | 399 | 1.7- 0.8-   | 1997 11 30 | 566 | 0.2- 1.4-   |
| 1989 04 06 | 399 | 0.2+ 0.7-   | 1993 08 14 | 675 | 0.2- 0.2+   | 1997 11 30 | 566 | 0.3- 1.7-   |
| 1989 04 09 | 399 | 1.8+ 0.1-   | 1993 08 14 | 675 | 0.5- 0.9+   | 1997 12 04 | 704 | (1.9- 2.9+) |
| 1989 04 09 | 399 | 0.6+ 0.4-   | 1996 05 11 | 399 | 0.1- 0.4-   | 1997 12 04 | 704 | 1.3+ 0.8+   |
| 1989 04 09 | 399 | (4.2+ 0.2-) | 1996 05 11 | 399 | 1.2+ 0.1+   | 1997 12 04 | 704 | 0.8- 1.8+   |
| 1989 04 28 | 399 | 0.2- 0.1-   | 1996 05 15 | 399 | 1.6- 1.0-   | 1997 12 04 | 704 | (2.4+ 2.6+) |
| 1989 04 28 | 399 | 2.1+ 0.2-   | 1996 05 15 | 399 | 0.6- 1.8-   | 1997 12 04 | 704 | 0.5- 0.9+   |

(8353)\* 1989 GC<sub>4</sub> = 1976 US<sub>19</sub> = 1981 UX<sub>29</sub> = 1991 TH<sub>12</sub>

Discovered 1989 Apr. 3 by E. W. Elst at the European Southern Observatory.

Id. E. Bowell (*MPC* 20635), G. V. Williams (*ibid.*)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 221.04062  | (2000.0)           | <i>P</i>      | <i>Q</i>    |
|----------|------------|--------------------|---------------|-------------|
| <i>n</i> | 0.19531924 | $\omega$ 322.85232 | -0.54684016   | +0.83702396 |
| <i>a</i> | 2.9419777  | $\Omega$ 273.98979 | -0.76353052   | -0.50782712 |
| <i>e</i> | 0.0691094  | <i>i</i> 1.08484   | -0.34349233   | -0.20372162 |
| <i>P</i> | 5.05       | <i>H</i> 13.3      | <i>G</i> 0.15 | <i>U</i> 1  |

Residuals in seconds of arc

|            |     |           |            |     |             |            |     |             |
|------------|-----|-----------|------------|-----|-------------|------------|-----|-------------|
| 1951 11 28 | 675 | 1.9- 0.2+ | 1989 04 07 | 809 | 0.4- 0.1-   | 1996 10 30 | 104 | 1.2+ 1.0+   |
| 1951 11 28 | 675 | 1.2+ 0.9+ | 1989 04 08 | 809 | 0.2+ 1.2+   | 1996 10 30 | 104 | 0.8+ 0.5+   |
| 1976 10 24 | 381 | 1.3+ 0.1- | 1989 04 08 | 809 | 0.6+ 0.2-   | 1996 10 30 | 104 | 0.6+ 0.1-   |
| 1976 10 24 | 381 | 0.6- 0.5+ | 1989 04 08 | 809 | 0.2+ 0.4-   | 1998 01 02 | 704 | 0.0 0.2+    |
| 1981 10 25 | 675 | 0.8+ 0.1+ | 1989 04 12 | 809 | 0.8+ 1.5-   | 1998 01 02 | 704 | 0.1- 0.4-   |
| 1981 10 26 | 675 | 0.3- 0.2- | 1989 04 12 | 809 | 0.7+ 0.5+   | 1998 01 02 | 704 | 0.2+ 0.6-   |
| 1989 04 03 | 809 | 0.2+ 0.2- | 1991 10 13 | 691 | 1.4- 0.1+   | 1998 01 02 | 704 | 0.1+ 0.6-   |
| 1989 04 03 | 809 | 0.3+ 0.5- | 1991 10 13 | 691 | 1.0- 0.0    | 1998 01 02 | 704 | 0.9+ 0.4-   |
| 1989 04 03 | 809 | 0.5+ 0.6- | 1991 10 13 | 691 | 1.4- 0.1-   | 1998 01 06 | 704 | 0.3- 0.1+   |
| 1989 04 05 | 809 | 0.7- 0.2+ | 1994 03 14 | 675 | (2.5+ 0.2+) | 1998 01 06 | 704 | 0.3- 0.5+   |
| 1989 04 05 | 809 | 1.0- 0.5+ | 1994 03 14 | 675 | (3.0+ 0.9+) | 1998 01 06 | 704 | (2.5- 0.5+) |
| 1989 04 06 | 809 | 0.1+ 0.4- | 1994 04 03 | 675 | 0.6- 0.7+   | 1998 01 26 | 704 | 0.4+ 0.4-   |
| 1989 04 06 | 809 | 0.5- 0.4+ | 1994 04 04 | 675 | 0.7+ 1.1+   | 1998 01 26 | 704 | 0.2+ 0.1-   |
| 1989 04 06 | 809 | 0.2+ 0.0  | 1994 04 04 | 675 | 0.8- 1.5+   | 1998 01 26 | 704 | 0.0 0.1+    |
| 1989 04 07 | 809 | 0.0 0.6-  | 1996 10 04 | 098 | 0.1- 0.8-   | 1998 01 26 | 704 | 0.6- 0.9+   |
| 1989 04 07 | 809 | 0.0 0.1-  | 1996 10 04 | 098 | (2.6- 3.2-) | 1998 01 26 | 704 | 0.0 0.4-    |

(8354)\* 1989 RF = 1978 RC<sub>5</sub> = 1978 TP<sub>3</sub> = 1983 PP<sub>2</sub> = 1992 CS<sub>7</sub>

Discovered 1989 Sept. 1 by E. W. Elst at Haute Provence.

Id. T. Kobayashi (*MPC* 25638)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 178.49462  | (2000.0)           | <i>P</i>      | <i>Q</i>    |
|----------|------------|--------------------|---------------|-------------|
| <i>n</i> | 0.17292662 | $\omega$ 103.73354 | +0.69122888   | +0.72165510 |
| <i>a</i> | 3.1907650  | $\Omega$ 210.10294 | -0.68861976   | +0.64200564 |
| <i>e</i> | 0.1534914  | <i>i</i> 4.30357   | -0.21910151   | +0.25892599 |
| <i>P</i> | 5.70       | <i>H</i> 12.6      | <i>G</i> 0.15 | <i>U</i> 2  |

Residuals in seconds of arc

|            |     |           |            |     |             |            |     |           |
|------------|-----|-----------|------------|-----|-------------|------------|-----|-----------|
| 1978 09 06 | 095 | 0.6- 0.4- | 1989 09 07 | 511 | (0.2+ 2.6-) | 1998 01 28 | 566 | 0.1- 0.8- |
| 1978 10 04 | 095 | 0.7+ 1.3+ | 1989 09 07 | 511 | (1.1+ 2.5-) | 1998 01 28 | 566 | 0.5- 0.9- |
| 1983 08 04 | 808 | 0.4+ 0.3+ | 1992 02 12 | 809 | 1.6- 0.7-   | 1998 02 17 | 012 | 0.1+ 0.5+ |
| 1983 08 04 | 808 | 0.4+ 0.9+ | 1992 02 12 | 809 | (2.7- 0.8-) | 1998 02 17 | 012 | 0.1+ 1.0+ |
| 1989 09 01 | 511 | 1.0- 0.4+ | 1992 02 12 | 809 | (4.2- 0.7-) | 1998 02 17 | 012 | 0.1+ 1.1+ |
| 1989 09 01 | 511 | 2.1- 0.9- | 1995 08 31 | 411 | 0.5+ 0.0    | 1998 02 19 | 012 | 0.7+ 0.0  |
| 1989 09 03 | 511 | 0.6+ 0.1- | 1995 08 31 | 411 | 1.0+ 0.8+   | 1998 02 19 | 012 | 0.3+ 1.0+ |
| 1989 09 03 | 511 | 0.2+ 0.7- | 1998 01 28 | 566 | 0.6- 0.8-   | 1998 02 19 | 012 | 1.6+ 0.8+ |

(8355)\* 1989 RQ<sub>1</sub> = 1971 OP = 1996 OA<sub>1</sub>

Discovered 1989 Sept. 5 by E. F. Helin at Palomar.

Id. S. Nakano (*MPC* 27555)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Nakano

| <i>M</i> | 115.79994  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.27599899 | $\omega$ | 195.87174 | +0.98445311   | +0.16577542 |
| <i>a</i> | 2.3363132  | $\Omega$ | 154.36721 | -0.14299657   | +0.94835038 |
| <i>e</i> | 0.2891842  | <i>i</i> | 7.71258   | -0.10200032   | +0.27046270 |
| <i>P</i> | 3.57       | <i>H</i> | 13.7      | <i>G</i> 0.15 | <i>U</i> 1  |

Residuals in seconds of arc

|            |     |      |      |            |     |       |       |            |     |      |      |
|------------|-----|------|------|------------|-----|-------|-------|------------|-----|------|------|
| 1971 07 26 | 095 | 0.2- | 1.3+ | 1989 10 05 | 675 | 0.6+  | 0.5+  | 1997 12 29 | 688 | 0.3+ | 0.2+ |
| 1989 09 02 | 675 | 0.6+ | 0.3+ | 1989 10 05 | 675 | 0.2-  | 0.3+  | 1997 12 29 | 688 | 0.1+ | 0.3+ |
| 1989 09 02 | 675 | 0.9+ | 0.3+ | 1996 07 18 | 894 | 0.2-  | 0.3-  | 1998 02 20 | 557 | 0.3+ | 0.7+ |
| 1989 09 05 | 675 | 0.4+ | 0.5+ | 1996 07 18 | 894 | 0.3-  | 1.2+  | 1998 02 20 | 557 | 0.2+ | 0.6+ |
| 1989 09 05 | 675 | 0.8- | 1.3+ | 1996 07 21 | 894 | 0.2+  | 0.4+  | 1998 02 20 | 557 | 0.1- | 0.5+ |
| 1989 09 07 | 675 | 0.2+ | 0.9- | 1996 07 21 | 894 | 0.1+  | 0.1+  | 1998 02 21 | 557 | 0.2+ | 0.9+ |
| 1989 09 07 | 675 | 0.2- | 1.2- | 1996 11 11 | 689 | (9.0- | 1.4-) | 1998 02 23 | 557 | 0.6+ | 0.2+ |
| 1989 10 02 | 675 | 0.3- | 0.2- | 1997 12 27 | 688 | 0.0   | 0.6+  | 1998 02 23 | 557 | 0.3- | 0.6+ |
| 1989 10 02 | 675 | 1.5- | 0.1+ | 1997 12 27 | 688 | 0.1-  | 0.5+  |            |     |      |      |

**(8356)\* 1989 RO<sub>2</sub>**

Discovered 1989 Sept. 3 by C. S. Shoemaker at Palomar.

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 47.57733   |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.26008557 | $\omega$ | 45.12168  | +0.76173293   | -0.64691137 |
| <i>a</i> | 2.4306656  | $\Omega$ | 354.80181 | +0.42586627   | +0.54136875 |
| <i>e</i> | 0.2950000  | <i>i</i> | 23.14924  | +0.48826312   | +0.53705265 |
| <i>P</i> | 3.79       | <i>H</i> | 12.8      | <i>G</i> 0.15 | <i>U</i> 2  |

Residuals in seconds of arc

|            |     |       |       |            |     |       |       |            |     |      |      |
|------------|-----|-------|-------|------------|-----|-------|-------|------------|-----|------|------|
| 1989 09 03 | 675 | 0.7-  | 0.5-  | 1991 05 07 | 413 | 0.5-  | 0.0   | 1994 01 07 | 675 | 0.1+ | 0.7- |
| 1989 09 03 | 675 | 0.4-  | 0.1+  | 1991 05 13 | 413 | (2.5- | 0.8+) | 1998 02 05 | 403 | 0.0  | 0.0  |
| 1989 09 27 | 675 | (3.8- | 0.6-) | 1991 05 13 | 413 | 1.7+  | 0.2+  | 1998 02 05 | 403 | 0.0  | 0.1+ |
| 1989 09 30 | 675 | 0.3-  | 0.0   | 1993 08 14 | 801 | 0.3-  | 0.3+  | 1998 02 05 | 403 | 0.1- | 0.5+ |
| 1989 10 01 | 675 | (1.8+ | 3.2-) | 1993 08 14 | 801 | 0.2-  | 0.2+  | 1998 02 18 | 127 | 0.3+ | 0.6+ |
| 1989 10 04 | 675 | 0.6+  | 1.8-  | 1993 12 10 | 675 | 0.2-  | 0.0   | 1998 02 18 | 127 | 0.3+ | 0.7+ |
| 1989 10 30 | 675 | 0.9+  | 0.4+  | 1993 12 10 | 675 | 0.3-  | 0.1+  | 1998 02 20 | 631 | 0.7+ | 0.8+ |
| 1989 11 01 | 675 | 0.2+  | 1.2+  | 1993 12 12 | 107 | 0.5+  | 0.4-  | 1998 02 20 | 631 | 0.3- | 0.1+ |
| 1991 03 12 | 675 | 1.3-  | 1.7-  | 1993 12 12 | 107 | (2.3+ | 3.3+) | 1998 02 28 | 127 | 0.1+ | 0.2- |
| 1991 03 12 | 675 | 0.4+  | 0.7-  | 1993 12 12 | 107 | 0.3+  | 0.1-  | 1998 02 28 | 127 | 0.2+ | 0.2- |
| 1991 04 14 | 675 | 1.0-  | 1.0-  | 1993 12 12 | 107 | 0.0   | 0.0   | 1998 03 01 | 631 | 0.4+ | 0.0  |
| 1991 04 19 | 675 | 0.6-  | 0.3-  | 1994 01 04 | 675 | 0.2-  | 0.9-  | 1998 03 01 | 631 | 0.6+ | 0.2+ |
| 1991 04 19 | 675 | 0.9-  | 0.9+  | 1994 01 07 | 675 | 0.2-  | 0.4-  |            |     |      |      |

**(8357)\* 1989 SC<sub>1</sub> = 1948 TM<sub>1</sub> = 1972 TM<sub>7</sub> = 1975 NP = 1982 QY<sub>2</sub> = 1988 HQ**

Discovered 1989 Sept. 25 at the Oak Ridge Observatory.

Id. C. M. Bardwell (*MPC* 15564)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Bardwell

| <i>M</i> | 160.59185  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.28741717 | $\omega$ | 52.66847  | +0.91642242   | +0.39933268 |
| <i>a</i> | 2.2740198  | $\Omega$ | 283.78133 | -0.37528376   | +0.83442887 |
| <i>e</i> | 0.1691761  | <i>i</i> | 1.56477   | -0.13903972   | +0.37981821 |
| <i>P</i> | 3.43       | <i>H</i> | 14.1      | <i>G</i> 0.15 | <i>U</i> 2  |

Residuals in seconds of arc

|            |     |        |       |            |     |      |      |            |     |      |      |
|------------|-----|--------|-------|------------|-----|------|------|------------|-----|------|------|
| 1948 10 10 | 012 | (2.9-  | 9.4-) | 1989 09 27 | 675 | 0.8+ | 0.2- | 1995 04 26 | 801 | 0.4+ | 0.1- |
| 1948 11 05 | 012 | (10.0+ | 4.6-) | 1989 09 30 | 809 | 0.1+ | 0.7- | 1995 05 02 | 801 | 0.7+ | 0.4- |
| 1950 04 17 | 675 | 0.6+   | 0.3-  | 1989 09 30 | 809 | 0.8+ | 0.6- | 1995 05 02 | 801 | 0.5+ | 0.6- |
| 1972 10 06 | 095 | (0.5+  | 8.0+) | 1989 09 30 | 809 | 1.6+ | 0.6- | 1998 01 28 | 566 | 0.6+ | 0.6- |
| 1975 07 11 | 095 | 1.2-   | 1.4+  | 1989 10 01 | 801 | 0.9+ | 0.4+ | 1998 01 28 | 566 | 0.9+ | 0.4- |
| 1982 08 17 | 095 | 0.3-   | 0.8+  | 1989 10 01 | 809 | 1.1- | 1.5- | 1998 01 28 | 566 | 0.3+ | 0.4- |
| 1984 01 25 | 675 | 0.5+   | 0.1-  | 1989 10 01 | 809 | 0.5- | 1.5- | 1998 02 06 | 809 | 0.4+ | 1.5+ |
| 1984 01 26 | 675 | 0.2+   | 0.3-  | 1989 10 01 | 809 | 0.0  | 1.6- | 1998 02 06 | 809 | 0.5+ | 1.0+ |
| 1988 04 20 | 413 | 0.6-   | 0.2+  | 1989 10 01 | 801 | 1.0+ | 1.2+ | 1998 02 06 | 809 | 0.6- | 0.5+ |
| 1988 04 20 | 413 | 0.1-   | 0.6-  | 1989 10 25 | 801 | 1.1- | 1.6+ | 1998 02 07 | 809 | 0.5- | 0.4+ |

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1989 09 02 | 675 | 0.5+ | 0.7+ | 1989 10 26 | 801 | 1.3- | 0.5+ | 1998 02 07 | 809 | 1.8- | 1.0+ |
| 1989 09 02 | 675 | 1.0+ | 0.9+ | 1989 10 27 | 801 | 2.3- | 0.9+ | 1998 02 07 | 809 | 1.6- | 1.1+ |
| 1989 09 04 | 675 | 0.6+ | 0.1- | 1989 11 01 | 675 | 1.6- | 1.3+ | 1998 02 24 | 566 | 0.0  | 0.2- |
| 1989 09 25 | 801 | 0.2- | 0.3- | 1989 11 01 | 675 | 0.4- | 1.3+ | 1998 02 24 | 566 | 0.3+ | 0.8- |
| 1989 09 27 | 675 | 1.0+ | 1.0- | 1995 04 26 | 801 | 0.5+ | 0.2- | 1998 02 24 | 566 | 0.1- | 0.0  |

**(8358)\* 1989 VN<sub>5</sub> = 1989 VL<sub>6</sub> = 1993 XU**

Discovered 1989 Nov. 4 by C. S. Shoemaker at Palomar.

Id. G. V. Williams (d, *MPC* 18600), K. Ichikawa (*MPC* 22953)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 38.71836   |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.26593441 | $\omega$ | 128.61926 | +0.20536928   | -0.97844423 |
| <i>a</i> | 2.3948943  | $\Omega$ | 309.51567 | +0.88896225   | +0.19576476 |
| <i>e</i> | 0.1805244  | <i>i</i> | 1.61096   | +0.40935262   | +0.06574993 |
| <i>P</i> | 3.71       | <i>H</i> | 14.6      | <i>G</i> 0.15 | <i>U</i> 2  |

Residuals in seconds of arc

|            |     |       |       |            |     |       |       |            |     |       |       |
|------------|-----|-------|-------|------------|-----|-------|-------|------------|-----|-------|-------|
| 1989 11 02 | 877 | 0.9+  | 0.6+  | 1993 12 14 | 411 | 0.6+  | 0.5+  | 1998 02 06 | 809 | (2.8+ | 1.4-) |
| 1989 11 02 | 877 | 0.1+  | 0.6-  | 1993 12 14 | 411 | 0.6+  | 0.3+  | 1998 02 06 | 809 | (3.4+ | 1.3-) |
| 1989 11 03 | 675 | 0.9-  | 1.6-  | 1993 12 23 | 411 | 0.3+  | 0.3-  | 1998 02 07 | 809 | (2.5+ | 1.8-) |
| 1989 11 03 | 675 | 0.7+  | 2.2-  | 1993 12 23 | 411 | 0.2+  | 0.0   | 1998 02 07 | 809 | 1.4+  | 1.3-  |
| 1989 11 04 | 675 | 0.1+  | 1.4-  | 1993 12 23 | 411 | 0.2+  | 0.5-  | 1998 02 07 | 809 | 1.9+  | 1.0-  |
| 1989 11 04 | 675 | (0.3+ | 3.3-) | 1996 07 21 | 809 | (3.2+ | 2.8+) | 1998 02 19 | 699 | 0.1-  | 0.3+  |
| 1993 08 18 | 691 | 1.4-  | 0.3-  | 1996 07 21 | 809 | (2.8+ | 3.0+) | 1998 02 19 | 699 | 0.9-  | 0.2-  |
| 1993 08 18 | 691 | 0.8-  | 0.2-  | 1996 07 21 | 809 | (2.7+ | 2.9+) | 1998 02 19 | 699 | 0.2-  | 0.2+  |
| 1993 08 18 | 691 | 1.5-  | 0.3-  | 1996 09 12 | 566 | 0.8+  | 0.5-  | 1998 02 21 | 557 | 0.3+  | 0.2+  |
| 1993 12 11 | 411 | (0.1- | 2.8+) | 1996 09 12 | 566 | 0.4+  | 0.4-  | 1998 02 21 | 557 | 0.3+  | 0.2+  |
| 1993 12 11 | 411 | 1.5+  | 1.6+  | 1996 09 12 | 566 | 0.3+  | 0.1+  | 1998 02 23 | 557 | 0.1+  | 0.7-  |
| 1993 12 12 | 411 | 0.4-  | 2.0+  | 1997 12 07 | 910 | 1.0-  | 0.2+  | 1998 02 23 | 557 | 0.2-  | 0.2-  |
| 1993 12 12 | 411 | 0.6+  | 0.0   | 1997 12 07 | 910 | 1.0-  | 0.1+  | 1998 02 23 | 557 | 0.0   | 0.2-  |
| 1993 12 12 | 411 | 0.6+  | 0.4-  | 1997 12 07 | 910 | 1.0-  | 0.1+  | 1998 02 27 | 557 | 0.2-  | 0.1-  |
| 1993 12 12 | 411 | 0.5+  | 0.3+  | 1998 01 26 | 566 | 1.8-  | 1.1-  | 1998 02 27 | 557 | 0.1-  | 0.1+  |
| 1993 12 12 | 411 | (0.7+ | 2.8+) | 1998 01 26 | 566 | 1.8-  | 1.5-  | 1998 02 27 | 566 | 0.2-  | 0.0   |
| 1993 12 12 | 411 | 0.9-  | 1.6+  | 1998 01 26 | 566 | 1.5-  | 1.0-  | 1998 02 27 | 566 | 0.2-  | 0.0   |
| 1993 12 14 | 411 | 0.7+  | 0.8+  | 1998 02 06 | 809 | (3.4+ | 0.3+) | 1998 02 27 | 566 | 0.1+  | 0.0   |

**(8359)\* 1989 WD = 1991 HB**

Discovered 1989 Nov. 19 by S. Ueda and H. Kaneda at Kushiro.

Id. S. Nakano (*MPC* 18294)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Nakano

| <i>M</i> | 325.09413  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.27356001 | $\omega$ | 126.60142 | -0.97833099   | +0.16962199 |
| <i>a</i> | 2.3501792  | $\Omega$ | 63.43891  | -0.20525819   | -0.86978426 |
| <i>e</i> | 0.0664573  | <i>i</i> | 7.62794   | +0.02715785   | -0.46336133 |
| <i>P</i> | 3.60       | <i>H</i> | 12.4      | <i>G</i> 0.15 | <i>U</i> 2  |

Residuals in seconds of arc

|            |     |       |       |            |     |       |       |              |     |       |       |
|------------|-----|-------|-------|------------|-----|-------|-------|--------------|-----|-------|-------|
| 1989 10 26 | 033 | 0.0   | 0.9+  | 1991 04 16 | 376 | 1.2+  | 0.8-  | 1994 02 01   | 657 | 0.3-  | 1.0-  |
| 1989 10 26 | 033 | 0.8+  | 0.4+  | 1991 04 16 | 399 | 0.1-  | 0.6+  | 1994 02 01   | 657 | 0.1+  | 1.0-  |
| 1989 10 28 | 033 | 0.5-  | 0.5-  | 1991 04 16 | 399 | 1.2-  | 0.5-  | 1994 02 01   | 657 | 0.2-  | 1.0-  |
| 1989 11 19 | 399 | (2.6- | 0.5-) | 1991 05 04 | 399 | 0.1+  | 1.1-  | 1996 11 03   | 399 | 1.1-  | 0.8+  |
| 1989 11 19 | 399 | 1.3-  | 1.3-  | 1991 05 04 | 399 | 0.6+  | 0.2-  | 1996 11 03   | 399 | 0.3-  | 0.3+  |
| 1989 11 21 | 399 | 0.4+  | 0.8-  | 1991 05 05 | 399 | 0.8-  | 1.7-  | 1996 11 06   | 399 | 0.2+  | 1.7+  |
| 1989 11 21 | 399 | 0.7-  | 0.3+  | 1991 05 05 | 399 | 1.5-  | 0.4-  | 1996 11 06   | 399 | 0.6+  | 0.2+  |
| 1989 12 01 | 399 | (0.7+ | 3.1-) | 1991 05 14 | 376 | (0.8+ | 3.1-) | Y 1996 11 15 | 801 | 1.5+  | 0.9-  |
| 1989 12 01 | 399 | (2.4- | 0.4+) | 1991 05 14 | 376 | 0.1+  | 1.9-  | y 1996 11 15 | 801 | (3.1+ | 1.2-) |
| 1989 12 01 | 399 | 0.7+  | 0.1-  | 1993 11 11 | 801 | 0.1-  | 0.2+  | 1996 11 15   | 399 | 1.6-  | 0.2-  |
| 1989 12 06 | 399 | (2.6+ | 1.8-) | 1993 11 11 | 801 | 0.0   | 0.1+  | 1996 11 15   | 399 | 0.2-  | 1.3-  |
| 1989 12 06 | 399 | 2.0+  | 0.8-  | 1993 11 16 | 801 | 0.2-  | 0.2+  | 1998 02 04   | 113 | 0.7+  | 0.8+  |
| 1989 12 18 | 399 | (0.3+ | 4.0-) | 1993 11 16 | 801 | 0.4-  | 0.2+  | 1998 02 05   | 113 | 0.6+  | 1.2+  |
| 1989 12 18 | 399 | (1.6+ | 2.7-) | 1994 01 07 | 596 | 0.8-  | 1.6-  | 1998 03 03   | 758 | 0.8+  | 0.6+  |
| 1989 12 18 | 399 | 1.2+  | 1.2-  | 1994 01 07 | 596 | 0.2-  | 0.4-  | 1998 03 03   | 758 | 1.0+  | 0.5+  |
| 1991 04 14 | 399 | 0.5-  | 0.1+  | 1994 01 07 | 596 | 0.9-  | 1.7+  | 1998 03 05   | 758 | 0.6+  | 1.3+  |
| 1991 04 14 | 399 | 0.5+  | 0.1+  | 1994 01 22 | 107 | 1.8+  | 0.6+  | 1998 03 05   | 758 | 0.3+  | 0.8+  |

1991 04 14 399 0.5− 0.4− 1994 01 22 107 1.0+ 0.0  
 1991 04 16 376 1.2− 0.7+ 1994 01 31 107 1.1− 0.3−

**(8360)\* 1990 FD<sub>1</sub> = 1973 GJ<sub>1</sub> = 1986 JP = 1991 NQ<sub>2</sub>**

Discovered 1990 Mar. 26 by A. Sugie at the Dynic Astronomical Observatory.  
 Id. H. E. Holt (*MPC* 18820), G. V. Williams (*ibid.*)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            | Williams           |               |             |  |
|----------|------------|--------------------|---------------|-------------|--|
| <i>M</i> | 289.14888  | (2000.0)           | <b>P</b>      | <b>Q</b>    |  |
| <i>n</i> | 0.22892102 | $\omega$ 76.17593  | −0.97142486   | +0.02588077 |  |
| <i>a</i> | 2.6465429  | $\Omega$ 104.90664 | −0.10470231   | −0.93881689 |  |
| <i>e</i> | 0.1168012  | <i>i</i> 14.13152  | +0.21300507   | −0.34344290 |  |
| <i>P</i> | 4.31       | <i>H</i> 12.4      | <i>G</i> 0.15 | <i>U</i> 1  |  |

Residuals in seconds of arc

|            |     |              |            |     |           |            |     |           |
|------------|-----|--------------|------------|-----|-----------|------------|-----|-----------|
| 1954 12 22 | 675 | (1.1− 2.7+)  | 1993 12 17 | 801 | 0.5+ 0.1− | 1998 01 08 | 704 | 1.1− 0.8− |
| 1954 12 22 | 675 | 0.2+ 0.1+    | 1993 12 17 | 801 | 0.5+ 0.2− | 1998 01 08 | 704 | 0.5+ 0.5− |
| 1973 04 03 | 095 | (3.7− 5.3+)  | 1994 01 11 | 596 | 1.0+ 0.2− | 1998 01 17 | 610 | 0.1− 0.4+ |
| 1986 05 13 | 054 | (10.1− 0.5−) | 1994 01 11 | 596 | 0.1− 0.2− | 1998 01 17 | 610 | 0.0 0.3+  |
| 1990 03 26 | 402 | 0.4− 0.2+    | 1994 01 11 | 596 | 0.8+ 0.1+ | 1998 01 17 | 610 | 0.1+ 0.2+ |
| 1990 03 26 | 402 | 0.2+ 0.0     | 1994 01 11 | 596 | 0.1− 0.0  | 1998 01 20 | 610 | 0.5+ 0.4− |
| 1990 04 02 | 402 | 1.0− 0.2−    | 1994 02 16 | 107 | 0.2+ 0.5+ | 1998 01 20 | 610 | 0.4− 0.3+ |
| 1990 04 02 | 402 | 0.6− 0.9+    | 1994 02 16 | 107 | 0.6+ 0.1− | 1998 01 20 | 610 | 1.0− 0.7+ |
| 1990 04 24 | 402 | 0.9− 0.6−    | 1995 05 23 | 402 | 0.2− 0.8+ | 1998 01 26 | 704 | 0.0 0.2+  |
| 1990 04 24 | 402 | 0.2− 0.1−    | 1995 05 23 | 402 | 0.9+ 0.6+ | 1998 01 26 | 704 | 0.5+ 0.1+ |
| 1991 07 14 | 675 | 1.0+ 0.4−    | 1995 05 27 | 402 | 0.3+ 0.0  | 1998 01 26 | 704 | 0.4− 0.5+ |
| 1991 07 14 | 675 | 0.6+ 0.3+    | 1995 05 27 | 402 | 0.6− 0.1− | 1998 01 26 | 704 | 0.0 0.5+  |
| 1992 12 22 | 801 | (1.3− 2.7−)  | 1998 01 08 | 704 | 0.1− 0.5− | 1998 01 26 | 704 | 0.3− 0.5+ |
| 1992 12 22 | 801 | (1.1− 2.4−)  | 1998 01 08 | 704 | 0.4+ 0.7− | 1998 01 31 | 631 | 0.1− 0.3+ |
| 1992 12 27 | 801 | 1.1− 0.7−    | 1998 01 08 | 704 | 0.3+ 0.5− | 1998 01 31 | 631 | 0.4− 1.0+ |
| 1992 12 27 | 801 | 1.2− 0.4−    | 1998 01 08 | 704 | 1.0+ 0.9− |            |     |           |

**(8361)\* 1990 JN<sub>1</sub> = 1972 TN<sub>3</sub> = 1991 RD<sub>9</sub>**

Discovered 1990 May 1 by A. Żytkow and M. J. Irwin at Siding Spring.  
 Id. A. Lowe (*MPC* 22592), G. V. Williams (*ibid.*)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            | Williams           |               |             |  |
|----------|------------|--------------------|---------------|-------------|--|
| <i>M</i> | 209.45768  | (2000.0)           | <b>P</b>      | <b>Q</b>    |  |
| <i>n</i> | 0.20699249 | $\omega$ 29.11669  | −0.02769725   | +0.99944936 |  |
| <i>a</i> | 2.8303033  | $\Omega$ 239.30158 | −0.92119383   | −0.03261688 |  |
| <i>e</i> | 0.0169723  | <i>i</i> 1.21756   | −0.38811698   | +0.00609215 |  |
| <i>P</i> | 4.76       | <i>H</i> 12.9      | <i>G</i> 0.15 | <i>U</i> 1  |  |

Residuals in seconds of arc

|            |     |             |            |     |           |            |     |           |
|------------|-----|-------------|------------|-----|-----------|------------|-----|-----------|
| 1953 10 31 | 675 | 0.2+ 0.4−   | 1991 10 07 | 691 | 1.7− 0.3+ | 1997 12 29 | 566 | 0.0 0.1+  |
| 1953 10 31 | 675 | 0.0 0.2+    | 1991 10 07 | 691 | 1.7− 0.1+ | 1997 12 29 | 566 | 0.4+ 0.2+ |
| 1972 10 05 | 095 | (4.7+ 1.4+) | 1991 10 07 | 691 | 1.5− 0.3+ | 1997 12 29 | 566 | 0.2+ 0.5+ |
| 1990 05 01 | 413 | 0.3+ 0.4−   | 1996 10 05 | 816 | 0.3+ 0.6+ | 1998 02 20 | 725 | 0.0 0.1−  |
| 1990 05 02 | 413 | 0.1− 0.5−   | 1996 10 05 | 816 | 0.5+ 0.6+ | 1998 02 20 | 725 | 0.2− 0.0  |
| 1991 09 11 | 675 | 1.0+ 0.5−   | 1996 10 05 | 816 | 0.3+ 0.7+ | 1998 02 23 | 725 | 0.2+ 0.2− |
| 1991 09 11 | 675 | 1.0+ 1.3−   | 1997 10 08 | 691 | 1.3− 0.7− | 1998 02 23 | 725 | 0.8+ 0.4− |
| 1991 09 14 | 675 | 0.9+ 0.6−   | 1997 10 08 | 691 | 1.0− 0.8− |            |     |           |
| 1991 09 14 | 675 | 1.4+ 0.1−   | 1997 10 08 | 691 | 1.0− 0.8− |            |     |           |

**(8362)\* 1990 QM<sub>1</sub> = 1979 WU = 1996 TU<sub>10</sub>**

Discovered 1990 Aug. 22 by H. E. Holt at Palomar.  
 Id. G. V. Williams (*MPC* 28072)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            | Williams           |               |             |  |
|----------|------------|--------------------|---------------|-------------|--|
| <i>M</i> | 67.55992   | (2000.0)           | <b>P</b>      | <b>Q</b>    |  |
| <i>n</i> | 0.17400440 | $\omega$ 245.79406 | +0.83744264   | −0.54600578 |  |
| <i>a</i> | 3.1775757  | $\Omega$ 147.28464 | +0.51606031   | +0.77565950 |  |
| <i>e</i> | 0.1784206  | <i>i</i> 2.52631   | +0.17992104   | +0.31659128 |  |
| <i>P</i> | 5.66       | <i>H</i> 13.1      | <i>G</i> 0.15 | <i>U</i> 2  |  |

Residuals in seconds of arc

|            |     |             |            |     |             |            |     |           |
|------------|-----|-------------|------------|-----|-------------|------------|-----|-----------|
| 1979 11 16 | 095 | (4.2− 4.9−) | 1990 09 14 | 809 | 0.4− 0.4+   | 1994 05 14 | 691 | 0.4− 0.1− |
| 1990 08 16 | 809 | 1.0− 1.3+   | 1990 09 14 | 809 | 0.1+ 0.4+   | 1996 10 09 | 399 | 1.1+ 0.1− |
| 1990 08 16 | 809 | (2.3− 1.6+) | 1990 09 14 | 675 | 0.3− 1.7−   | 1996 10 09 | 399 | 0.1− 0.7− |
| 1990 08 16 | 809 | 1.6− 1.3+   | 1990 09 14 | 675 | 0.3− 1.6−   | 1996 10 10 | 399 | 1.0− 0.2+ |
| 1990 08 20 | 809 | 1.6− 1.4+   | 1990 09 15 | 809 | 0.5− 0.2−   | 1996 10 10 | 399 | 0.9− 0.4− |
| 1990 08 20 | 809 | (2.2− 1.2+) | 1990 09 15 | 809 | 0.0 0.1+    | 1997 01 06 | 327 | 0.6+ 0.9+ |
| 1990 08 20 | 809 | (2.3− 1.7+) | 1990 09 15 | 809 | 0.3+ 0.1−   | 1997 01 06 | 327 | 0.4+ 0.8+ |
| 1990 08 22 | 675 | 0.0 0.3+    | 1990 09 16 | 809 | 0.1− 0.3+   | 1997 01 06 | 327 | 0.4+ 0.6+ |
| 1990 08 22 | 675 | 0.3− 0.8−   | 1990 09 16 | 809 | 0.3+ 0.6+   | 1997 10 09 | 691 | 1.0− 0.0  |
| 1990 08 23 | 675 | 0.7− 0.9−   | 1990 09 16 | 809 | 0.4+ 0.2+   | 1997 10 09 | 691 | 0.9− 0.1+ |
| 1990 08 23 | 675 | 0.3− 1.9−   | 1990 09 19 | 675 | (0.6+ 2.4−) | 1997 10 09 | 691 | 1.0− 0.0  |
| 1990 08 26 | 809 | (1.1+ 2.4+) | 1990 09 19 | 675 | 0.5− 1.6−   | 1997 12 24 | 910 | 0.3+ 0.5+ |
| 1990 08 26 | 809 | 0.5+ 1.5+   | 1990 09 25 | 809 | 1.3+ 0.2+   | 1997 12 24 | 910 | 0.3+ 0.4+ |
| 1990 08 26 | 809 | 1.1+ 1.4+   | 1990 09 25 | 809 | 1.3+ 0.2+   | 1997 12 24 | 910 | 0.2+ 0.4+ |
| 1990 08 27 | 675 | (0.4− 2.8−) | 1990 09 25 | 809 | 1.7+ 0.5+   | 1998 02 24 | 566 | 0.3+ 0.9− |
| 1990 08 27 | 675 | 0.7− 1.1−   | 1990 09 26 | 809 | 0.6+ 0.3+   | 1998 02 24 | 566 | 0.7+ 1.2− |
| 1990 08 28 | 675 | 0.2− 1.4−   | 1990 09 26 | 809 | 0.6+ 0.0    | 1998 02 24 | 566 | 0.1− 0.5− |
| 1990 08 28 | 675 | 0.6+ 0.3−   | 1990 09 26 | 809 | 0.8+ 0.1−   |            |     |           |
| 1990 09 14 | 809 | 0.9− 0.3+   | 1994 05 14 | 691 | 0.3+ 0.3−   |            |     |           |

**(8363)\* 1990 RV = 1990 QV<sub>16</sub> = 1993 EB**

Discovered 1990 Sept. 13 by C. M. Olmstead at Palomar.

Id. S. Nakano (d, *MPC* 20912; *MPC* 21941)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            | Williams           |               |             |  |
|----------|------------|--------------------|---------------|-------------|--|
| <i>M</i> | 7.38494    | (2000.0)           | <b>P</b>      | <b>Q</b>    |  |
| <i>n</i> | 0.18217768 | $\omega$ 353.74426 | −0.40056374   | −0.91537953 |  |
| <i>a</i> | 3.0818105  | $\Omega$ 119.86276 | +0.84266467   | −0.38532653 |  |
| <i>e</i> | 0.1434106  | <i>i</i> 2.66754   | +0.35981238   | −0.11663522 |  |
| <i>P</i> | 5.41       | <i>H</i> 12.7      | <i>G</i> 0.15 | <i>U</i> 1  |  |

Residuals in seconds of arc

|            |     |              |            |     |           |            |     |           |
|------------|-----|--------------|------------|-----|-----------|------------|-----|-----------|
| 1990 08 26 | 809 | 1.2+ 0.4+    | 1996 12 24 | 327 | 0.2− 1.0+ | 1998 01 29 | 691 | 1.0− 0.4+ |
| 1990 08 26 | 809 | 0.5+ 0.6+    | 1996 12 24 | 327 | 1.0− 1.7+ | 1998 02 05 | 610 | 0.4− 0.1+ |
| 1990 08 26 | 809 | 0.4− 0.6−    | 1996 12 24 | 327 | 0.6− 0.7+ | 1998 02 05 | 610 | 0.4− 0.1+ |
| 1990 09 13 | 675 | (2.3− 0.5−)  | 1997 01 06 | 327 | 0.5− 1.3+ | 1998 02 05 | 610 | 0.3− 0.1+ |
| 1990 09 13 | 675 | 0.8− 1.0−    | 1997 01 06 | 327 | 0.2− 1.5+ | 1998 02 13 | 610 | 0.0 1.7+  |
| 1990 09 18 | 675 | 0.5+ 1.3−    | 1997 01 06 | 327 | 0.1+ 1.6+ | 1998 02 13 | 610 | 0.1− 1.2+ |
| 1990 09 18 | 675 | 0.6− 0.1−    | 1998 01 24 | 426 | 0.2+ 0.5+ | 1998 02 13 | 610 | 0.0 0.7+  |
| 1993 03 01 | 896 | 0.3− 0.9− Y  | 1998 01 24 | 426 | 0.2+ 0.2+ | 1998 02 15 | 403 | 0.4+ 0.1+ |
| 1993 03 01 | 896 | (1.2− 3.2−)Y | 1998 01 24 | 426 | 0.4+ 0.2+ | 1998 02 15 | 403 | 0.7+ 0.4− |
| 1993 03 02 | 896 | 0.1+ 0.3− Y  | 1998 01 26 | 566 | 0.1+ 0.3− | 1998 02 17 | 403 | 0.1+ 0.4− |
| 1993 03 02 | 896 | 0.3− 1.1− Y  | 1998 01 26 | 566 | 0.3+ 0.4− | 1998 02 17 | 403 | 1.1− 0.2+ |
| 1994 06 08 | 809 | 0.4− 1.1+    | 1998 01 26 | 566 | 0.2+ 0.6− | 1998 02 18 | 127 | 0.5+ 0.2− |
| 1994 06 08 | 809 | 0.0 1.7+     | 1998 01 26 | 426 | 0.1+ 0.2+ | 1998 02 18 | 127 | 0.8+ 0.2− |
| 1994 06 08 | 809 | 0.5− 1.6+    | 1998 01 26 | 426 | 0.3+ 0.0  | 1998 02 26 | 610 | 1.2+ 0.2+ |
| 1994 06 09 | 809 | 0.0 1.3+     | 1998 01 26 | 426 | 0.3+ 0.2+ | 1998 02 26 | 610 | 0.5+ 0.0  |
| 1994 06 09 | 809 | 0.9+ 1.7+    | 1998 01 29 | 691 | 1.0− 0.1+ | 1998 02 26 | 610 | 0.4− 0.1− |
| 1994 06 09 | 809 | 1.2+ 0.7+    | 1998 01 29 | 691 | 1.0− 0.5+ |            |     |           |

**(8364)\* 1990 RE<sub>5</sub> = 1993 CU**

Discovered 1990 Sept. 15 by H. E. Holt at Palomar.

Id. K. Ichikawa (*MPC* 21942)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            | Williams           |               |             |  |
|----------|------------|--------------------|---------------|-------------|--|
| <i>M</i> | 277.98672  | (2000.0)           | <b>P</b>      | <b>Q</b>    |  |
| <i>n</i> | 0.19181644 | $\omega$ 246.76007 | −0.75547172   | +0.64773293 |  |
| <i>a</i> | 2.9776856  | $\Omega$ 333.28734 | −0.49192167   | −0.66008584 |  |
| <i>e</i> | 0.1068096  | <i>i</i> 12.65911  | −0.43275344   | −0.38043229 |  |
| <i>P</i> | 5.14       | <i>H</i> 12.2      | <i>G</i> 0.15 | <i>U</i> 1  |  |

Residuals in seconds of arc

|            |     |           |            |     |           |            |     |           |
|------------|-----|-----------|------------|-----|-----------|------------|-----|-----------|
| 1955 10 24 | 675 | 0.2+ 0.6+ | 1993 02 13 | 894 | 0.7+ 0.7− | 1998 02 14 | 958 | 0.0 0.2−  |
| 1955 10 24 | 675 | 0.8− 0.6+ | 1993 02 13 | 894 | 0.5− 0.4− | 1998 02 14 | 958 | 0.2+ 0.6+ |
| 1988 02 16 | 675 | 0.6+ 0.1+ | 1993 02 14 | 894 | 0.2− 0.2− | 1998 02 19 | 699 | 0.3+ 0.4+ |
| 1988 02 16 | 675 | 0.5+ 0.2− | 1993 02 14 | 894 | 0.8− 0.6+ | 1998 02 19 | 699 | 0.2− 0.6+ |

|            |     |       |       |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| 1988 03 18 | 675 | 1.0+  | 0.9+  | 1993 02 18 | 894 | 1.0- | 0.4- | 1998 02 19 | 699 | 1.3+ | 0.7+ |
| 1988 03 18 | 675 | 0.2-  | 0.0   | 1993 02 18 | 894 | 0.3- | 1.0- | 1998 02 20 | 958 | 0.1+ | 0.1+ |
| 1990 09 15 | 675 | 1.3+  | 1.7-  | 1993 02 25 | 894 | 0.3- | 0.7- | 1998 02 20 | 958 | 2.0- | 0.4- |
| 1990 09 15 | 675 | (6.9+ | 8.1+) | 1993 02 25 | 894 | 0.2- | 0.7- | 1998 02 21 | 958 | 0.1- | 1.0+ |
| 1990 09 18 | 675 | 0.2+  | 0.3+  | 1993 04 24 | 801 | 0.4- | 0.7+ | 1998 02 22 | 566 | 0.2- | 0.1- |
| 1990 09 18 | 675 | 0.9+  | 0.0   | 1993 04 24 | 801 | 1.4+ | 0.1- | 1998 02 22 | 566 | 0.2- | 0.0  |
| 1990 09 20 | 675 | (2.2+ | 1.1-) | 1995 10 24 | 691 | 1.1- | 0.9+ | 1998 02 22 | 566 | 0.0  | 0.5- |
| 1990 09 20 | 675 | 0.4+  | 0.1-  | 1995 10 24 | 691 | 1.0- | 0.6+ | 1998 02 25 | 758 | 1.2+ | 0.0  |
| 1991 12 01 | 675 | 0.5-  | 0.4-  | 1995 10 24 | 691 | 1.2- | 0.5+ | 1998 02 25 | 758 | 1.3- | 0.1+ |
| 1991 12 01 | 675 | 1.1+  | 0.3-  | 1998 01 26 | 566 | 1.0+ | 0.7- | 1998 02 26 | 758 | 1.0- | 0.6+ |
| 1993 01 23 | 675 | 0.9+  | 1.9+  | 1998 01 26 | 566 | 0.7+ | 0.8- | 1998 02 26 | 758 | 0.5- | 0.0  |
| 1993 01 23 | 675 | 1.0-  | 0.1+  | 1998 01 26 | 566 | 0.7+ | 0.8- |            |     |      |      |

**(8365)\* 1990 RR<sub>5</sub> = 1973 SH<sub>4</sub> = 1973 UU = 1997 SS**

Discovered 1990 Sept. 15 by H. E. Holt at Palomar.

Id. G. V. Williams (*MPC* 30756)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| Williams |            |                    |                          |
|----------|------------|--------------------|--------------------------|
| <i>M</i> | 28.38984   | (2000.0)           | <i>Q</i>                 |
| <i>n</i> | 0.28922407 | $\omega$ 175.23324 | +0.90400309 -0.42727469  |
| <i>a</i> | 2.2645388  | $\Omega$ 210.07502 | +0.39127441 +0.84067642  |
| <i>e</i> | 0.1437538  | <i>i</i> 1.67572   | +0.17228683 +0.33271533  |
| <i>P</i> | 3.41       | <i>H</i> 13.9      | <i>G</i> 0.15 <i>U</i> 2 |

Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| 1973 09 26 | 095 | 0.4+  | 0.3+  | 1997 09 17 | 327 | 0.2- | 0.3+ | 1997 11 29 | 704 | 0.5+ | 0.8- |
| 1973 10 26 | 095 | (4.1- | 3.9-) | 1997 09 17 | 327 | 0.1- | 0.5+ | 1997 11 29 | 704 | 0.0  | 1.1+ |
| 1990 09 15 | 675 | 0.1-  | 1.8-  | 1997 10 19 | 327 | 0.1+ | 0.4+ | 1997 11 29 | 704 | 0.2+ | 0.8+ |
| 1990 09 17 | 675 | 0.7+  | 1.0-  | 1997 10 19 | 327 | 0.6+ | 1.1+ | 1997 11 29 | 704 | 0.6+ | 1.5+ |
| 1990 09 17 | 675 | 0.2+  | 1.5-  | 1997 10 19 | 327 | 0.1+ | 0.3+ | 1997 11 29 | 704 | 0.2- | 1.7+ |
| 1990 09 23 | 095 | 1.4+  | 1.3+  | 1997 10 22 | 327 | 0.1- | 0.3+ | 1998 02 22 | 327 | 0.3- | 1.2- |
| 1990 10 11 | 095 | 1.6-  | 1.4-  | 1997 10 22 | 327 | 0.3+ | 0.9+ | 1998 02 22 | 327 | 0.6- | 1.1- |
| 1990 10 15 | 095 | 0.8-  | 0.2+  | 1997 10 22 | 327 | 0.3+ | 0.1+ | 1998 02 22 | 327 | 0.5- | 0.7- |
| 1990 10 15 | 095 | (0.2+ | 3.8+) | 1997 11 06 | 704 | 0.4+ | 0.5- | 1998 02 23 | 327 | 0.8- | 0.6- |
| 1996 05 15 | 566 | 0.2+  | 0.1+  | 1997 11 06 | 704 | 0.1- | 0.9- | 1998 02 23 | 327 | 0.1- | 0.9- |
| 1996 05 15 | 566 | 0.1-  | 0.8+  | 1997 11 06 | 704 | 0.6- | 0.1- | 1998 02 23 | 327 | 0.0  | 1.1- |
| 1996 05 15 | 566 | 0.5+  | 0.3+  | 1997 11 06 | 704 | 0.2+ | 0.3- | 1998 02 24 | 327 | 0.4- | 0.9- |
| 1997 09 16 | 327 | 0.2+  | 0.5+  | 1997 11 06 | 704 | 0.5+ | 1.0- | 1998 02 24 | 327 | 0.1- | 0.5- |
| 1997 09 16 | 327 | 0.1+  | 0.3+  | 1997 11 26 | 566 | 0.2- | 0.3+ | 1998 02 24 | 327 | 0.3- | 0.8- |
| 1997 09 16 | 327 | 0.1+  | 0.2+  | 1997 11 26 | 566 | 0.3- | 0.4+ |            |     |      |      |
| 1997 09 17 | 327 | 0.3-  | 0.6+  | 1997 11 26 | 566 | 0.5- | 0.5+ |            |     |      |      |

**(8366)\* 1990 UL<sub>1</sub> = 1989 KP**

Discovered 1990 Oct. 20 by A. Sugie at the Dync Astronomical Observatory.

Id. G. V. Williams (*MPC* 29097)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| Williams |            |                    |                          |
|----------|------------|--------------------|--------------------------|
| <i>M</i> | 43.24641   | (2000.0)           | <i>Q</i>                 |
| <i>n</i> | 0.29028499 | $\omega$ 285.61610 | +0.84384842 -0.53125706  |
| <i>a</i> | 2.2590178  | $\Omega$ 106.52841 | +0.51750552 +0.76863570  |
| <i>e</i> | 0.1754794  | <i>i</i> 4.51121   | +0.14180226 +0.35632161  |
| <i>P</i> | 3.40       | <i>H</i> 14.3      | <i>G</i> 0.15 <i>U</i> 2 |

Residuals in seconds of arc

|            |     |       |       |            |     |       |       |            |     |      |      |
|------------|-----|-------|-------|------------|-----|-------|-------|------------|-----|------|------|
| 1989 05 26 | 372 | 0.5+  | 1.2-  | 1990 11 18 | 809 | 0.2+  | 1.5-  | 1998 01 06 | 704 | 0.1- | 0.1+ |
| 1989 05 26 | 372 | 2.1+  | 0.3+  | 1990 11 18 | 809 | 0.2+  | 1.2-  | 1998 01 07 | 704 | 0.1+ | 1.0+ |
| 1990 10 16 | 809 | (2.2+ | 0.5-) | 1990 11 18 | 809 | 0.3-  | 0.5-  | 1998 01 07 | 704 | 0.4+ | 0.2- |
| 1990 10 16 | 809 | 1.1+  | 0.2+  | 1990 11 20 | 809 | (2.4+ | 1.2-) | 1998 01 07 | 704 | 0.5+ | 0.5+ |
| 1990 10 16 | 809 | 0.5+  | 0.1-  | 1990 11 20 | 809 | 1.5+  | 0.8-  | 1998 01 07 | 704 | 0.6+ | 0.2- |
| 1990 10 20 | 809 | 1.4+  | 1.2-  | 1990 11 20 | 809 | 0.5+  | 0.7-  | 1998 01 08 | 704 | 0.0  | 0.5+ |
| 1990 10 20 | 809 | 1.1+  | 1.7-  | 1992 03 30 | 691 | 1.3-  | 1.5-  | 1998 01 08 | 704 | 0.1+ | 1.1+ |
| 1990 10 20 | 809 | 1.1+  | 1.3-  | 1992 03 30 | 691 | 1.4-  | 1.3-  | 1998 01 08 | 704 | 0.3- | 0.3+ |
| 1990 10 20 | 402 | 1.3-  | 1.3-  | 1992 03 30 | 691 | 1.2-  | 1.5-  | 1998 01 08 | 704 | 0.4- | 0.4+ |
| 1990 10 20 | 402 | 0.1-  | 0.6-  | 1992 04 27 | 691 | 0.8-  | 1.3-  | 1998 01 08 | 704 | 0.0  | 0.5+ |
| 1990 10 21 | 402 | (1.6- | 2.1-) | 1992 04 27 | 691 | 1.2-  | 1.6-  | 1998 01 08 | 704 | 0.4- | 0.5+ |
| 1990 10 21 | 402 | (0.3- | 3.7-) | 1992 04 27 | 691 | 1.1-  | 1.8-  | 1998 01 26 | 704 | 0.3+ | 0.1- |
| 1990 10 24 | 809 | 0.3+  | 0.7-  | 1993 07 25 | 675 | 0.2+  | 0.4-  | 1998 01 26 | 704 | 0.4- | 0.4+ |

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1990 10 24 | 809 | 0.7- | 0.2+ | 1993 08 13 | 675 | 0.2- | 0.4- | 1998 01 26 | 704 | 0.1- | 0.3+ |
| 1990 10 24 | 809 | 1.0- | 0.1+ | 1993 08 13 | 675 | 0.2- | 0.8+ | 1998 01 26 | 704 | 0.3- | 0.1+ |
| 1990 10 28 | 402 | 0.3- | 0.3+ | 1998 01 06 | 704 | 0.1- | 1.1- | 1998 01 26 | 704 | 0.1- | 0.4+ |
| 1990 10 28 | 402 | 1.0- | 1.0+ | 1998 01 06 | 704 | 0.5+ | 0.1+ |            |     |      |      |

**(8367)\* 1990 UL<sub>2</sub> = 1988 BG<sub>1</sub>**

Discovered 1990 Oct. 23 by T. Seki at Geisei.

Id. G. V. Williams (*MPC* 29097)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| Williams |            |                    |                          |
|----------|------------|--------------------|--------------------------|
| <i>M</i> | 55.57801   | (2000.0)           | <i>Q</i>                 |
| <i>n</i> | 0.30055948 | $\omega$ 352.35871 | +0.56739464 -0.81915270  |
| <i>a</i> | 2.2072376  | $\Omega$ 63.03585  | +0.76039303 +0.48207819  |
| <i>e</i> | 0.1288430  | <i>i</i> 5.40642   | +0.31601545 +0.31078846  |
| <i>P</i> | 3.28       | <i>H</i> 13.8      | <i>G</i> 0.15 <i>U</i> 1 |

Residuals in seconds of arc

|            |     |       |       |            |     |        |       |            |     |      |      |
|------------|-----|-------|-------|------------|-----|--------|-------|------------|-----|------|------|
| 1988 01 21 | 511 | 1.1+  | 2.2-  | 1990 11 14 | 372 | 0.5+   | 0.0   | 1998 01 25 | 566 | 0.2+ | 0.4- |
| 1988 01 21 | 511 | (5.2+ | 0.6+) | 1990 11 15 | 095 | (11.5+ | 0.8-) | 1998 01 25 | 566 | 0.1+ | 0.3- |
| 1988 01 21 | 511 | (6.1+ | 0.0 ) | 1990 11 15 | 095 | (2.6+  | 2.6-) | 1998 01 25 | 566 | 0.1+ | 0.2- |
| 1990 10 23 | 372 | (1.9+ | 2.1-) | 1990 11 21 | 095 | 1.1+   | 0.1-  | 1998 02 18 | 127 | 0.1+ | 0.2- |
| 1990 10 24 | 400 | 1.1-  | 0.4+  | 1990 11 21 | 095 | 0.7-   | 0.0   | 1998 02 18 | 127 | 0.1+ | 0.2- |
| 1990 10 24 | 400 | (2.9+ | 1.5-) | 1990 11 23 | 095 | 1.4-   | 1.2+  | 1998 02 19 | 758 | 0.1+ | 0.2+ |
| 1990 10 26 | 372 | 0.5-  | 0.9-  | 1990 11 23 | 095 | (2.7-  | 2.3+) | 1998 02 19 | 758 | 1.1- | 0.4+ |
| 1990 10 26 | 372 | (0.3+ | 2.3+) | 1992 04 29 | 691 | 0.4-   | 0.3+  | 1998 02 21 | 758 | 0.0  | 0.1+ |
| 1990 10 27 | 372 | (4.0+ | 1.2+) | 1992 04 29 | 691 | 0.3-   | 0.2+  | 1998 02 21 | 758 | 0.1+ | 0.7+ |
| 1990 10 27 | 372 | (0.3+ | 2.7+) | 1992 04 29 | 691 | 0.3-   | 0.2-  | 1998 02 24 | 758 | 0.4+ | 0.1- |
| 1990 10 28 | 095 | (1.8+ | 2.6-) | 1993 07 26 | 675 | 0.5+   | 0.4+  | 1998 02 24 | 758 | 0.6+ | 0.2+ |
| 1990 10 29 | 095 | 1.7+  | 0.2+  | 1993 07 26 | 675 | 0.9+   | 0.6-  | 1998 02 26 | 699 | 0.8+ | 0.3- |
| 1990 11 11 | 372 | 1.2-  | 0.3+  | 1993 08 17 | 675 | 0.1+   | 0.4+  | 1998 02 26 | 699 | 0.9+ | 0.1+ |
| 1990 11 11 | 372 | 1.4-  | 0.5+  | 1993 08 17 | 675 | 0.2+   | 0.2-  | 1998 02 26 | 699 | 0.0  | 0.0  |
| 1990 11 13 | 372 | 1.6+  | 0.2-  | 1998 01 10 | 355 | 0.7-   | 0.5+  | 1998 02 28 | 699 | 0.2+ | 0.8+ |
| 1990 11 13 | 372 | 0.4-  | 0.2-  | 1998 01 10 | 355 | 0.6-   | 0.3-  | 1998 02 28 | 699 | 0.3- | 0.3+ |
| 1990 11 14 | 372 | 0.2-  | 0.5-  | 1998 01 10 | 355 | 0.4-   | 0.7-  | 1998 02 28 | 699 | 0.3- | 0.7+ |

**(8368)\* 1991 DM = 1993 VF<sub>4</sub>**

Discovered 1991 Feb. 20 by R. H. McNaught at Siding Spring.

Id. S. Nakano (*MPC* 22814)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| Nakano   |            |                    |                          |
|----------|------------|--------------------|--------------------------|
| <i>M</i> | 311.99427  | (2000.0)           | <i>Q</i>                 |
| <i>n</i> | 0.27046756 | $\omega$ 25.48056  | -0.93256219 -0.36060767  |
| <i>a</i> | 2.3680594  | $\Omega$ 133.37086 | +0.32708255 -0.86394213  |
| <i>e</i> | 0.1487636  | <i>i</i> 1.34208   | +0.15278996 -0.35151971  |
| <i>P</i> | 3.64       | <i>H</i> 14.0      | <i>G</i> 0.15 <i>U</i> 2 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1991 02 13 | 675 | 1.6- | 0.5- | 1993 11 11 | 399 | 0.6+ | 0.3- | 1998 01 07 | 688 | 0.2- | 0.4- |
| 1991 02 13 | 675 | 1.2- | 1.3+ | 1993 11 11 | 399 | 0.2+ | 0.4+ | 1998 01 08 | 704 | 0.2- | 0.4+ |
| 1991 02 20 | 413 | 1.0+ | 1.1- | 1993 11 16 | 399 | 0.1- | 0.5+ | 1998 01 08 | 704 | 0.1+ | 0.9+ |
| 1991 02 22 | 413 | 0.8- | 1.2- | 1993 11 16 | 399 | 0.7- | 0.4- | 1998 01 08 | 704 | 0.4- | 0.0  |
| 1991 02 24 | 413 | 0.6- | 0.4- | 1996 09 07 | 691 | 0.5- | 0.4- | 1998 01 08 | 704 | 0.0  | 0.0  |
| 1991 03 11 | 809 | 0.3- | 0.8+ | 1996 09 07 | 691 | 0.6- | 0.1- | 1998 01 08 | 704 | 0.1- | 0.2+ |
| 1991 03 11 | 809 | 0.4+ | 0.6+ | 1996 09 07 | 691 | 0.4- | 0.5- | 1998 01 26 | 704 | 0.4+ | 0.0  |
| 1991 03 11 | 809 | 0.8+ | 0.5+ | 1996 09 10 | 566 | 0.3+ | 0.2- | 1998 01 26 | 704 | 1.0+ | 0.5- |
| 1991 03 13 | 809 | 0.4+ | 0.5- | 1996 09 10 | 566 | 0.8+ | 0.6- | 1998 01 26 | 704 | 0.3- | 0.0  |
| 1991 03 13 | 809 | 0.7+ | 0.4- | 1996 09 10 | 566 | 0.9+ | 0.0  | 1998 01 26 | 704 | 0.2+ | 0.6- |
| 1991 03 13 | 809 | 0.5+ | 0.4- | 1998 01 07 | 688 | 0.1- | 0.2- | 1998 01 26 | 704 | 0.2- | 0.4+ |

**(8369)\* 1991 GR = 1972 VA**

Discovered 1991 Apr. 8 by E. F. Helin at Palomar.

Id. G. V. Williams (*MPC* 23123)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 58.44497   |          | (2000.0) | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|----------|---------------|-------------|
| <i>n</i> | 0.24007385 | $\omega$ | 0.41867  | +0.94064549   | -0.32737905 |
| <i>a</i> | 2.5639299  | $\Omega$ | 19.43621 | +0.31059797   | +0.72408943 |
| <i>e</i> | 0.1222195  | <i>i</i> | 15.60146 | +0.13680265   | +0.60705639 |
| <i>P</i> | 4.11       | <i>H</i> | 11.6     | <i>G</i> 0.15 | <i>U</i> 1  |

Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| 1953 02 14 | 675 | 0.2+  | 0.1+  | 1995 03 29 | 801 | 0.6- | 0.1+ | 1996 06 24 | 423 | 0.0  | 0.5+ |
| 1953 02 14 | 675 | 0.9+  | 0.3+  | 1995 03 29 | 801 | 0.6- | 0.0  | 1996 06 24 | 423 | 0.4+ | 0.2+ |
| 1972 11 10 | 095 | 2.3-  | 0.5+  | 1995 05 19 | 608 | 0.2+ | 0.3+ | 1996 06 24 | 423 | 0.2+ | 0.1+ |
| 1991 04 08 | 675 | 1.8+  | 0.2-  | 1995 05 19 | 608 | 0.2+ | 0.3+ | 1996 06 24 | 423 | 0.2+ | 0.5+ |
| 1991 04 08 | 675 | 1.8+  | 0.9+  | 1995 05 31 | 801 | 0.6+ | 0.7- | 1996 06 24 | 423 | 0.7+ | 0.2+ |
| 1991 04 10 | 675 | 0.1+  | 0.1-  | 1995 05 31 | 801 | 0.0  | 0.4- | 1996 10 12 | 689 | 0.0  | 0.1- |
| 1991 04 10 | 675 | 0.5-  | 0.2-  | 1995 06 01 | 608 | 0.9+ | 0.6+ | 1996 10 13 | 689 | 0.1+ | 0.1- |
| 1991 05 08 | 675 | 0.5+  | 0.7-  | 1995 06 01 | 608 | 0.4+ | 0.6+ | 1998 01 10 | 631 | 0.9- | 0.1+ |
| 1991 05 08 | 675 | 0.5-  | 0.7+  | 1995 06 03 | 658 | 0.1- | 0.4+ | 1998 01 10 | 470 | 0.1+ | 0.2+ |
| 1994 01 12 | 675 | 1.1+  | 0.5-  | 1995 06 03 | 658 | 0.0  | 0.4+ | 1998 01 10 | 470 | 0.0  | 0.3+ |
| 1994 01 12 | 675 | 0.3+  | 0.0   | 1995 06 03 | 658 | 0.5- | 0.2+ | 1998 01 10 | 470 | 0.2+ | 0.3+ |
| 1994 01 16 | 675 | 0.2+  | 0.5-  | 1995 06 03 | 658 | 0.4- | 0.2+ | 1998 01 10 | 631 | 0.5- | 0.1- |
| 1994 03 10 | 675 | 0.8+  | 0.8-  | 1995 06 08 | 608 | 1.0- | 0.3+ | 1998 01 11 | 631 | 0.5- | 0.2+ |
| 1994 03 10 | 675 | (2.2- | 1.1+) | 1995 06 08 | 608 | 1.9- | 1.0+ | 1998 01 11 | 631 | 0.1- | 0.4+ |
| 1994 03 11 | 675 | 0.8-  | 0.7+  | 1996 06 21 | 423 | 0.3- | 0.1- | 1998 02 12 | 470 | 0.1+ | 0.8+ |
| 1995 03 05 | 801 | 0.3+  | 0.1-  | 1996 06 21 | 423 | 0.0  | 0.1- | 1998 02 12 | 470 | 0.2+ | 0.6+ |
| 1995 03 05 | 801 | 0.3-  | 0.1+  | 1996 06 21 | 423 | 0.6- | 0.1- | 1998 02 13 | 470 | 0.3+ | 0.1+ |
| 1995 03 27 | 801 | 0.7-  | 0.2-  | 1996 06 21 | 423 | 0.6- | 1.3+ | 1998 02 13 | 470 | 0.1+ | 0.0  |
| 1995 03 27 | 801 | 0.6-  | 0.2+  | 1996 06 24 | 423 | 0.4+ | 0.4+ | 1998 02 13 | 470 | 0.3+ | 0.2- |

**(8370)\* 1991 RK<sub>11</sub> = 1961 EC = 1994 BO<sub>4</sub>**

Discovered 1991 Sept. 4 by E. W. Elst at the European Southern Observatory.

Id. K. Ichikawa (*MPC* 23239)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 286.12629  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.23982172 | $\omega$ | 74.03044  | -0.86328266   | +0.48535652 |
| <i>a</i> | 2.5657266  | $\Omega$ | 134.75992 | -0.50451539   | -0.82199868 |
| <i>e</i> | 0.1254520  | <i>i</i> | 11.24480  | -0.01439685   | -0.29790472 |
| <i>P</i> | 4.11       | <i>H</i> | 13.5      | <i>G</i> 0.15 | <i>U</i> 1  |

Residuals in seconds of arc

|            |     |       |       |            |     |       |       |            |     |      |      |
|------------|-----|-------|-------|------------|-----|-------|-------|------------|-----|------|------|
| 1955 10 23 | 675 | 1.0-  | 0.5-  | 1994 01 21 | 303 | (1.7+ | 2.5-) | 1998 01 26 | 426 | 0.1+ | 0.3+ |
| 1955 10 23 | 675 | 0.8+  | 0.4+  | 1994 01 21 | 303 | (3.7+ | 2.8-) | 1998 01 26 | 426 | 0.1+ | 0.1+ |
| 1961 03 09 | 033 | 0.1+  | 0.2+  | 1994 01 22 | 303 | (2.4- | 0.1-) | 1998 02 03 | 691 | 0.3- | 0.4- |
| 1991 09 04 | 809 | (2.2+ | 1.5-) | 1994 02 13 | 411 | 0.4-  | 0.7-  | 1998 02 03 | 691 | 0.5- | 0.4- |
| 1991 09 04 | 809 | 1.1+  | 1.5-  | 1994 02 13 | 411 | 0.1-  | 0.0   | 1998 02 03 | 691 | 0.7- | 0.5- |
| 1991 09 04 | 809 | 0.2-  | 1.6-  | 1994 02 13 | 411 | 0.2-  | 0.2-  | 1998 02 05 | 610 | 0.4+ | 0.5- |
| 1991 09 05 | 809 | (0.8+ | 3.0-) | 1994 02 14 | 411 | 0.4+  | 0.1+  | 1998 02 05 | 610 | 0.3+ | 0.4- |
| 1991 09 05 | 809 | (0.1- | 2.8-) | 1994 02 14 | 411 | 0.3-  | 0.2-  | 1998 02 05 | 610 | 0.2+ | 0.2- |
| 1991 09 05 | 809 | 1.3-  | 1.5-  | 1994 02 14 | 411 | 0.1-  | 0.3-  | 1998 02 13 | 610 | 0.8+ | 1.1- |
| 1991 09 07 | 809 | 0.7+  | 1.2-  | 1998 01 24 | 426 | 0.1-  | 0.3+  | 1998 02 13 | 610 | 0.2+ | 1.1- |
| 1991 09 07 | 809 | 0.0   | 1.6-  | 1998 01 24 | 426 | 0.2-  | 0.4+  | 1998 02 13 | 610 | 0.3- | 1.1- |
| 1991 09 07 | 809 | (0.9- | 2.5-) | 1998 01 24 | 426 | 0.2-  | 0.3+  |            |     |      |      |
| 1994 01 21 | 303 | 0.4+  | 1.3-  | 1998 01 26 | 426 | 0.2-  | 0.1+  |            |     |      |      |

**(8371)\* 1991 TJ<sub>14</sub>**

Discovered 1991 Oct. 2 by C. P. de Saint-Aignan at Palomar.

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 182.66362  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.22012552 | $\omega$ | 200.00950 | +0.71950583   | +0.69180722 |
| <i>a</i> | 2.7165797  | $\Omega$ | 116.06266 | -0.62758876   | +0.68526790 |
| <i>e</i> | 0.0578866  | <i>i</i> | 3.89006   | -0.29739487   | +0.22761958 |
| <i>P</i> | 4.48       | <i>H</i> | 13.8      | <i>G</i> 0.15 | <i>U</i> 1  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1954 05 23 | 675 | 0.8- | 0.5- | 1991 10 07 | 675 | 0.2+ | 0.5+ | 1998 02 15 | 552 | 0.7+ | 1.5- |
| 1954 05 23 | 675 | 1.2+ | 1.4+ | 1991 10 08 | 675 | 0.2+ | 0.7- | 1998 02 15 | 552 | 0.7+ | 0.8- |

|            |     |      |      |            |     |       |       |            |     |      |      |
|------------|-----|------|------|------------|-----|-------|-------|------------|-----|------|------|
| 1987 11 23 | 675 | 0.4+ | 0.2- | 1993 01 24 | 675 | (2.6- | 1.3+) | 1998 02 20 | 552 | 0.5- | 0.6- |
| 1987 11 26 | 675 | 1.1- | 0.0  | 1993 01 24 | 675 | 0.1+  | 0.8-  | 1998 02 20 | 552 | 0.3- | 0.4- |
| 1989 03 09 | 675 | 1.3- | 1.1+ | 1996 12 01 | 691 | 0.7-  | 0.4+  | 1998 02 21 | 552 | 0.0  | 0.5+ |
| 1989 03 09 | 675 | 1.7+ | 0.2- | 1996 12 01 | 691 | 0.9-  | 0.4+  | 1998 02 21 | 552 | 0.0  | 0.5+ |
| 1990 05 25 | 675 | 1.5- | 0.9- | 1996 12 01 | 691 | 0.9-  | 0.4+  | 1998 02 24 | 552 | 0.3+ | 0.6- |
| 1991 09 15 | 675 | 1.0+ | 1.6- | 1996 12 09 | 691 | 0.4-  | 0.4+  | 1998 02 24 | 552 | 0.4+ | 0.1- |
| 1991 09 15 | 675 | 0.7+ | 0.2- | 1996 12 09 | 691 | 0.2+  | 0.3+  | 1998 02 26 | 699 | 0.6- | 0.8+ |
| 1991 10 02 | 675 | 1.5+ | 0.1+ | 1996 12 09 | 691 | 0.1-  | 0.3+  | 1998 02 26 | 699 | 0.7+ | 0.5- |
| 1991 10 03 | 675 | 0.5- | 0.2+ | 1998 01 22 | 691 | 0.6-  | 0.4-  | 1998 02 26 | 699 | 0.8+ | 1.1- |
| 1991 10 03 | 675 | 0.3+ | 1.0- | 1998 01 22 | 691 | 0.7-  | 0.4-  | 1998 02 27 | 552 | 0.2- | 0.6+ |
| 1991 10 07 | 675 | 0.2+ | 0.6- | 1998 01 22 | 691 | 0.9-  | 0.5-  | 1998 02 27 | 552 | 0.1+ | 0.6- |

**(8372)\* 1991 VC<sub>2</sub> = 1986 XO<sub>4</sub> = 1996 TE<sub>6</sub>**

Discovered 1991 Nov. 9 by S. Ueda and H. Kaneda at Kushiro.

Id. G. V. Williams (*MPC* 28073)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 70.40481   |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.19133595 | $\omega$ | 201.07736 | +0.62942854   | -0.77287959 |
| <i>a</i> | 2.9826686  | $\Omega$ | 210.08687 | +0.73393170   | +0.62532178 |
| <i>e</i> | 0.0837612  | <i>i</i> | 9.23804   | +0.25527237   | +0.10784166 |
| <i>P</i> | 5.15       | <i>H</i> | 12.9      | <i>G</i> 0.15 | <i>U</i> 1  |

Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| 1986 12 05 | 010 | (9.4+ | 0.2+) | 1994 05 14 | 691 | 0.3+ | 0.5+ | 1996 11 15 | 399 | 0.7- | 1.3+ |
| 1986 12 05 | 010 | (9.1+ | 0.0 ) | 1994 05 14 | 691 | 0.2+ | 0.4+ | 1996 11 15 | 399 | 2.0- | 0.2+ |
| 1986 12 05 | 010 | (8.9+ | 0.4-) | 1996 10 03 | 327 | 0.5+ | 0.1+ | 1998 01 25 | 566 | 0.7- | 0.1+ |
| 1991 11 09 | 399 | 0.4-  | 0.3+  | 1996 10 03 | 327 | 0.8+ | 0.2+ | 1998 01 25 | 566 | 0.8- | 0.1- |
| 1991 11 09 | 399 | 2.2+  | 0.7-  | 1996 10 03 | 327 | 0.3+ | 0.3+ | 1998 01 25 | 566 | 0.4- | 0.1- |
| 1991 11 11 | 399 | 2.1+  | 0.5-  | 1996 10 05 | 327 | 0.9+ | 0.0  | 1998 01 29 | 566 | 0.2- | 0.3- |
| 1991 11 11 | 399 | 0.0   | 1.0+  | 1996 10 05 | 327 | 1.2+ | 0.2- | 1998 01 29 | 566 | 0.6- | 0.3- |
| 1991 11 13 | 399 | 0.3+  | 0.4-  | 1996 10 05 | 327 | 1.1+ | 0.0  | 1998 01 29 | 566 | 0.6- | 0.3- |
| 1991 11 13 | 399 | 0.9-  | 0.3+  | 1996 11 06 | 399 | 0.1- | 0.3+ | 1998 02 26 | 566 | 1.2+ | 0.3+ |
| 1991 12 05 | 399 | 0.4-  | 1.7-  | 1996 11 07 | 399 | 0.4- | 1.1- | 1998 02 26 | 566 | 1.0+ | 0.3+ |
| 1991 12 05 | 399 | 2.5-  | 1.9+  | 1996 11 07 | 399 | 0.2- | 0.5- | 1998 02 26 | 566 | 1.2+ | 0.2+ |
| 1991 12 07 | 399 | 0.4-  | 0.3+  | 1996 11 12 | 399 | 0.7- | 0.0  |            |     |      |      |
| 1994 05 14 | 691 | 0.5-  | 0.3+  | 1996 11 12 | 399 | 0.6- | 0.1+ |            |     |      |      |

**(8373)\* 1992 AB**

Discovered 1992 Jan. 1 by C. S. Shoemaker at Palomar.

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 344.11727  |          | (2000.0) | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|----------|---------------|-------------|
| <i>n</i> | 0.16534601 | $\omega$ | 55.60991 | -0.61414503   | -0.44361283 |
| <i>a</i> | 3.2875592  | $\Omega$ | 88.90041 | +0.31483421   | -0.89611858 |
| <i>e</i> | 0.5526007  | <i>i</i> | 40.75551 | +0.72367486   | +0.01338470 |
| <i>P</i> | 5.96       | <i>H</i> | 13.8     | <i>G</i> 0.15 | <i>U</i> 1  |

Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| 1992 01 01 | 675 | (1.0- | 3.1-) | 1997 11 12 | 658 | 0.3- | 0.2+ | 1998 01 18 | 403 | 1.1+ | 0.6+ |
| 1992 01 01 | 675 | 0.7-  | 0.2-  | 1997 11 12 | 658 | 0.4- | 0.1+ | 1998 01 18 | 118 | 0.1+ | 0.1+ |
| 1992 01 04 | 675 | 0.9+  | 0.3-  | 1997 11 12 | 658 | 0.6- | 0.3+ | 1998 01 18 | 118 | 0.3+ | 0.1- |
| 1992 01 07 | 372 | (3.3- | 0.1-) | 1997 11 14 | 658 | 0.5- | 1.2+ | 1998 01 22 | 628 | 0.7+ | 0.5- |
| 1992 01 07 | 885 | (5.5+ | 2.4-) | 1997 11 14 | 658 | 0.3+ | 0.5- | 1998 01 22 | 628 | 0.2- | 1.2+ |
| 1992 01 07 | 885 | (1.6- | 2.1+) | 1997 11 14 | 658 | 0.0  | 0.4+ | 1998 01 22 | 628 | 0.2+ | 0.3+ |
| 1992 01 09 | 894 | (0.7+ | 2.6-) | 1997 11 24 | 360 | 0.4+ | 0.1+ | 1998 01 22 | 628 | 0.5+ | 0.0  |
| 1992 01 09 | 372 | (2.8- | 1.8-) | 1997 11 24 | 360 | 0.7+ | 0.1+ | 1998 01 25 | 628 | 0.5+ | 0.6- |
| 1992 01 10 | 688 | 0.2-  | 0.9+  | 1997 11 24 | 360 | 0.7+ | 0.1+ | 1998 01 25 | 628 | 0.5+ | 0.6- |
| 1992 01 10 | 688 | 0.2-  | 0.8+  | 1997 12 06 | 118 | 0.0  | 0.2+ | 1998 01 25 | 628 | 0.5+ | 0.4- |
| 1992 01 10 | 413 | (2.2+ | 0.5-) | 1997 12 06 | 118 | 0.4+ | 0.5- | 1998 01 25 | 628 | 0.5+ | 0.4- |
| 1992 01 11 | 413 | 1.2+  | 0.3+  | 1997 12 07 | 118 | 0.3+ | 0.0  | 1998 01 26 | 628 | 1.3- | 0.6+ |
| 1992 01 12 | 413 | 0.4+  | 0.2+  | 1997 12 07 | 118 | 0.3+ | 0.1+ | 1998 01 26 | 628 | 1.0- | 0.5+ |
| 1992 01 13 | 688 | 0.4+  | 0.9+  | 1997 12 09 | 732 | 0.1- | 0.2+ | 1998 01 26 | 628 | 1.0- | 0.6+ |
| 1992 01 13 | 688 | 0.4+  | 0.5+  | 1997 12 09 | 732 | 0.0  | 0.2+ | 1998 01 26 | 628 | 1.3- | 0.5+ |

|            |     |             |            |     |             |            |            |           |      |      |
|------------|-----|-------------|------------|-----|-------------|------------|------------|-----------|------|------|
| 1992 02 05 | 675 | (0.1− 3.2−) | 1997 12 10 | 732 | 0.0         | 0.2−       | 1998 01 26 | 143       | 0.7− | 0.0  |
| 1992 02 05 | 675 | 1.1− 0.6−   | 1997 12 10 | 732 | 0.1+        | 1.0+       | 1998 01 26 | 143       | 0.3− | 0.7− |
| 1992 02 06 | 801 | 0.2+ 0.4−   | 1997 12 10 | 732 | 0.1−        | 0.4+       | 1998 01 26 | 143       | 0.4− | 0.1− |
| 1992 02 06 | 801 | 0.2+ 0.5−   | 1997 12 21 | 596 | 0.3+        | 0.0        | 1998 01 27 | 118       | 0.4− | 0.3+ |
| 1992 02 07 | 801 | 0.1+ 0.5−   | 1997 12 21 | 596 | 0.2−        | 0.4−       | 1998 01 27 | 118       | 0.4− | 0.2+ |
| 1992 02 07 | 801 | 0.1− 0.2−   | 1997 12 21 | 596 | 0.2−        | 0.1+       | 1998 01 28 | 143       | 0.0  | 0.2+ |
| 1992 03 04 | 801 | 0.1+ 0.3+   | 1997 12 24 | 750 | 0.1+ 0.9+   | 1998 01 28 | 143        | 0.1+ 0.6+ |      |      |
| 1992 03 13 | 658 | 0.3− 0.5+   | 1997 12 24 | 750 | 0.2+ 0.3+   | 1998 01 28 | 143        | 0.0 0.4+  |      |      |
| 1992 03 13 | 658 | 0.2− 0.7+   | 1997 12 24 | 104 | 0.2+ 0.3+   | 1998 01 28 | 143        | 0.4+ 0.1+ |      |      |
| 1992 07 28 | 658 | 0.6− 0.7+   | 1997 12 24 | 104 | 0.1− 0.3+   | 1998 01 28 | 143        | 0.5+ 0.1+ |      |      |
| 1992 07 28 | 658 | 1.0− 0.6+   | 1997 12 24 | 104 | 0.2− 0.3+   | 1998 01 28 | 143        | 0.2− 0.2+ |      |      |
| 1992 07 28 | 658 | 0.8− 0.1−   | 1997 12 27 | 046 | 0.4− 0.7−   | 1998 01 31 | 628        | 0.3+ 0.1+ |      |      |
| 1993 07 01 | 413 | 0.6+ 0.4−   | 1997 12 27 | 046 | 0.3− 0.8−   | 1998 01 31 | 628        | 0.3+ 0.0  |      |      |
| 1993 07 01 | 413 | 0.4+ 0.3−   | 1997 12 27 | 046 | 0.3− 0.8−   | 1998 01 31 | 628        | 0.4+ 0.0  |      |      |
| 1994 07 25 | 413 | 1.0− 1.2+   | 1997 12 30 | 118 | 0.2+ 0.2−   | 1998 01 31 | 628        | 0.2+ 0.1+ |      |      |
| 1994 07 25 | 413 | 0.6+ 0.4+   | 1997 12 30 | 118 | 0.2+ 0.3−   | 1998 01 31 | 628        | 0.1+ 0.5+ |      |      |
| 1994 08 15 | 413 | 0.3− 0.3+   | 1998 01 01 | 127 | 0.0 0.2−    | 1998 01 31 | 118        | 0.3+ 0.3+ |      |      |
| 1994 08 15 | 413 | 0.6− 0.2−   | 1998 01 01 | 127 | 0.4+ 0.2−   | 1998 01 31 | 118        | 0.4+ 0.4+ |      |      |
| 1995 10 19 | 413 | 0.5+ 0.5+   | 1998 01 01 | 127 | 0.1+ 0.2−   | 1998 01 31 | 046        | 0.3+ 0.3+ |      |      |
| 1995 10 19 | 413 | 0.7+ 0.2−   | 1998 01 01 | 108 | 0.7+ 1.6−   | 1998 01 31 | 046        | 0.3+ 0.2+ |      |      |
| 1996 11 02 | 413 | 1.1+ 0.7+   | 1998 01 01 | 108 | 0.0 1.6−    | 1998 01 31 | 046        | 0.3+ 0.2+ |      |      |
| 1996 11 02 | 413 | 0.1+ 0.2+   | 1998 01 01 | 108 | 0.5− 1.4−   | 1998 02 02 | 143        | 0.1− 0.3− |      |      |
| 1997 09 21 | 118 | 0.4− 0.2+   | 1998 01 04 | 127 | 0.1+ 0.7−   | 1998 02 02 | 143        | 0.2+ 0.1− |      |      |
| 1997 09 21 | 118 | 0.4+ 0.1+   | 1998 01 04 | 127 | 0.3+ 0.6−   | 1998 02 02 | 143        | 0.4+ 0.2− |      |      |
| 1997 09 21 | 118 | 0.0 0.5−    | 1998 01 06 | 352 | 1.1+ 0.9+   | 1998 02 03 | 711        | 0.2+ 0.2− |      |      |
| 1997 09 23 | 118 | 0.4+ 0.3−   | 1998 01 06 | 352 | 1.0+ 0.5+   | 1998 02 03 | 711        | 0.2+ 0.1− |      |      |
| 1997 09 23 | 118 | 0.6+ 0.3−   | 1998 01 06 | 352 | 1.0+ 0.5+   | 1998 02 05 | 711        | 0.5+ 0.2+ |      |      |
| 1997 09 23 | 118 | 0.4+ 0.6−   | 1998 01 11 | 113 | 1.4− 1.6+   | 1998 02 05 | 711        | 0.1+ 0.2− |      |      |
| 1997 09 29 | 118 | 0.2− 0.7−   | 1998 01 11 | 113 | (1.5− 2.3+) | 1998 02 06 | 711        | 0.6+ 0.0  |      |      |
| 1997 09 29 | 118 | 0.0 0.3−    | 1998 01 11 | 113 | (1.5− 2.4+) | 1998 02 06 | 711        | 0.4+ 0.0  |      |      |
| 1997 09 29 | 118 | 0.4− 0.6−   | 1998 01 12 | 113 | 0.8− 1.2+   | 1998 02 13 | 628        | 0.5− 0.4+ |      |      |
| 1997 10 18 | 658 | 1.3− 1.0−   | 1998 01 12 | 113 | 1.1− 1.0+   | 1998 02 13 | 628        | 0.4− 0.1+ |      |      |
| 1997 10 18 | 658 | 0.6− 1.0−   | 1998 01 12 | 113 | 1.1− 1.2+   | 1998 02 13 | 628        | 0.2− 0.4− |      |      |
| 1997 10 18 | 658 | 1.1− 1.0−   | 1998 01 12 | 046 | 0.0 0.0     | 1998 02 14 | 628        | 0.7− 1.1− |      |      |
| 1997 10 19 | 658 | 1.3− 0.7−   | 1998 01 12 | 046 | 0.1+ 0.0    | 1998 02 14 | 628        | 0.2− 0.1− |      |      |
| 1997 10 19 | 658 | 1.5− 0.9−   | 1998 01 12 | 046 | 0.1+ 0.0    | 1998 02 14 | 628        | 0.6− 0.6+ |      |      |
| 1997 10 19 | 658 | 1.2− 0.6−   | 1998 01 16 | 403 | 0.2+ 0.3+   | 1998 02 18 | 628        | 0.0 0.1+  |      |      |
| 1997 11 03 | 360 | 0.6− 0.2−   | 1998 01 16 | 403 | 0.3+ 0.4−   | 1998 02 18 | 628        | 0.1+ 0.2− |      |      |
| 1997 11 03 | 360 | 0.5− 0.3−   | 1998 01 16 | 403 | 0.1− 0.1+   | 1998 02 18 | 628        | 0.3+ 0.1+ |      |      |
| 1997 11 03 | 360 | 0.4− 0.2−   | 1998 01 17 | 118 | 0.1+ 0.2−   | 1998 02 18 | 628        | 0.4+ 0.4+ |      |      |
| 1997 11 05 | 046 | 0.4− 0.1+   | 1998 01 17 | 118 | 0.1+ 0.1−   | 1998 02 23 | 118        | 0.3− 1.1− |      |      |
| 1997 11 05 | 046 | 0.6− 0.4+   | 1998 01 17 | 118 | 0.1+ 0.1−   | 1998 02 23 | 118        | 0.5− 1.2− |      |      |
| 1997 11 05 | 046 | 0.2+ 0.2+   | 1998 01 18 | 403 | 0.1− 0.5+   |            |            |           |      |      |

**(8374)\* 1992 AK<sub>1</sub> = 1990 SP<sub>2</sub>**

Discovered 1992 Jan. 10 by S. Otomo at Kiyosato.

Id. S. Nakano (*MPC* 19687)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            |                    | Nakano        |             |  |
|----------|------------|--------------------|---------------|-------------|--|
| <i>M</i> | 68.66010   | (2000.0)           | <b>P</b>      | <b>Q</b>    |  |
| <i>n</i> | 0.16959460 | $\omega$ 294.02080 | +0.83190631   | −0.55264012 |  |
| <i>a</i> | 3.2324218  | $\Omega$ 99.56332  | +0.52583342   | +0.75616712 |  |
| <i>e</i> | 0.1689212  | <i>i</i> 2.91848   | +0.17728822   | +0.35042858 |  |
| <i>P</i> | 5.81       | <i>H</i> 12.0      | <i>G</i> 0.15 | <i>U</i> 1  |  |

Residuals in seconds of arc

|            |     |           |            |     |           |            |     |             |
|------------|-----|-----------|------------|-----|-----------|------------|-----|-------------|
| 1990 09 18 | 675 | 0.8+ 1.0− | 1992 01 15 | 894 | 0.9+ 0.2− | 1996 10 09 | 367 | 0.4+ 0.2+   |
| 1990 09 18 | 675 | 0.1− 0.3− | 1992 01 15 | 894 | 1.7− 0.1− | 1996 10 11 | 367 | 0.5+ 0.7+   |
| 1990 09 20 | 675 | 0.1+ 0.0  | 1992 01 24 | 894 | 0.3+ 0.6− | 1996 10 11 | 367 | 0.3+ 0.6+   |
| 1990 09 20 | 675 | 0.6+ 1.4− | 1992 01 24 | 894 | 0.6+ 0.1+ | 1996 10 15 | 886 | 1.8− 0.5−   |
| 1990 09 28 | 675 | 0.4+ 0.4+ | 1992 01 26 | 894 | 0.4− 0.7+ | 1996 10 15 | 886 | (2.3− 0.4−) |
| 1991 12 14 | 691 | 1.2− 0.6+ | 1992 01 26 | 894 | 0.5+ 0.7− | 1998 01 28 | 758 | 0.7+ 0.7−   |
| 1991 12 14 | 691 | 1.3− 0.5+ | 1992 02 02 | 894 | 0.1+ 1.0+ | 1998 01 28 | 758 | 1.8− 0.5−   |
| 1991 12 14 | 691 | 1.2− 1.1+ | 1992 02 02 | 894 | 0.7− 0.0  | 1998 01 29 | 758 | 0.6+ 0.5+   |
| 1992 01 10 | 894 | 1.8+ 0.6+ | 1992 02 04 | 894 | 1.5− 1.3− | 1998 01 29 | 758 | 1.7+ 0.6−   |
| 1992 01 10 | 894 | 1.4+ 1.8− | 1992 02 04 | 894 | 1.2− 0.2− | 1998 01 29 | 758 | 0.6+ 0.3−   |
| 1992 01 12 | 894 | 0.4+ 1.0+ | 1994 05 10 | 675 | 0.4− 0.4− | 1998 02 24 | 566 | 0.4− 0.5−   |
| 1992 01 12 | 894 | 0.8+ 0.4+ | 1996 10 05 | 367 | 0.3− 0.0  | 1998 02 24 | 566 | 0.3− 0.0    |

|            |     |           |            |     |           |            |     |           |
|------------|-----|-----------|------------|-----|-----------|------------|-----|-----------|
| 1992 01 14 | 894 | 0.7+ 0.2+ | 1996 10 05 | 367 | 0.5− 0.2+ | 1998 02 24 | 566 | 0.4− 0.1− |
| 1992 01 14 | 894 | 0.4+ 0.3− | 1996 10 09 | 367 | 0.0 0.0   |            |     |           |

**(8375)\* 1992 AP<sub>1</sub> = 1968 UR = 1985 WO = 1993 FM<sub>50</sub>**

Discovered 1992 Jan. 12 by T. Seki at Geisei.

Id. G. V. Williams (*MPC* 23519)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            |                    | Williams      |             |  |
|----------|------------|--------------------|---------------|-------------|--|
| <i>M</i> | 63.54541   | (2000.0)           | <b>P</b>      | <b>Q</b>    |  |
| <i>n</i> | 0.17618284 | $\omega$ 145.11972 | +0.58183666   | −0.81318313 |  |
| <i>a</i> | 3.1513283  | $\Omega$ 269.29644 | +0.74294498   | +0.53848317 |  |
| <i>e</i> | 0.1360957  | <i>i</i> 0.80896   | +0.33090611   | +0.22083721 |  |
| <i>P</i> | 5.59       | <i>H</i> 12.2      | <i>G</i> 0.15 | <i>U</i> 1  |  |

Residuals in seconds of arc

|            |     |             |            |     |             |            |     |             |
|------------|-----|-------------|------------|-----|-------------|------------|-----|-------------|
| 1968 10 22 | 095 | 1.0+ 0.7−   | 1993 03 24 | 809 | 0.3− 0.1−   | 1998 02 15 | 587 | 0.9+ 0.4+   |
| 1968 10 26 | 095 | 1.0− 0.7+   | 1993 04 17 | 413 | 0.6− 0.4+   | 1998 02 17 | 587 | 1.1+ 0.1−   |
| 1985 11 20 | 095 | 2.0+ 0.1+   | 1995 06 29 | 372 | 0.1− 0.7−   | 1998 02 17 | 587 | 0.9+ 0.1−   |
| 1992 01 12 | 372 | 1.8− 1.3+   | 1995 06 29 | 372 | (2.1− 0.7−) | 1998 02 17 | 587 | 1.4+ 0.6−   |
| 1992 01 12 | 372 | (5.0− 1.9+) | 1995 07 25 | 372 | (3.4+ 1.2+) | 1998 02 21 | 732 | 0.6− 0.0    |
| 1992 01 14 | 372 | 1.3− 0.3−   | 1995 07 25 | 372 | (0.7− 9.1+) | 1998 02 21 | 732 | 0.7− 0.4+   |
| 1992 01 14 | 372 | (4.2− 2.2+) | 1996 10 20 | 411 | 0.4− 0.4−   | 1998 02 21 | 732 | 1.0+ 1.1−   |
| 1992 01 23 | 372 | 0.3− 0.1+   | 1996 10 20 | 411 | 0.3+ 0.6+   | 1998 02 22 | 732 | (0.5+ 2.2−) |
| 1992 01 23 | 372 | 0.4− 0.7−   | 1998 02 03 | 127 | 0.0 0.9−    | 1998 02 22 | 732 | 0.7− 0.0    |
| 1993 03 19 | 809 | 0.3+ 0.1−   | 1998 02 03 | 127 | 0.1− 0.8−   | 1998 02 22 | 732 | 1.4− 0.6+   |
| 1993 03 20 | 809 | 0.1+ 0.5+   | 1998 02 15 | 587 | 0.8+ 0.4+   |            |     |             |

**(8376)\* 1992 OZ<sub>9</sub> = 1978 WZ<sub>5</sub> = 1985 SR<sub>6</sub> = 1986 WQ<sub>7</sub> = 1993 TA<sub>1</sub>**

Discovered 1992 July 30 by H. Debehogne and A. Lopez G. at the European

Southern Observatory.

Id. K. Kinoshita (*MPC* 23674)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            |                    | Williams      |             |  |
|----------|------------|--------------------|---------------|-------------|--|
| <i>M</i> | 240.22664  | (2000.0)           | <b>P</b>      | <b>Q</b>    |  |
| <i>n</i> | 0.12432495 | $\omega$ 259.57198 | +0.64352158   | +0.76394795 |  |
| <i>a</i> | 3.9758549  | $\Omega$ 50.59096  | −0.67597569   | +0.59637594 |  |
| <i>e</i> | 0.2054071  | <i>i</i> 3.53032   | −0.35907777   | +0.24641279 |  |
| <i>P</i> | 7.93       | <i>H</i> 11.5      | <i>G</i> 0.15 | <i>U</i> 1  |  |

Residuals in seconds of arc

|            |     |             |            |     |             |            |     |             |
|------------|-----|-------------|------------|-----|-------------|------------|-----|-------------|
| 1978 11 29 | 675 | 2.2+ 0.8+   | 1992 08 01 | 809 | 0.3− 0.4+   | 1993 10 11 | 809 | (2.0+ 4.0+) |
| 1978 11 30 | 675 | 2.0+ 0.9+   | 1992 08 03 | 809 | 0.2+ 0.1+   | 1993 10 11 | 400 | 1.2+ 0.9−   |
| 1985 09 22 | 095 | (3.4+ 2.2−) | 1992 08 03 | 809 | 0.4+ 0.0    | 1993 10 11 | 400 | (2.7+ 0.0 ) |
| 1986 11 30 | 046 | 1.1− 1.4−   | 1992 08 03 | 809 | 0.3+ 0.3−   | 1993 10 13 | 675 | 0.7+ 0.2+   |
| 1986 11 30 | 046 | 0.1− 0.7−   | 1992 08 04 | 809 | 0.3+ 0.2−   | 1993 10 13 | 675 | 0.6+ 0.0    |
| 1986 12 01 | 046 | 0.6− 0.7−   | 1992 08 04 | 809 | 0.7+ 0.1+   | 1993 10 15 | 400 | 1.2+ 0.6−   |
| 1986 12 01 | 046 | 1.8− 0.2−   | 1992 08 04 | 809 | 1.0+ 0.0    | 1993 10 15 | 400 | 0.7+ 0.1+   |
| 1986 12 03 | 046 | 2.1− 0.7−   | 1992 08 05 | 809 | 0.6− 1.0−   | 1997 12 08 | 910 | 0.5− 0.8−   |
| 1986 12 03 | 046 | 2.0− 0.8+   | 1992 08 05 | 809 | 0.9− 1.0−   | 1997 12 08 | 910 | 0.5− 0.5−   |
| 1991 05 13 | 675 | 0.8− 0.3+   | 1992 08 05 | 809 | 0.8− 0.8−   | 1997 12 08 | 910 | 0.7− 0.6−   |
| 1991 05 15 | 675 | 0.2− 0.2+   | 1993 10 09 | 809 | (2.0+ 2.3+) | 1998 03 05 | 327 | 0.3+ 0.6−   |
| 1991 05 15 | 675 | 0.5+ 0.5−   | 1993 10 09 | 809 | (1.7+ 2.2+) | 1998 03 05 | 327 | 0.2+ 0.6−   |
| 1992 07 30 | 809 | (3.7− 0.7−) | 1993 10 09 | 809 | (1.3+ 2.6+) | 1998 03 05 | 327 | 0.2+ 0.6−   |
| 1992 07 30 | 809 | (3.6− 0.5−) | 1993 10 10 | 675 | (0.2+ 2.6+) | 1998 03 08 | 327 | 0.1+ 0.8−   |
| 1992 07 30 | 809 | (3.2− 0.2−) | 1993 10 10 | 675 | 0.2+ 0.0    | 1998 03 08 | 327 | 0.1+ 0.4−   |
| 1992 08 01 | 809 | 0.9− 0.2+   | 1993 10 11 | 809 | (3.3+ 2.5+) | 1998 03 08 | 327 | 0.3+ 0.4−   |
| 1992 08 01 | 809 | 0.5− 0.1+   | 1993 10 11 | 809 | (2.8+ 3.3+) |            |     |             |

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5 Nakano

| <i>M</i> | 129.87405  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.24334049 | $\omega$ | 294.50783 | +0.94497064   | +0.30184077 |
| <i>a</i> | 2.5409325  | $\Omega$ | 48.19198  | -0.20353409   | +0.84437954 |
| <i>e</i> | 0.0960145  | <i>i</i> | 9.74647   | -0.25613350   | +0.44262324 |
| <i>P</i> | 4.05       | <i>H</i> | 13.6      | <i>G</i> 0.15 | <i>U</i> 1  |

Residuals in seconds of arc

|            |     |             |            |     |           |            |     |           |
|------------|-----|-------------|------------|-----|-----------|------------|-----|-----------|
| 1976 10 30 | 095 | (5.8+ 0.3-) | 1992 10 26 | 400 | 0.5- 0.4+ | 1996 10 15 | 801 | 0.1- 1.3- |
| 1980 10 17 | 095 | 1.0- 0.8+   | 1992 10 26 | 400 | 0.2+ 1.8- | 1996 10 15 | 801 | 0.5- 1.0- |
| 1992 09 23 | 400 | 0.7+ 2.1+   | 1992 11 26 | 675 | 0.5- 0.8- | 1998 01 28 | 566 | 0.1+ 0.0  |
| 1992 09 23 | 400 | 0.4+ 0.3+   | 1992 11 26 | 675 | 0.4+ 0.1- | 1998 01 28 | 566 | 0.1+ 0.1- |
| 1992 09 28 | 400 | 0.1- 0.4+   | 1992 11 28 | 675 | 0.5- 0.9- | 1998 01 28 | 566 | 0.3+ 0.1- |
| 1992 09 28 | 400 | 1.6+ 1.4-   | 1992 11 28 | 675 | 0.0 0.1-  | 1998 02 21 | 557 | 0.3- 0.1- |
| 1992 09 30 | 675 | 0.5- 0.5-   | 1995 05 08 | 400 | 0.2- 0.9- | 1998 02 21 | 557 | 0.4- 0.1+ |
| 1992 09 30 | 675 | 0.0 0.3-    | 1995 05 08 | 400 | 0.7+ 0.9+ | 1998 02 21 | 557 | 0.3- 0.0  |
| 1992 10 03 | 675 | 0.1+ 0.8-   | 1995 05 18 | 400 | 0.7- 1.6- | 1998 03 04 | 557 | 0.1+ 1.4- |
| 1992 10 03 | 675 | (0.5- 4.2-) | 1995 05 18 | 400 | 0.5+ 0.4+ | 1998 03 04 | 557 | 0.0 0.8-  |
| 1992 10 19 | 400 | 1.2+ 0.3+   | 1995 06 03 | 400 | 0.0 0.6-  |            |     |           |
| 1992 10 19 | 400 | 0.5+ 1.9+   | 1995 06 03 | 400 | 1.7- 0.7- |            |     |           |

**(8378)\* 1992 SN<sub>1</sub> = 1990 FL<sub>2</sub> = 1990 FK<sub>3</sub>**

Discovered 1992 Sept. 23 by E. F. Helin at Palomar.

Id. G. V. Williams (*MPC* 21116)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5 Williams

| <i>M</i> | 77.37452   |          | (2000.0) | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|----------|---------------|-------------|
| <i>n</i> | 0.23886352 | $\omega$ | 27.55614 | +0.77939922   | -0.62435871 |
| <i>a</i> | 2.5725836  | $\Omega$ | 11.52952 | +0.51613005   | +0.59271332 |
| <i>e</i> | 0.2080180  | <i>i</i> | 15.10572 | +0.35517125   | +0.50878986 |
| <i>P</i> | 4.13       | <i>H</i> | 12.7     | <i>G</i> 0.15 | <i>U</i> 2  |

Residuals in seconds of arc

|            |     |             |            |     |             |            |     |           |
|------------|-----|-------------|------------|-----|-------------|------------|-----|-----------|
| 1990 03 17 | 046 | (2.6- 0.4-) | 1992 11 19 | 675 | 0.1- 0.0    | 1996 10 12 | 801 | 0.6+ 0.4- |
| 1990 03 17 | 046 | 1.4- 0.9-   | 1992 11 19 | 675 | 1.0+ 0.0    | 1996 10 12 | 801 | 0.1+ 0.0  |
| 1990 03 19 | 046 | 0.4- 0.4+   | 1992 11 21 | 675 | 0.3+ 1.3-   | 1996 11 13 | 801 | 0.8- 1.2- |
| 1990 03 19 | 046 | (3.5+ 3.3-) | 1992 11 21 | 675 | (1.1+ 3.9-) | 1996 11 14 | 801 | 0.1+ 0.1+ |
| 1992 09 23 | 675 | 1.0- 0.9+   | 1993 01 18 | 801 | 1.0- 0.7+   | 1996 11 14 | 801 | 0.0 0.0   |
| 1992 09 23 | 675 | (2.0- 2.4-) | 1993 01 26 | 801 | 1.2+ 1.2-   | 1998 01 28 | 566 | 1.1+ 0.1- |
| 1992 09 24 | 675 | 1.2+ 1.4-   | 1993 01 26 | 801 | 0.5- 0.0    | 1998 01 28 | 566 | 1.2+ 0.3+ |
| 1992 09 24 | 675 | (0.6- 2.4-) | 1994 02 07 | 801 | 0.0 0.8+    | 1998 01 28 | 566 | 1.2+ 0.1- |
| 1992 09 26 | 372 | (2.6- 0.5+) | 1994 02 07 | 801 | 0.2- 0.6+   | 1998 02 24 | 566 | 0.1- 0.3- |
| 1992 09 26 | 372 | 0.2- 0.4+   | 1994 03 09 | 675 | 1.2+ 1.0+   | 1998 02 24 | 566 | 0.1- 0.5- |
| 1992 10 01 | 372 | 1.0+ 0.7+   | 1994 03 09 | 675 | 0.9+ 0.6+   | 1998 02 24 | 566 | 0.2+ 0.7- |
| 1992 10 01 | 372 | 1.2+ 0.9-   | 1994 03 10 | 675 | 0.8+ 0.6-   | 1998 03 03 | 758 | 0.7- 1.0+ |
| 1992 10 03 | 691 | (5.5- 0.7+) | 1996 09 15 | 801 | 0.1+ 0.6+   | 1998 03 03 | 758 | 0.2- 0.3+ |
| 1992 10 03 | 691 | 1.7- 0.2-   | 1996 09 15 | 801 | 0.1- 0.5+   | 1998 03 04 | 758 | 0.4- 0.1- |
| 1992 10 03 | 691 | (2.6- 0.3-) | 1996 10 10 | 801 | 0.8- 0.5+   | 1998 03 04 | 758 | 1.7- 0.1- |
| 1992 10 05 | 372 | 0.7- 1.7+   | 1996 10 10 | 801 | 0.9- 0.7+   |            |     |           |

**(8379)\* 1992 SW<sub>10</sub> = 1974 OG<sub>2</sub> = 1974 QN<sub>3</sub> = 1977 EW<sub>4</sub> = 1988 XC<sub>1</sub>**

Discovered 1992 Sept. 27 by Spacewatch at Kitt Peak.

Id. G. V. Williams (*MPC* 21117)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5 Williams

| <i>M</i> | 19.78021   |          | (2000.0) | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|----------|---------------|-------------|
| <i>n</i> | 0.23020931 | $\omega$ | 68.00063 | +0.03415293   | -0.99749855 |
| <i>a</i> | 2.6366600  | $\Omega$ | 20.33741 | +0.83867187   | -0.00507504 |
| <i>e</i> | 0.1925633  | <i>i</i> | 10.25751 | +0.54356515   | +0.07050451 |
| <i>P</i> | 4.28       | <i>H</i> | 13.1     | <i>G</i> 0.15 | <i>U</i> 1  |

Residuals in seconds of arc

|            |     |             |            |     |           |            |     |           |
|------------|-----|-------------|------------|-----|-----------|------------|-----|-----------|
| 1974 07 24 | 413 | 0.8+ 0.5+   | 1992 10 02 | 691 | 0.3- 0.2+ | 1998 02 05 | 403 | 0.1- 0.4+ |
| 1974 08 18 | 809 | (6.9+ 2.9-) | 1994 02 07 | 801 | 0.5- 0.0  | 1998 02 05 | 403 | 0.2- 0.5+ |
| 1977 03 15 | 381 | 0.2- 0.7+   | 1994 02 07 | 801 | 0.1- 0.5- | 1998 02 05 | 403 | 0.1- 0.3+ |
| 1977 03 15 | 381 | 0.8+ 0.9+   | 1994 02 15 | 675 | 0.4- 0.7- | 1998 02 18 | 127 | 0.2- 0.1- |

|            |     |             |            |     |           |            |     |           |
|------------|-----|-------------|------------|-----|-----------|------------|-----|-----------|
| 1988 12 06 | 675 | 0.3+ 0.1-   | 1994 02 15 | 675 | 0.3- 1.0- | 1998 02 18 | 127 | 0.1- 0.0  |
| 1988 12 07 | 675 | (0.4- 3.8-) | 1994 04 08 | 801 | 0.2- 0.6+ | 1998 02 26 | 699 | 0.3+ 0.1+ |
| 1992 08 25 | 675 | (2.1+ 1.1-) | 1994 04 08 | 801 | 0.2+ 0.7+ | 1998 02 26 | 699 | 0.2- 0.5+ |
| 1992 08 25 | 675 | (3.1+ 1.7-) | 1998 01 29 | 713 | 0.1- 0.6- | 1998 02 26 | 699 | 0.2+ 0.3+ |
| 1992 09 27 | 691 | 0.2- 0.0    | 1998 01 29 | 713 | 0.1- 0.7- | 1998 02 28 | 699 | 0.4- 0.5+ |
| 1992 09 27 | 691 | 0.1- 0.2+   | 1998 01 29 | 713 | 0.0 0.4-  | 1998 02 28 | 699 | 0.3- 0.2+ |
| 1992 09 27 | 691 | 0.1- 0.0    | 1998 01 30 | 713 | 0.8+ 0.1+ | 1998 02 28 | 699 | 0.2- 0.5+ |
| 1992 10 02 | 691 | 0.4- 0.6+   | 1998 01 30 | 713 | 0.6+ 0.4- | 1998 02 28 | 127 | 0.1+ 0.1+ |
| 1992 10 02 | 691 | 0.4- 0.0    | 1998 01 30 | 713 | 1.0+ 0.2+ | 1998 02 28 | 127 | 0.3+ 0.1- |

**(8380)\* 1992 SW<sub>17</sub> = 1974 XH**

Discovered 1992 Sept. 29 by H. E. Holt at Palomar.

Id. G. V. Williams (*MPC* 23124)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5 Williams

| <i>M</i> | 57.14042   |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.21635343 | $\omega$ | 94.22699  | +0.93516756   | -0.26248420 |
| <i>a</i> | 2.7480641  | $\Omega$ | 281.11863 | +0.14139054   | +0.89226642 |
| <i>e</i> | 0.1535712  | <i>i</i> | 14.02709  | +0.32476199   | +0.36737266 |
| <i>P</i> | 4.56       | <i>H</i> | 12.0      | <i>G</i> 0.15 | <i>U</i> 1  |

Residuals in seconds of arc

|            |     |             |            |     |             |            |     |           |
|------------|-----|-------------|------------|-----|-------------|------------|-----|-----------|
| 1974 12 14 | 095 | (2.2+ 5.5+) | 1996 07 14 | 801 | 0.2+ 0.1+   | 1997 12 27 | 952 | 0.0 1.1+  |
| 1992 09 29 | 675 | 0.6+ 1.3-   | 1996 07 18 | 894 | (2.3- 1.1+) | 1997 12 27 | 952 | 0.5+ 0.8+ |
| 1992 09 29 | 675 | 0.7+ 1.0-   | 1996 07 18 | 894 | 0.5- 1.6+   | 1997 12 27 | 952 | 0.5+ 0.7+ |
| 1992 10 01 | 675 | 0.5+ 1.0-   | 1996 07 18 | 072 | 1.1- 1.7+   | 1997 12 27 | 952 | 0.3+ 1.0+ |
| 1992 10 01 | 675 | 0.5+ 1.1-   | 1996 07 18 | 072 | 1.1- 1.6+   | 1997 12 29 | 104 | 0.5+ 0.2+ |
| 1992 11 19 | 675 | 0.0 0.8+    | 1996 07 20 | 801 | 0.4- 0.3-   | 1997 12 29 | 104 | 0.8+ 0.2+ |
| 1992 11 19 | 675 | 0.6+ 1.1+   | 1996 07 20 | 801 | 0.2+ 0.1+   | 1997 12 29 | 104 | 0.7+ 0.1+ |
| 1992 11 24 | 675 | 0.0 1.0-    | 1996 07 21 | 894 | 0.6+ 0.4-   | 1998 01 26 | 704 | 0.1+ 0.0  |
| 1992 11 24 | 675 | 1.0- 0.5-   | 1996 07 21 | 894 | 1.0+ 0.1+   | 1998 01 26 | 704 | 0.1+ 0.1- |
| 1993 01 24 | 801 | 1.3- 0.6-   | 1996 08 16 | 801 | 0.3- 0.3-   | 1998 01 26 | 704 | 0.2- 0.1- |
| 1993 01 26 | 801 | 0.3- 0.3+   | 1996 08 16 | 801 | 0.6- 0.2-   | 1998 01 26 | 704 | 0.2- 0.3+ |
| 1993 01 26 | 801 | 0.1- 0.6+   | 1996 08 19 | 801 | 0.1- 0.4-   | 1998 01 26 | 704 | 0.0 0.2+  |
| 1994 01 15 | 399 | 0.9- 0.2-   | 1996 08 19 | 801 | 0.2- 0.2-   | 1998 01 31 | 631 | 0.0 0.0   |
| 1994 01 15 | 399 | 1.6- 0.4-   | 1996 08 19 | 072 | 0.3- 0.2-   | 1998 01 31 | 631 | 0.5- 0.1- |
| 1994 02 11 | 675 | 0.7+ 0.4-   | 1996 08 19 | 072 | 0.4+ 0.2-   | 1998 02 17 | 470 | 0.4- 0.1+ |
| 1994 02 11 | 675 | 0.7- 0.0    | 1996 09 16 | 689 | 0.1- 0.0    | 1998 02 17 | 470 | 0.4+ 0.9- |
| 1994 03 12 | 801 | 0.4+ 0.5+   | 1996 10 13 | 689 | 0.1+ 0.3-   | 1998 02 18 | 470 | 0.4- 0.3- |
| 1994 03 21 | 801 | 1.0+ 1.8-   | 1997 12 27 | 952 | 0.4+ 0.6+   | 1998 02 18 | 470 | 0.9- 0.1- |
| 1996 07 14 | 801 | 0.3+ 0.3+   | 1997 12 27 | 952 | 0.3+ 1.1+   | 1998 02 18 | 470 | 1.1- 0.5+ |

**(8381)\* 1992 SO<sub>24</sub> = 1981 WY<sub>8</sub> = 1991 LY<sub>3</sub>**

Discovered 1992 Sept. 21 by F. Börngen at Tautenburg.

Id. G. V. Williams (*MPC* 22689)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5 Williams

| <i>M</i> | 359.65897  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.25458017 | $\omega$ | 272.29847 | -0.64219442   | -0.76267256 |
| <i>a</i> | 2.4655832  | $\Omega$ | 218.01828 | +0.74354480   | -0.59538801 |
| <i>e</i> | 0.0857363  | <i>i</i> | 7.17440   | +0.18635307   | -0.25267308 |
| <i>P</i> | 3.87       | <i>H</i> | 14.3      | <i>G</i> 0.15 | <i>U</i> 1  |

Residuals in seconds of arc

|            |     |             |            |     |             |            |     |           |
|------------|-----|-------------|------------|-----|-------------|------------|-----|-----------|
| 1981 11 25 | 095 | (3.1+ 2.9-) | 1994 01 15 | 033 | 0.9+ 0.4+   | 1998 02 05 | 113 | 0.3- 0.5+ |
| 1991 06 06 | 809 | 0.4- 0.1-   | 1994 02 16 | 033 | 0.2+ 0.3+   | 1998 02 05 | 113 | 0.9- 0.1- |
| 1991 06 06 | 809 | 0.8- 0.1+   | 1994 02 16 | 033 | 1.4+ 0.9+   | 1998 02 18 | 113 | 0.1- 0.0  |
| 1991 06 06 | 809 | 0.2- 0.8-   | 1994 02 17 | 033 | 0.7- 0.6+   | 1998 02 18 | 113 | 0.2+ 0.6- |
| 1991 06 08 | 809 | 0.4- 0.7-   | 1995 06 18 | 104 | 1.0+ 0.2+   | 1998 02 18 | 113 | 0.3- 0.3- |
| 1991 06 08 | 809 | 0.3- 1.3-   | 1995 06 18 | 104 | 0.8+ 0.0    | 1998 02 18 | 113 | 0.0 0.4-  |
| 1991 06 08 | 809 | 0.9- 0.9-   | 1995 06 18 | 104 | 0.0 0.1+    | 1998 02 20 | 113 | 0.2+ 0.4- |
| 1992 09 07 | 033 | 0.4- 1.2-   | 1995 06 21 | 104 | (2.6+ 0.3-) | 1998 02 20 | 113 | 0.1+ 0.2- |
| 1992 09 07 | 033 | 0.5- 1.7-   | 1995 06 21 | 104 | 1.2+ 0.0    | 1998 02 20 | 113 | 0.0 0.4-  |
| 1992 09 21 | 033 | 0.4+ 1.6-   | 1998 01 28 | 113 | 0.8- 0.4+   | 1998 02 20 | 113 | 0.4- 0.5- |
| 1992 09 21 | 033 | 1.4+ 1.0-   | 1998 01 28 | 113 | 1.1- 0.6+   | 1998 02 21 | 113 | 0.3+ 0.4- |
| 1992 09 22 | 033 | 0.3+ 0.9-   | 1998 01 28 | 113 | 1.9- 0.3+   | 1998 02 21 | 113 | 0.1+ 0.1- |
| 1992 09 25 | 033 | 0.1- 0.1-   | 1998 01 28 | 566 | 0.0 1.5-    | 1998 02 21 | 113 | 0.1+ 0.3- |

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1992 09 26 | 033 | 0.6+ | 0.5− | 1998 01 28 | 566 | 0.1+ | 1.2− | 1998 02 24 | 566 | 1.3+ | 1.9− |
| 1992 09 27 | 033 | 0.2+ | 1.0− | 1998 01 28 | 566 | 0.2− | 1.4− | 1998 02 24 | 566 | 0.8+ | 1.6− |
| 1992 09 28 | 033 | 0.4+ | 1.7− | 1998 02 01 | 113 | 0.9− | 0.2+ | 1998 02 24 | 566 | 1.1+ | 1.9− |
| 1994 01 14 | 033 | 0.6+ | 0.2+ | 1998 02 01 | 113 | 1.6− | 0.3+ |            |     |      |      |
| 1994 01 15 | 033 | 0.9+ | 0.0  | 1998 02 01 | 113 | 1.7− | 0.3+ |            |     |      |      |

**(8382)\* 1992 SQ<sub>26</sub> = 1977 DB<sub>8</sub> = 1977 DO<sub>8</sub> = 1994 CV<sub>18</sub> = 1994 CW<sub>18</sub>**

Discovered 1992 Sept. 23 by F. Börngen at Tautenburg.

Id. D. Kubaček (d, *MPC* 14668), G. V. Williams (*MPC* 25641)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| $M$ | 76.31725   |          | (2000.0)  | $P$         | $Q$         |
|-----|------------|----------|-----------|-------------|-------------|
| $n$ | 0.23344093 | $\omega$ | 285.43313 | +0.81683562 | −0.57298210 |
| $a$ | 2.6122699  | $\Omega$ | 109.56951 | +0.55274451 | +0.74422721 |
| $e$ | 0.1339409  | $i$      | 4.06944   | +0.16508506 | +0.34324535 |
| $P$ | 4.22       | $H$      | 14.8      | $G$ 0.15    | $U$ 2       |

Residuals in seconds of arc

|            |     |       |       |            |     |       |       |            |     |      |      |
|------------|-----|-------|-------|------------|-----|-------|-------|------------|-----|------|------|
| 1977 02 19 | 381 | 0.8−  | 1.0+  | 1994 02 08 | 809 | 0.2+  | 2.0+  | 1998 01 28 | 566 | 0.3+ | 0.7− |
| 1977 02 19 | 381 | 0.3−  | 0.3+  | 1994 02 10 | 809 | 1.2+  | 1.7+  | 1998 01 28 | 411 | 0.1+ | 0.5− |
| 1977 02 19 | 381 | 0.1+  | 0.3−  | 1994 02 10 | 809 | 0.7+  | 0.9+  | 1998 01 28 | 411 | 0.6− | 0.7− |
| 1977 02 19 | 381 | 1.0+  | 0.5−  | 1994 02 10 | 809 | 0.6−  | 1.3+  | 1998 01 29 | 727 | 0.6− | 0.2+ |
| 1992 09 23 | 033 | 0.4+  | 0.4+  | 1994 02 13 | 809 | (2.4+ | 0.8+) | 1998 01 29 | 727 | 1.4− | 0.5− |
| 1992 09 25 | 033 | 0.1+  | 0.5+  | 1994 02 13 | 809 | 0.8+  | 0.8+  | 1998 01 30 | 727 | 0.1+ | 0.2− |
| 1992 09 25 | 033 | 0.4+  | 0.5+  | 1994 02 13 | 809 | 1.0+  | 0.1+  | 1998 01 30 | 727 | 0.0  | 0.3− |
| 1992 09 27 | 033 | 1.3−  | 0.5−  | 1996 09 19 | 113 | (3.4− | 1.4−) | 1998 01 30 | 727 | 0.6+ | 0.2− |
| 1992 09 28 | 033 | 0.3−  | 0.2−  | 1996 09 19 | 113 | 0.7−  | 1.2−  | 1998 02 24 | 566 | 0.6+ | 0.2− |
| 1992 10 25 | 675 | 0.3+  | 0.7+  | 1996 09 19 | 113 | 0.2+  | 0.3+  | 1998 02 24 | 566 | 0.2+ | 0.0  |
| 1992 10 25 | 675 | 0.3+  | 0.6+  | 1996 10 03 | 113 | 0.2+  | 0.8+  | 1998 02 24 | 566 | 0.1+ | 0.2+ |
| 1992 10 31 | 033 | 0.2+  | 0.5−  | 1996 10 03 | 113 | 0.4−  | 1.0+  | 1998 03 01 | 699 | 0.0  | 0.1+ |
| 1992 10 31 | 033 | 0.2−  | 0.3−  | 1998 01 26 | 721 | 1.6+  | 1.0−  | 1998 03 01 | 699 | 1.3− | 0.8− |
| 1992 11 01 | 033 | 0.3+  | 0.5+  | 1998 01 26 | 721 | 1.0−  | 0.4+  | 1998 03 01 | 699 | 0.3− | 1.8− |
| 1992 11 23 | 033 | 0.8−  | 0.3−  | 1998 01 27 | 721 | 0.3+  | 0.9+  | 1998 03 01 | 327 | 0.4+ | 0.6− |
| 1992 11 23 | 033 | 0.1+  | 0.4+  | 1998 01 27 | 721 | 0.4+  | 0.5+  | 1998 03 01 | 327 | 0.6− | 0.3− |
| 1994 02 08 | 809 | (1.3+ | 2.8+) | 1998 01 28 | 566 | 0.2−  | 0.7−  | 1998 03 01 | 327 | 1.1− | 0.4− |
| 1994 02 08 | 809 | 0.5+  | 1.6+  | 1998 01 28 | 566 | 0.3+  | 0.8−  |            |     |      |      |

**(8383)\* 1992 UA<sub>3</sub> = 1994 EB<sub>6</sub>**

Discovered 1992 Oct. 25 by T. Hioki and S. Hayakawa at Okutama.

Id. G. V. Williams (*MPC* 23340)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| $M$ | 72.30108   |          | (2000.0)  | $P$         | $Q$         |
|-----|------------|----------|-----------|-------------|-------------|
| $n$ | 0.22754121 | $\omega$ | 352.63306 | +0.79622852 | −0.60306770 |
| $a$ | 2.6572312  | $\Omega$ | 44.57531  | +0.55852149 | +0.70205775 |
| $e$ | 0.0986761  | $i$      | 3.94325   | +0.23253792 | +0.37871396 |
| $P$ | 4.33       | $H$      | 13.4      | $G$ 0.15    | $U$ 1       |

Residuals in seconds of arc

|            |     |       |       |            |     |       |       |            |     |      |      |
|------------|-----|-------|-------|------------|-----|-------|-------|------------|-----|------|------|
| 1992 10 21 | 675 | 0.3−  | 0.8−  | 1994 02 13 | 809 | (2.0+ | 3.6+) | 1996 10 10 | 809 | 0.7− | 1.0+ |
| 1992 10 21 | 675 | 0.3+  | 0.3+  | 1994 02 13 | 809 | (1.9+ | 3.4+) | 1996 10 10 | 809 | 1.1− | 0.8+ |
| 1992 10 25 | 877 | 1.2+  | 1.2−  | 1994 02 16 | 010 | (2.8+ | 0.2−) | 1996 10 10 | 809 | 0.0  | 0.7+ |
| 1992 10 25 | 877 | 0.6−  | 0.7+  | 1994 02 16 | 010 | (2.9+ | 0.9−) | 1998 01 24 | 566 | 0.1+ | 0.8+ |
| 1992 10 27 | 877 | (2.4− | 0.8+) | 1994 03 09 | 010 | 0.1−  | 1.4−  | 1998 01 24 | 566 | 0.0  | 0.8+ |
| 1992 10 27 | 877 | 0.1−  | 0.1−  | 1994 03 09 | 010 | 0.6+  | 0.9−  | 1998 01 28 | 566 | 0.2+ | 0.8− |
| 1992 10 30 | 877 | 0.4−  | 0.6−  | 1994 03 09 | 010 | 0.6+  | 1.0−  | 1998 01 28 | 566 | 0.1− | 0.5− |
| 1992 11 18 | 877 | 1.6+  | 0.9−  | 1994 03 10 | 010 | 0.1+  | 1.3−  | 1998 01 28 | 566 | 0.4+ | 1.1− |
| 1992 11 18 | 877 | (6.7+ | 1.7−) | 1994 03 10 | 010 | 0.5+  | 1.1−  | 1998 01 29 | 566 | 0.4+ | 0.9+ |
| 1992 11 27 | 675 | 0.1−  | 0.6−  | 1994 03 10 | 010 | 0.2+  | 1.0−  | 1998 01 29 | 566 | 0.2+ | 0.4+ |
| 1992 11 27 | 675 | 0.1−  | 0.4−  | 1996 09 15 | 292 | 1.4+  | 0.1+  | 1998 01 29 | 566 | 0.1− | 0.7+ |
| 1994 02 08 | 809 | 0.9−  | 1.1+  | 1996 09 15 | 292 | 1.7+  | 1.0+  | 1998 02 17 | 327 | 0.4+ | 1.1+ |
| 1994 02 08 | 809 | 1.6−  | 1.3+  | 1996 09 20 | 292 | 0.4−  | 0.9−  | 1998 02 17 | 327 | 0.2− | 0.6+ |
| 1994 02 08 | 809 | 1.4−  | 0.7+  | 1996 09 20 | 292 | 0.7+  | 0.0   | 1998 02 17 | 327 | 0.1+ | 0.9+ |
| 1994 02 08 | 809 | (3.8+ | 2.6+) | 1996 10 07 | 809 | 0.2+  | 0.0   | 1998 02 22 | 566 | 0.2− | 0.2+ |
| 1994 02 08 | 809 | (3.8+ | 2.3+) | 1996 10 07 | 809 | 0.3−  | 0.9+  | 1998 02 22 | 566 | 0.1− | 0.0  |
| 1994 02 08 | 809 | (2.8+ | 1.7+) | 1996 10 07 | 809 | 0.3+  | 0.7+  | 1998 02 22 | 566 | 0.1+ | 0.3− |
| 1994 02 10 | 809 | (3.0+ | 5.6+) | 1996 10 08 | 809 | 0.4−  | 1.0−  | 1998 02 23 | 566 | 0.3+ | 0.4+ |

|            |     |       |       |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| 1994 02 10 | 809 | (3.0+ | 4.9+) | 1996 10 08 | 809 | 1.5− | 0.8− | 1998 02 23 | 566 | 0.4+ | 0.0  |
| 1994 02 10 | 809 | (2.4+ | 4.7+) | 1996 10 08 | 809 | 0.2− | 1.0− | 1998 02 23 | 566 | 0.4− | 0.1− |
| 1994 02 13 | 809 | (3.7+ | 4.0+) | 1996 10 10 | 809 | 0.7− | 1.1+ |            |     |      |      |

**(8384)\* 1992 YB**

Discovered 1992 Dec. 16 by T. Urata at the Nihondaira Observatory.

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| $M$ | 185.43523  |          | (2000.0)  | $\mathbf{P}$ | $\mathbf{Q}$ |
|-----|------------|----------|-----------|--------------|--------------|
| $n$ | 0.27544941 | $\omega$ | 257.67843 | +0.74955262  | −0.65862239  |
| $a$ | 2.3394197  | $\Omega$ | 143.45644 | +0.64231144  | +0.69948020  |
| $e$ | 0.1059967  | $i$      | 6.38694   | +0.16002150  | +0.27738779  |
| $P$ | 3.58       | $H$      | 14.2      | $G$ 0.15     | $U$ 1        |

Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| 1988 10 09 | 675 | 0.4−  | 0.7+  | 1993 01 17 | 385 | 0.8− | 1.4− | 1997 02 03 | 566 | 0.2− | 0.1− |
| 1988 10 09 | 675 | 0.9−  | 0.0   | 1993 01 19 | 385 | 0.6+ | 0.6− | 1997 02 03 | 566 | 0.3− | 0.4− |
| 1988 11 04 | 675 | 0.1+  | 0.6−  | 1993 01 19 | 385 | 0.4− | 0.9+ | 1997 02 03 | 566 | 1.0− | 0.1− |
| 1988 11 04 | 675 | 1.0+  | 0.7+  | 1993 02 13 | 385 | 1.0+ | 0.3− | 1997 02 07 | 098 | 0.7− | 1.1− |
| 1992 12 16 | 385 | 0.2+  | 0.3+  | 1993 02 13 | 385 | 1.3− | 0.9+ | 1997 02 07 | 098 | 0.4+ | 0.7− |
| 1992 12 16 | 385 | 0.8+  | 0.4−  | 1995 08 26 | 809 | 0.4− | 0.2+ | 1997 02 08 | 098 | 0.8− | 0.3+ |
| 1992 12 17 | 385 | 0.9+  | 0.3−  | 1995 08 27 | 809 | 0.3− | 0.2− | 1997 02 08 | 098 | 0.0  | 0.1+ |
| 1992 12 17 | 385 | 0.3−  | 0.5+  | 1995 08 27 | 809 | 0.3− | 0.6− | 1997 02 11 | 385 | 0.2+ | 0.1+ |
| 1992 12 18 | 885 | 1.7−  | 0.4−  | 1995 08 28 | 809 | 0.3− | 0.5− | 1997 02 11 | 385 | 0.5+ | 0.1+ |
| 1992 12 25 | 885 | (1.6+ | 2.4+) | 1995 08 29 | 809 | 0.6+ | 0.7− | 1997 02 13 | 385 | 1.0+ | 0.1− |
| 1992 12 25 | 885 | 0.9+  | 0.6+  | 1995 08 30 | 809 | 1.1+ | 0.1− | 1997 02 13 | 385 | 0.4+ | 0.1− |
| 1992 12 25 | 885 | 0.2+  | 0.7+  | 1995 08 30 | 809 | 0.1− | 0.3− | 1997 03 03 | 385 | 0.2+ | 0.0  |
| 1992 12 30 | 385 | 0.3−  | 0.5+  | 1995 08 31 | 809 | 0.6+ | 0.3− | 1997 03 03 | 385 | 0.1+ | 0.4− |
| 1992 12 31 | 385 | (2.2+ | 0.2+) | 1997 02 03 | 411 | 0.4− | 0.3+ |            |     |      |      |
| 1993 01 17 | 385 | 0.0   | 1.0−  | 1997 02 03 | 411 | 0.0  | 0.0  |            |     |      |      |

**(8385)\* 1993 AN = 1982 BP<sub>13</sub> = 1988 EX = 1988 FH<sub>3</sub>**

Discovered 1993 Jan. 13 by S. Ueda and H. Kaneda at Kushiho.

Id. S. Nakano (*MPC* 21946), B. G. Marsden (d, *ibid.*), A. Lowe (unpublished)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Nakano

| $M$ | 325.56826  |          | (2000.0)  | $\mathbf{P}$ | $\mathbf{Q}$ |
|-----|------------|----------|-----------|--------------|--------------|
| $n$ | 0.17868504 | $\omega$ | 8.51060   | −0.38657188  | −0.92119044  |
| $a$ | 3.1218396  | $\Omega$ | 104.24011 | +0.84343759  | −0.37259259  |
| $e$ | 0.1583198  | $i$      | 2.62482   | +0.37306194  | −0.11217367  |
| $P$ | 5.52       | $H$      | 13.1      | $G$ 0.15     | $U$ 1        |

Residuals in seconds of arc

|            |     |        |       |            |     |      |      |            |     |      |      |
|------------|-----|--------|-------|------------|-----|------|------|------------|-----|------|------|
| 1982 01 30 | 675 | 0.4+   | 0.3−  | 1993 01 13 | 399 | 0.4+ | 0.2− | 1997 11 29 | 704 | 0.5+ | 0.1+ |
| 1982 01 31 | 675 | 0.2+   | 0.3+  | 1993 01 13 | 399 | 0.2− | 0.3− | 1997 12 04 | 704 | 0.0  | 0.3+ |
| 1988 03 13 | 054 | 0.4+   | 0.2+  | 1993 01 20 | 399 | 1.0− | 0.4+ | 1997 12 04 | 704 | 1.0+ | 0.3− |
| 1988 03 13 | 054 | 1.7−   | 1.4+  | 1993 01 20 | 399 | 0.7+ | 0.1+ | 1997 12 04 | 704 | 0.4+ | 0.3− |
| 1988 03 14 | 054 | 0.5−   | 1.3−  | 1993 02 10 | 399 | 0.3+ | 0.6+ | 1997 12 04 | 704 | 0.3+ | 0.9+ |
| 1988 03 23 | 809 | (34.6+ | 8.1−) | 1993 02 10 | 399 | 0.2− | 0.3+ | 1997 12 04 | 704 | 0.5− | 0.0  |
| 1988 03 23 | 809 | (36.4+ | 2.7−) | 1993 02 15 | 399 | 0.7− | 0.7+ | 1998 02 19 | 910 | 0.6− | 0.9− |
| 1988 03 24 | 809 | 1.8+   | 1.1−  | 1993 02 15 | 399 | 0.5− | 0.8+ | 1998 02 19 | 910 | 0.5− | 0.7− |
| 1988 03 24 | 809 | 0.0    | 0.1−  | 1997 11 29 | 704 | 0.4+ | 0.3+ | 1998 02 19 | 910 | 0.7− | 0.6− |
| 1991 10 06 | 691 | 0.6−   | 0.2+  | 1997 11 29 | 704 | 1.5+ | 0.6− | 1998 02 20 | 910 | 0.9− | 0.3− |
| 1991 10 06 | 691 | 0.3−   | 0.4+  | 1997 11 29 | 704 | 0.5+ | 0.3− | 1998 02 20 | 910 | 0.8− | 0.3− |
| 1991 10 06 | 691 | 0.9−   | 0.1+  | 1997 11 29 | 704 | 0.6+ | 0.3+ | 1998 02 20 | 910 | 0.6− | 0.3− |

**(8386)\* 1993 BB<sub>6</sub> = 1981 UL<sub>2</sub>**

Discovered 1993 Jan. 27 by E. W. Elst at Caussols.

Id. S. Nakano (*MPC* 28300)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Nakano

| $M$ | 140.83622  | (2000.0) | $\mathbf{P}$ | $\mathbf{Q}$ |             |
|-----|------------|----------|--------------|--------------|-------------|
| $n$ | 0.19765805 | $\omega$ | 347.82447    | +0.97126907  | +0.23798266 |
| $a$ | 2.9187241  | $\Omega$ | 358.40735    | −0.21585748  | +0.87954349 |
| $e$ | 0.0469231  | $i$      | 1.65118      | −0.10020947  | +0.41202851 |
| $P$ | 4.99       | $H$      | 13.4         | $G$ 0.15     | $U$ 1       |

Residuals in seconds of arc

|            |     |      |      |            |     |       |       |            |     |      |      |
|------------|-----|------|------|------------|-----|-------|-------|------------|-----|------|------|
| 1981 10 30 | 381 | 0.5+ | 0.8- | 1993 01 29 | 691 | 1.1-  | 0.5+  | 1996 10 21 | 411 | 0.3+ | 0.9- |
| 1981 10 30 | 381 | 0.7+ | 0.4- | 1993 01 29 | 691 | 1.0-  | 0.1-  | 1996 10 21 | 411 | 1.3- | 0.1+ |
| 1989 05 07 | 675 | 0.4+ | 0.0  | 1993 01 29 | 691 | 1.1-  | 0.9+  | 1998 01 24 | 566 | 0.3+ | 0.2- |
| 1989 05 07 | 675 | 0.0  | 1.3+ | 1993 01 29 | 691 | 1.0-  | 0.3+  | 1998 01 24 | 566 | 0.1+ | 0.1- |
| 1991 11 27 | 691 | 0.8- | 0.9+ | 1993 01 29 | 691 | 0.9-  | 0.2+  | 1998 01 24 | 566 | 0.3+ | 0.1+ |
| 1991 11 27 | 691 | 0.5- | 0.9+ | 1993 01 29 | 691 | 1.1-  | 0.1+  | 1998 02 23 | 557 | 0.2+ | 0.0  |
| 1991 11 27 | 691 | 0.9- | 0.3+ | 1993 02 20 | 010 | (2.4+ | 1.8-) | 1998 02 23 | 557 | 0.4+ | 0.0  |
| 1993 01 27 | 010 | 0.6+ | 0.7- | 1993 02 20 | 010 | (1.0+ | 2.5-) | 1998 02 23 | 557 | 0.1- | 0.2- |
| 1993 01 27 | 010 | 0.4- | 0.3- | 1993 02 20 | 010 | (2.1+ | 3.0-) | 1998 02 23 | 557 | 0.1+ | 0.2- |
| 1993 01 27 | 010 | 0.2+ | 0.7- | 1993 02 22 | 010 | 0.8+  | 0.7-  | 1998 03 01 | 557 | 0.3+ | 0.2- |
| 1993 01 28 | 010 | 0.7+ | 0.5+ | 1993 02 23 | 010 | 1.2+  | 1.0-  | 1998 03 01 | 557 | 0.2- | 0.8+ |
| 1993 01 28 | 010 | 0.7+ | 0.1+ | 1996 10 20 | 411 | 0.7+  | 1.1+  |            |     |      |      |
| 1993 01 28 | 010 | 1.0+ | 0.3+ | 1996 10 20 | 411 | 0.7+  | 0.0   |            |     |      |      |

**(8387)\* 1993 DO = 1977 CK<sub>1</sub> = 1985 RH<sub>6</sub> = 1990 RH<sub>11</sub>**

Discovered 1993 Feb. 19 by T. Seki at Geisei.

Id. K. Ichikawa (*MPC* 22059)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| Williams |            |                    |                          |
|----------|------------|--------------------|--------------------------|
| <i>M</i> | 67.31666   | (2000.0)           |                          |
| <i>n</i> | 0.18945651 | $\omega$ 270.70795 | +0.41895364 -0.90429994  |
| <i>a</i> | 3.0023618  | $\Omega$ 154.03406 | +0.88964905 +0.39074505  |
| <i>e</i> | 0.0955796  | <i>i</i> 10.79067  | +0.18166569 +0.17193001  |
| <i>P</i> | 5.20       | <i>H</i> 12.5      | <i>G</i> 0.15 <i>U</i> 1 |

Residuals in seconds of arc

|            |     |       |       |            |     |       |       |            |     |      |      |
|------------|-----|-------|-------|------------|-----|-------|-------|------------|-----|------|------|
| 1951 01 04 | 675 | 1.2-  | 0.0   | 1994 05 14 | 801 | 0.2-  | 0.4-  | 1998 02 06 | 758 | 0.5+ | 0.5+ |
| 1951 01 04 | 675 | 0.9-  | 0.3-  | 1994 05 15 | 801 | 0.0   | 0.9-  | 1998 02 06 | 758 | 0.4+ | 0.5+ |
| 1951 02 10 | 760 | 1.5+  | 0.8-  | 1994 05 15 | 801 | 0.4+  | 0.9-  | 1998 02 06 | 758 | 0.5+ | 0.4- |
| 1951 02 10 | 760 | (3.5+ | 0.9+) | 1994 06 09 | 801 | 0.3-  | 0.6+  | 1998 02 06 | 809 | 1.4- | 1.2- |
| 1977 02 11 | 675 | 0.5+  | 0.3+  | 1994 06 09 | 801 | 0.4-  | 0.1+  | 1998 02 06 | 809 | 1.4- | 1.8- |
| 1977 02 12 | 675 | 1.8+  | 0.5-  | 1995 07 25 | 372 | (0.2+ | 3.2-) | 1998 02 06 | 809 | 2.5- | 2.0- |
| 1985 09 15 | 095 | 1.5-  | 1.4-  | 1995 07 25 | 372 | 0.4+  | 0.9+  | 1998 02 07 | 809 | 0.3+ | 1.4+ |
| 1990 09 14 | 675 | 0.3+  | 1.3-  | 1995 08 17 | 372 | (3.3- | 0.7-) | 1998 02 07 | 809 | 1.1+ | 1.3+ |
| 1990 09 14 | 675 | 0.5-  | 0.9-  | 1995 08 17 | 372 | (0.1+ | 2.8+) | 1998 02 07 | 809 | 0.9+ | 1.4+ |
| 1993 02 19 | 372 | (2.7- | 1.4+) | 1995 08 28 | 801 | 1.0+  | 0.2+  | 1998 02 19 | 699 | 0.2+ | 0.4- |
| 1993 02 19 | 372 | 0.4-  | 0.1+  | 1995 08 28 | 801 | 0.9-  | 0.5+  | 1998 02 19 | 699 | 0.6+ | 0.2- |
| 1993 02 25 | 372 | 0.0   | 0.1+  | 1995 08 29 | 801 | 1.2+  | 0.4-  | 1998 02 19 | 699 | 0.3+ | 0.4- |
| 1993 02 25 | 372 | 1.5-  | 1.0-  | 1995 08 29 | 801 | 1.0+  | 0.1-  | 1998 02 27 | 610 | 0.1+ | 0.5- |
| 1993 03 02 | 372 | (2.7- | 1.2-) | 1996 11 10 | 801 | 0.0   | 0.6+  | 1998 02 27 | 610 | 0.3+ | 0.2- |
| 1993 03 02 | 372 | 1.3-  | 1.3+  | 1996 11 11 | 801 | 0.1+  | 0.4-  | 1998 02 27 | 610 | 0.6+ | 0.1+ |
| 1994 05 14 | 801 | 0.1-  | 0.6-  | 1996 11 11 | 801 | 0.1+  | 1.3-  |            |     |      |      |

**(8388)\* 1993 FO<sub>6</sub> = 1990 UO<sub>14</sub>**

Discovered 1993 Mar. 17 at the European Southern Observatory in the course of the Uppsala-ESO Survey of Asteroids and Comets.

Id. G. V. Williams (*MPC* 29917)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| Williams |            |                    |                          |
|----------|------------|--------------------|--------------------------|
| <i>M</i> | 128.46854  | (2000.0)           |                          |
| <i>n</i> | 0.19737414 | $\omega$ 326.41544 | +0.82291039 -0.56599569  |
| <i>a</i> | 2.9215224  | $\Omega$ 68.13308  | +0.53235579 +0.73753618  |
| <i>e</i> | 0.0575139  | <i>i</i> 3.06814   | +0.19853414 +0.36836024  |
| <i>P</i> | 4.99       | <i>H</i> 12.8      | <i>G</i> 0.15 <i>U</i> 2 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1988 03 18 | 675 | 0.6+ | 1.9+ | 1993 04 12 | 372 | 0.3- | 1.0+ | 1997 12 07 | 910 | 0.8- | 0.5- |
| 1988 03 18 | 675 | 0.4+ | 1.0+ | 1993 04 16 | 413 | 1.0+ | 0.1- | 1997 12 08 | 910 | 0.8- | 0.5- |
| 1990 10 22 | 675 | 0.3+ | 1.1+ | 1996 12 07 | 411 | 0.5- | 0.5- | 1997 12 08 | 910 | 0.7- | 0.5- |
| 1990 10 22 | 675 | 0.7- | 0.5- | 1996 12 07 | 411 | 0.7+ | 0.3+ | 1997 12 08 | 910 | 0.8- | 0.2- |
| 1993 03 17 | 809 | 1.3- | 1.5+ | 1996 12 08 | 411 | 0.0  | 0.6+ | 1998 02 24 | 566 | 0.1+ | 0.8- |
| 1993 03 18 | 809 | 0.8+ | 0.1- | 1996 12 08 | 411 | 0.3+ | 0.4+ | 1998 02 24 | 566 | 0.2+ | 1.0- |
| 1993 03 23 | 809 | 1.4+ | 0.2- | 1997 12 07 | 910 | 0.7- | 0.6- | 1998 02 24 | 566 | 0.0  | 0.2- |
| 1993 04 12 | 372 | 0.1+ | 0.7- | 1997 12 07 | 910 | 0.7- | 0.5- |            |     |      |      |

**(8389)\* 1993 FT<sub>37</sub> = 1977 FO<sub>2</sub> = 1996 XZ<sub>8</sub>**

Discovered 1993 Mar. 19 at the European Southern Observatory in the course of the Uppsala-ESO Survey of Asteroids and Comets.

Id. T. B. Spahr (*MPC* 30659)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| Williams |            |                    |                          |
|----------|------------|--------------------|--------------------------|
| <i>M</i> | 343.98548  | (2000.0)           |                          |
| <i>n</i> | 0.18618524 | $\omega$ 1.34581   | -0.95449131 -0.29789201  |
| <i>a</i> | 3.0374273  | $\Omega$ 161.30380 | +0.27320796 -0.89269635  |
| <i>e</i> | 0.1534393  | <i>i</i> 2.57052   | +0.11959824 -0.33816206  |
| <i>P</i> | 5.29       | <i>H</i> 13.3      | <i>G</i> 0.15 <i>U</i> 1 |

Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |       |       |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|-------|-------|
| 1977 03 26 | 095 | 1.3+  | 0.7+  | 1995 09 17 | 809 | 0.2- | 0.7- | 1998 02 01 | 621 | 0.3+  | 0.2-  |
| 1993 03 19 | 809 | 1.4-  | 1.5+  | 1995 09 18 | 809 | 0.1+ | 0.5- | 1998 02 01 | 621 | 0.2+  | 0.1-  |
| 1993 03 20 | 809 | 0.8-  | 1.4+  | 1995 09 18 | 809 | 0.3+ | 0.4- | 1998 02 02 | 621 | 0.1+  | 0.1-  |
| 1993 03 24 | 809 | 0.4-  | 0.5+  | 1995 09 19 | 809 | 1.0+ | 0.0  | 1998 02 02 | 621 | 0.2+  | 0.1-  |
| 1993 03 29 | 399 | 1.8-  | 0.1-  | 1995 09 20 | 809 | 0.2- | 0.9+ | 1998 02 04 | 621 | 0.3+  | 0.3-  |
| 1993 03 29 | 399 | (2.2- | 0.8-) | 1995 09 22 | 809 | 0.8- | 0.0  | 1998 02 04 | 621 | 0.3+  | 0.3-  |
| 1993 04 18 | 413 | 0.2-  | 0.4-  | 1996 12 08 | 684 | 0.0  | 0.0  | 1998 02 04 | 621 | 0.3+  | 0.4-  |
| 1993 05 09 | 695 | 0.2+  | 0.1-  | 1996 12 08 | 684 | 0.2- | 0.2+ | 1998 02 06 | 809 | 0.8+  | 1.1+  |
| 1993 05 09 | 695 | 0.1+  | 0.0   | 1996 12 09 | 684 | 0.2- | 0.2- | 1998 02 06 | 809 | 0.2-  | 0.7+  |
| 1993 05 09 | 695 | 0.1+  | 0.1-  | 1996 12 09 | 684 | 0.3- | 0.3- | 1998 02 06 | 809 | 0.2-  | 0.7+  |
| 1993 05 09 | 695 | 0.2+  | 0.1-  | 1996 12 09 | 684 | 0.2- | 0.1- | 1998 02 07 | 809 | (1.2- | 3.2-) |
| 1993 05 09 | 695 | 0.3+  | 0.2-  | 1996 12 12 | 684 | 1.1- | 0.1- | 1998 02 07 | 809 | (1.2- | 3.5-) |
| 1995 08 19 | 809 | 0.6+  | 0.9+  | 1996 12 12 | 684 | 0.1+ | 1.2+ | 1998 02 07 | 809 | (1.4- | 2.9-) |
| 1995 08 20 | 809 | 0.4+  | 0.7+  | 1996 12 13 | 684 | 0.4- | 0.2- | 1998 02 25 | 566 | 0.4+  | 0.5-  |
| 1995 08 22 | 809 | 1.0+  | 0.6+  | 1996 12 13 | 684 | 0.4- | 0.3- | 1998 02 25 | 566 | 0.7+  | 0.6-  |
| 1995 08 24 | 809 | 0.0   | 0.3+  | 1996 12 13 | 684 | 0.5- | 0.3- | 1998 02 25 | 566 | 0.4+  | 0.5-  |
| 1995 08 25 | 809 | 0.4-  | 0.6-  | 1998 02 01 | 621 | 0.0  | 0.2- | 1998 02 26 | 610 | 0.4-  | 0.3-  |
| 1995 08 26 | 809 | 0.4+  | 0.2+  | 1998 02 01 | 621 | 0.1- | 0.3- | 1998 02 26 | 610 | 0.1-  | 0.2-  |
| 1995 08 27 | 809 | 0.1-  | 0.7+  | 1998 02 01 | 621 | 0.1+ | 0.2- | 1998 02 26 | 610 | 0.2+  | 0.1-  |
| 1995 08 27 | 809 | (2.4+ | 1.6-) | 1998 02 01 | 621 | 0.2+ | 0.3- |            |     |       |       |

**(8390)\* 1993 FE<sub>48</sub> = 1977 EG<sub>8</sub> = 1990 TZ<sub>13</sub>**

Discovered 1993 Mar. 19 at the European Southern Observatory in the course of the Uppsala-ESO Survey of Asteroids and Comets.

Id. G. V. Williams (*MPC* 23528)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| Williams |            |                    |                          |
|----------|------------|--------------------|--------------------------|
| <i>M</i> | 266.16738  | (2000.0)           |                          |
| <i>n</i> | 0.18530194 | $\omega$ 51.03207  | -0.37616604 +0.92651932  |
| <i>a</i> | 3.0470722  | $\Omega$ 196.87659 | -0.85820214 -0.35158340  |
| <i>e</i> | 0.0962253  | <i>i</i> 1.54228   | -0.34926808 -0.13398156  |
| <i>P</i> | 5.32       | <i>H</i> 12.9      | <i>G</i> 0.15 <i>U</i> 1 |

Residuals in seconds of arc

|            |     |      |      |            |     |       |       |            |     |      |      |
|------------|-----|------|------|------------|-----|-------|-------|------------|-----|------|------|
| 1977 03 12 | 381 | 0.1- | 0.1- | 1993 04 17 | 413 | 0.5-  | 0.1+  | 1998 02 07 | 809 | 1.6- | 2.1+ |
| 1977 03 12 | 381 | 1.5- | 0.6- | 1994 07 09 | 809 | (2.0- | 4.5-) | 1998 02 07 | 809 | 1.6- | 2.4+ |
| 1977 03 14 | 381 | 0.5- | 0.4- | 1994 07 09 | 809 | (2.1- | 4.1-) | 1998 02 07 | 809 | 2.0- | 2.0+ |
| 1977 03 14 | 381 | 0.3+ | 1.2- | 1994 07 09 | 809 | (3.0- | 4.0-) | 1998 02 07 | 809 | 2.9+ | 0.8+ |
| 1977 03 15 | 381 | 0.2- | 1.6- | 1994 07 12 | 801 | 0.1-  | 0.1+  | 1998 02 07 | 809 | 3.0+ | 0.8+ |
| 1977 03 15 | 381 | 0.4- | 0.9- | 1994 07 12 | 801 | 0.7-  | 0.4+  | 1998 02 07 | 809 | 2.7+ | 1.0- |
| 1989 08 01 | 675 | 0.5- | 0.5+ | 1994 07 13 | 801 | 0.4+  | 0.1+  | 1998 02 25 | 426 | 0.1+ | 0.7- |
| 1989 08 01 | 675 | 0.0  | 0.8+ | 1994 07 13 | 801 | 0.1-  | 0.1+  | 1998 02 25 | 426 | 0.1+ | 0.4- |
| 1990 10 14 | 033 | 0.9+ | 0.9- | 1998 02 06 | 809 | 1.2-  | 2.0+  | 1998 02 25 | 426 | 0.2+ | 0.6- |
| 1990 10 14 | 033 | 0.2+ | 0.9- | 1998 02 06 | 809 | 2.3-  | 2.4+  | 1998 02 27 | 426 | 0.4- | 0.4- |
| 1990 10 14 | 033 | 0.0  | 0.5- | 1998 02 06 | 809 | (2.5- | 3.4+) | 1998 02 27 | 426 | 0.5- | 0.5- |
| 1993 03 19 | 809 | 0.3- | 0.6- | 1998 02 06 | 809 | 1.6+  | 1.2-  | 1998 02 27 | 426 | 0.7- | 0.8- |
| 1993 03 20 | 809 | 0.1- | 0.3- | 1998 02 06 | 809 | 1.5+  | 1.4-  |            |     |      |      |
| 1993 03 24 | 809 | 2.1+ | 1.0- | 1998 02 06 | 809 | 2.1+  | 1.6-  |            |     |      |      |

**(8391)\* 1993 HH<sub>3</sub> = 1982 HT<sub>2</sub> = 1990 SV<sub>4</sub>**

Discovered 1993 Apr. 20 by Spacewatch at Kitt Peak.

Id. G. V. Williams (*MPC* 23528)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 35.54962   |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.17837957 | $\omega$ | 327.11538 | -0.02177404   | -0.99881731 |
| <i>a</i> | 3.1254026  | $\Omega$ | 124.09675 | +0.92822967   | -0.03634907 |
| <i>e</i> | 0.1074520  | <i>i</i> | 3.00926   | +0.37136985   | +0.03229124 |
| <i>P</i> | 5.53       | <i>H</i> | 12.4      | <i>G</i> 0.15 | <i>U</i> 1  |

Residuals in seconds of arc

|            |     |      |      |            |     |       |       |            |     |      |      |
|------------|-----|------|------|------------|-----|-------|-------|------------|-----|------|------|
| 1982 04 27 | 033 | 0.5+ | 1.1+ | 1993 04 29 | 691 | 0.1-  | 0.5-  | 1998 02 25 | 132 | 0.6- | 0.6- |
| 1982 04 27 | 033 | 0.1+ | 0.4+ | 1993 04 29 | 691 | 0.2-  | 0.4-  | 1998 02 25 | 132 | 0.0  | 0.6- |
| 1990 09 22 | 809 | 0.6- | 0.6- | 1993 04 29 | 691 | 0.2+  | 0.6-  | 1998 02 26 | 566 | 0.1+ | 0.3+ |
| 1990 09 22 | 809 | 0.1- | 0.8- | 1998 01 23 | 691 | 0.7-  | 0.7-  | 1998 02 26 | 566 | 0.0  | 0.3+ |
| 1990 09 22 | 809 | 0.3- | 0.7- | 1998 01 23 | 691 | 0.9-  | 0.7-  | 1998 02 26 | 566 | 0.3+ | 0.3+ |
| 1990 09 25 | 809 | 0.6+ | 0.8+ | 1998 01 23 | 691 | 0.9-  | 0.3-  | 1998 02 26 | 610 | 1.5- | 0.3- |
| 1990 09 25 | 809 | 0.1- | 0.7+ | 1998 02 20 | 713 | 0.5-  | 0.1-  | 1998 02 26 | 610 | 0.5- | 0.0  |
| 1990 09 25 | 809 | 0.4+ | 0.8+ | 1998 02 20 | 713 | 0.1-  | 0.4+  | 1998 02 26 | 610 | 0.5+ | 0.5+ |
| 1993 03 19 | 809 | 0.4- | 0.2+ | 1998 02 20 | 713 | 0.2-  | 0.5+  | 1998 02 27 | 713 | 0.3+ | 0.3+ |
| 1993 03 20 | 809 | 1.1+ | 0.3+ | 1998 02 24 | 566 | 0.6+  | 1.0-  | 1998 02 27 | 713 | 0.4+ | 0.4+ |
| 1993 03 24 | 809 | 0.5- | 0.3- | 1998 02 24 | 566 | 0.6+  | 0.9-  | 1998 02 27 | 713 | 0.2+ | 0.5+ |
| 1993 03 24 | 809 | 0.1+ | 1.3+ | 1998 02 24 | 566 | 1.0+  | 1.0-  | 1998 02 28 | 699 | 0.4- | 0.7+ |
| 1993 04 20 | 691 | 0.2+ | 0.6- | 1998 02 24 | 610 | (2.1+ | 0.9+) | 1998 02 28 | 699 | 0.0  | 0.7+ |
| 1993 04 20 | 691 | 0.3- | 0.9- | 1998 02 24 | 610 | 1.3+  | 1.6+  | 1998 02 28 | 699 | 1.0+ | 0.0  |
| 1993 04 20 | 691 | 0.6- | 0.4- | 1998 02 24 | 610 | (0.3+ | 2.1+) |            |     |      |      |
| 1993 04 21 | 413 | 0.3- | 0.3+ | 1998 02 25 | 132 | (1.8- | 2.5-) |            |     |      |      |

**(8392)\* 1993 OP = 1995 CG<sub>2</sub>**

Discovered 1993 July 18 by E. F. Helin at Palomar.

Id. G. V. Williams (*MPC* 24898)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 52.70669   |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.28485894 | $\omega$ | 95.42602  | +0.84723320   | -0.36172413 |
| <i>a</i> | 2.2876144  | $\Omega$ | 286.25952 | +0.15660470   | +0.86987504 |
| <i>e</i> | 0.1982636  | <i>i</i> | 23.90666  | +0.50761292   | +0.33537005 |
| <i>P</i> | 3.46       | <i>H</i> | 13.6      | <i>G</i> 0.15 | <i>U</i> 1  |

Residuals in seconds of arc

|            |     |       |       |            |     |       |       |            |     |      |      |
|------------|-----|-------|-------|------------|-----|-------|-------|------------|-----|------|------|
| 1990 12 17 | 675 | 0.6-  | 1.6-  | 1993 08 22 | 675 | (0.2+ | 2.9+) | 1995 02 09 | 413 | 0.2- | 0.1+ |
| 1990 12 17 | 675 | 0.9-  | 2.0-  | 1993 10 11 | 801 | 0.1+  | 0.5-  | 1995 02 09 | 413 | 0.1- | 0.0  |
| 1991 01 15 | 675 | (2.9- | 0.3-) | 1993 10 12 | 801 | 0.1+  | 0.7-  | 1997 11 23 | 327 | 1.0+ | 0.4+ |
| 1991 01 15 | 675 | 0.0   | 0.1+  | 1993 10 18 | 801 | 1.2-  | 0.7-  | 1997 11 23 | 327 | 0.8+ | 0.7+ |
| 1993 07 18 | 675 | 0.9-  | 0.1-  | 1993 10 18 | 801 | 0.4+  | 1.3-  | 1997 11 23 | 327 | 0.5+ | 1.0+ |
| 1993 07 18 | 675 | 0.3-  | 0.2-  | 1993 11 11 | 801 | 0.1+  | 0.8+  | 1998 01 18 | 758 | 0.4+ | 0.7+ |
| 1993 07 20 | 675 | 0.3+  | 0.3+  | 1993 11 11 | 801 | 0.0   | 0.8+  | 1998 01 26 | 704 | 0.0  | 0.4+ |
| 1993 07 20 | 675 | 0.4-  | 2.0+  | 1993 11 16 | 801 | 0.1-  | 0.1-  | 1998 01 26 | 704 | 0.3- | 0.6+ |
| 1993 08 19 | 675 | 0.7+  | 0.1+  | 1993 11 16 | 801 | 0.2+  | 0.1-  | 1998 01 26 | 704 | 0.7+ | 0.6+ |
| 1993 08 19 | 675 | 0.5+  | 0.1+  | 1995 02 08 | 413 | 0.4-  | 0.5+  | 1998 01 26 | 704 | 0.1+ | 0.9+ |
| 1993 08 22 | 675 | 0.9-  | 1.1+  | 1995 02 08 | 413 | 1.0+  | 0.2-  | 1998 01 26 | 704 | 0.1+ | 0.1+ |

**(8393)\* 1993 TJ<sub>1</sub> = 1955 QT<sub>1</sub> = 1986 SD<sub>3</sub>**

Discovered 1993 Oct. 15 by K. Endate and K. Watanabe at Kitami.

Id. S. Nakano (*MPC* 22818)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 111.85089  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.28738466 | $\omega$ | 316.60214 | +0.93773735   | +0.34485995 |
| <i>a</i> | 2.2741913  | $\Omega$ | 23.32121  | -0.28313186   | +0.82808088 |
| <i>e</i> | 0.1919466  | <i>i</i> | 6.01382   | -0.20120888   | +0.44198832 |
| <i>P</i> | 3.43       | <i>H</i> | 13.5      | <i>G</i> 0.15 | <i>U</i> 2  |

Residuals in seconds of arc

|            |     |      |      |            |     |       |       |            |     |      |      |
|------------|-----|------|------|------------|-----|-------|-------|------------|-----|------|------|
| 1955 08 25 | 839 | 0.6+ | 0.8- | 1995 02 05 | 372 | (5.2- | 2.1+) | 1998 02 17 | 426 | 0.3- | 0.6- |
| 1986 09 29 | 095 | 0.1+ | 1.3+ | 1995 02 05 | 372 | (6.7- | 2.5+) | 1998 02 18 | 426 | 0.4- | 0.3+ |
| 1986 10 02 | 095 | 1.7- | 0.7- | 1995 02 06 | 372 | (2.9- | 4.3+) | 1998 02 18 | 426 | 0.3+ | 0.1+ |
| 1993 10 14 | 675 | 1.1+ | 0.6+ | 1995 02 06 | 372 | (0.5- | 4.0+) | 1998 02 18 | 426 | 0.2- | 0.1- |
| 1993 10 15 | 400 | 0.8+ | 0.9+ | 1995 03 03 | 400 | 1.7-  | 0.0   | 1998 02 20 | 725 | 0.4+ | 0.5+ |

|            |     |      |      |            |     |       |       |            |     |      |      |
|------------|-----|------|------|------------|-----|-------|-------|------------|-----|------|------|
| 1993 10 15 | 400 | 0.5- | 0.1- | 1995 03 03 | 400 | (2.3- | 0.9+) | 1998 02 20 | 426 | 0.5- | 0.5- |
| 1993 10 16 | 400 | 1.5- | 0.6+ | 1995 03 05 | 400 | (2.6- | 0.0 ) | 1998 02 20 | 426 | 0.3- | 0.1+ |
| 1993 10 16 | 400 | 1.4+ | 0.1+ | 1995 03 05 | 400 | 0.4+  | 0.2-  | 1998 02 20 | 426 | 0.1- | 0.9- |
| 1993 10 19 | 403 | 0.3- | 1.6- | 1996 06 19 | 689 | 0.3+  | 1.3+  | 1998 02 21 | 725 | 0.0  | 0.1+ |
| 1993 10 19 | 403 | 1.6+ | 1.6- | 1998 01 26 | 566 | 0.3+  | 0.5+  | 1998 02 21 | 725 | 0.2- | 0.1+ |
| 1993 10 20 | 399 | 0.5- | 1.5+ | 1998 01 26 | 566 | 0.3+  | 0.6+  | 1998 02 23 | 725 | 1.2+ | 0.8+ |
| 1993 10 20 | 399 | 0.1+ | 0.1+ | 1998 01 26 | 566 | 0.4+  | 0.4+  | 1998 02 23 | 725 | 0.2+ | 1.1+ |
| 1993 11 10 | 400 | 0.9- | 0.7- | 1998 02 17 | 426 | 0.2-  | 0.5-  |            |     |      |      |
| 1993 11 10 | 400 | 0.5- | 0.3- | 1998 02 17 | 426 | 0.3+  | 0.3-  |            |     |      |      |

**(8394)\* 1993 TM<sub>12</sub> = 1986 PG<sub>3</sub> = 1996 NE<sub>3</sub>**

Discovered 1993 Oct. 13 by H. E. Holt at Palomar.

Id. G. V. Williams (*MPC* 27715)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 49.18494   |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.29545153 | $\omega$ | 295.38952 | +0.34495865   | -0.93812104 |
| <i>a</i> | 2.2326049  | $\Omega$ | 134.39521 | +0.87579361   | +0.30999711 |
| <i>e</i> | 0.1146125  | <i>i</i> | 2.44932   | +0.33762270   | +0.15437196 |
| <i>P</i> | 3.34       | <i>H</i> | 14.6      | <i>G</i> 0.15 | <i>U</i> 1  |

Residuals in seconds of arc

|            |     |        |       |            |     |       |       |            |     |      |      |
|------------|-----|--------|-------|------------|-----|-------|-------|------------|-----|------|------|
| 1986 08 01 | 675 | (28.5- | 4.1-) | 1993 10 11 | 809 | 1.1-  | 0.9+  | 1996 08 17 | 566 | 0.2- | 0.0  |
| 1986 08 01 | 675 | (27.4- | 1.0-) | 1993 10 13 | 675 | 0.2-  | 1.4-  | 1996 08 17 | 566 | 0.2- | 0.2- |
| 1986 08 02 | 675 | 0.8+   | 1.8-  | 1993 10 13 | 675 | 0.1+  | 0.9-  | 1998 01 08 | 910 | 0.0  | 0.1+ |
| 1986 08 02 | 675 | 1.5+   | 0.0   | 1993 10 15 | 675 | 0.1-  | 1.1-  | 1998 01 08 | 910 | 0.1+ | 0.2+ |
| 1992 05 03 | 809 | 0.9-   | 1.7+  | 1996 07 14 | 809 | 0.8+  | 0.0   | 1998 01 08 | 910 | 0.0  | 0.2+ |
| 1992 05 03 | 809 | 0.7-   | 1.5+  | 1996 07 14 | 809 | 0.3-  | 0.0   | 1998 01 09 | 910 | 0.0  | 0.1+ |
| 1992 05 03 | 809 | (2.5-  | 2.6+) | 1996 07 14 | 809 | 0.5-  | 0.6-  | 1998 01 09 | 910 | 0.2+ | 0.2+ |
| 1993 09 21 | 675 | 0.8-   | 1.0-  | 1996 07 16 | 809 | (0.2+ | 2.7+) | 1998 01 09 | 910 | 0.1+ | 0.2+ |
| 1993 09 21 | 675 | 1.1-   | 1.1-  | 1996 07 16 | 809 | 0.2-  | 2.0+  | 1998 02 25 | 566 | 0.3- | 0.2- |
| 1993 10 09 | 809 | 0.8+   | 1.5+  | 1996 07 16 | 809 | 0.1-  | 1.9+  | 1998 02 25 | 566 | 0.1- | 0.2- |
| 1993 10 09 | 809 | 0.3-   | 1.4+  | 1996 08 09 | 566 | 0.4+  | 0.2-  | 1998 02 25 | 566 | 0.3- | 0.3- |
| 1993 10 09 | 809 | 1.1-   | 1.0+  | 1996 08 09 | 566 | 0.6+  | 0.0   | 1998 02 26 | 699 | 1.1+ | 1.1+ |
| 1993 10 11 | 809 | 0.4+   | 1.8+  | 1996 08 09 | 566 | 0.1+  | 0.1-  | 1998 02 26 | 699 | 0.2+ | 0.3+ |
| 1993 10 11 | 809 | 0.3+   | 1.2+  | 1996 08 17 | 566 | 0.2-  | 0.0   | 1998 02 26 | 699 | 1.0+ | 0.1+ |

**(8395)\* 1993 TQ<sub>23</sub> = 1978 EE = 1979 OO<sub>4</sub>**

Discovered 1993 Oct. 9 by E. W. Elst at the European Southern Observatory.

Id. T. Kobayashi (*MPC* 24111)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 4.12045    |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.29480286 | $\omega$ | 13.19081  | -0.46592163   | -0.88425584 |
| <i>a</i> | 2.2358788  | $\Omega$ | 104.58678 | +0.80880407   | -0.44017217 |
| <i>e</i> | 0.0960831  | <i>i</i> | 1.88062   | +0.35882170   | -0.15601308 |
| <i>P</i> | 3.34       | <i>H</i> | 14.4      | <i>G</i> 0.15 | <i>U</i> 2  |

Residuals in seconds of arc

|            |     |       |       |            |     |       |       |            |     |      |      |
|------------|-----|-------|-------|------------|-----|-------|-------|------------|-----|------|------|
| 1978 03 11 | 049 | (4.2+ | 2.0-) | 1993 10 11 | 809 | 0.0   | 0.8+  | 1998 01 27 | 012 | 0.3- | 0.3- |
| 1978 03 11 | 049 | (0.9+ | 2.7+) | 1993 10 11 | 809 | 0.7-  | 0.4-  | 1998 02 19 | 758 | 0.1- | 0.7+ |
| 1978 03 11 | 049 | 0.7+  | 0.5+  | 1993 10 11 | 809 | 0.6-  | 0.1-  | 1998 02 19 | 758 | 0.2+ | 1.1+ |
| 1978 03 11 | 049 | 0.7+  | 0.1-  | 1993 10 20 | 809 | 0.5+  | 0.9+  | 1998 02 21 | 758 | 0.4+ | 0.7+ |
| 1978 03 12 | 049 | 0.3+  | 0.3+  | 1993 10 20 | 809 | 0.0   | 1.3+  | 1998 02 21 | 758 | 0.6- | 0.6+ |
| 1978 03 12 | 049 | 0.5-  | 1.0+  | 1993 10 20 | 809 | 0.1+  | 0.8+  | 1998 02 24 | 758 | 0.3- | 1.6+ |
| 1979 07 24 | 675 | 1.1-  | 1.7+  | 1995 04 20 | 399 | 0.0   | 0.5+  | 1998 02 24 | 758 | 0.9+ | 1.5+ |
| 1979 07 24 | 413 | 1.7-  | 0.1-  | 1995 04 20 | 399 | 1.9+  | 0.5+  | 1998 02 26 | 566 | 0.2+ | 0.6- |
| 1979 07 25 | 675 | 0.4+  | 2.1+  | 1995 04 27 | 399 | 0.5+  | 1.2+  | 1998 02 26 | 566 | 0.1- | 0.9- |
| 1993 10 09 | 809 | 0.0   | 2.1+  | 1995 04 27 | 399 | (0.4- | 2.6+) | 1998 02 26 | 566 | 0.1- | 0.3- |
| 1993 10 09 | 809 | (0.9+ | 2.3+) | 1998 01 27 | 012 | 0.6-  | 0.1+  |            |     |      |      |
| 1993 10 09 | 809 | (0.8+ | 2.6+) | 1998 01 27 | 012 | 0.9-  | 0.4-  |            |     |      |      |

**(8396)\* 1993 UR<sub>2</sub> = 1976 UD<sub>14</sub>**

Discovered 1993 Oct. 19 by E. F. Helin at Palomar.

Id. S. Nakano (*MPC* 25069)

|                                         |            |      |      |                    |     |        |             |            |     |             |      |  |
|-----------------------------------------|------------|------|------|--------------------|-----|--------|-------------|------------|-----|-------------|------|--|
| Epoch 1997 Dec. 18.0 TT = JDT 2450800.5 |            |      |      |                    |     | Nakano |             |            |     |             |      |  |
| $M$                                     | 315.79285  |      |      | (2000.0)           |     |        | <b>P</b>    |            |     | <b>Q</b>    |      |  |
| $n$                                     | 0.29077787 |      |      | $\omega$ 354.09008 |     |        | −0.95897801 |            |     | −0.28257132 |      |  |
| $a$                                     | 2.2564644  |      |      | $\Omega$ 169.41265 |     |        | +0.26488350 |            |     | −0.92170036 |      |  |
| $e$                                     | 0.0788781  |      |      | $i$ 7.09234        |     |        | +0.10098472 |            |     | −0.26574781 |      |  |
| $P$                                     | 3.39       |      |      | $H$ 13.9           |     |        | $G$ 0.15    |            |     | $U$ 2       |      |  |
| Residuals in seconds of arc             |            |      |      |                    |     |        |             |            |     |             |      |  |
| 1976 10 22                              | 381        | 0.9− | 0.3− | 1993 10 18         | 033 | 1.0−   | 0.3−        | 1996 09 10 | 566 | 0.6−        | 0.0  |  |
| 1976 10 22                              | 381        | 0.7− | 0.5− | 1993 10 19         | 675 | 1.1+   | 1.5−        | 1997 12 30 | 566 | 0.4−        | 0.9+ |  |
| 1988 03 17                              | 675        | 0.9+ | 0.3− | 1993 10 19         | 675 | 0.0    | 2.1−        | 1997 12 30 | 566 | 0.5−        | 1.1+ |  |
| 1988 03 17                              | 675        | 0.5+ | 0.3+ | 1993 10 20         | 675 | (0.8+  | 2.3−)       | 1997 12 30 | 566 | 0.0         | 1.2+ |  |
| 1989 08 01                              | 675        | 0.8+ | 0.4− | 1993 10 21         | 809 | 0.2+   | 1.2−        | 1998 02 16 | 470 | 0.2−        | 0.3+ |  |
| 1989 08 01                              | 675        | 1.6+ | 0.3− | 1993 10 21         | 809 | 0.2+   | 1.0−        | 1998 02 16 | 470 | 0.3−        | 0.2+ |  |
| 1993 10 09                              | 809        | 1.4+ | 0.8+ | 1993 10 21         | 809 | 0.5−   | 0.9−        | 1998 02 16 | 470 | 0.1−        | 0.3+ |  |
| 1993 10 09                              | 809        | 1.1+ | 1.3+ | 1995 03 27         | 411 | 0.0    | 1.0+        | 1998 02 17 | 470 | 0.6+        | 0.5− |  |
| 1993 10 09                              | 809        | 0.2+ | 1.6+ | 1995 03 27         | 411 | 0.4−   | 0.6−        | 1998 02 17 | 470 | 0.9+        | 0.3− |  |
| 1993 10 11                              | 809        | 0.8+ | 0.9+ | 1995 03 28         | 411 | 0.1−   | 0.3+        | 1998 02 26 | 566 | 0.1+        | 1.1− |  |
| 1993 10 11                              | 809        | 0.1− | 1.2+ | 1995 03 28         | 411 | 0.7−   | 0.6−        | 1998 02 26 | 566 | 0.2−        | 1.6− |  |
| 1993 10 11                              | 809        | 0.0  | 0.9+ | 1996 09 10         | 566 | 0.6−   | 0.0         | 1998 02 26 | 566 | 0.3−        | 1.4− |  |
| 1993 10 17                              | 033        | 1.1− | 0.0  | 1996 09 10         | 566 | 0.9−   | 0.4−        |            |     |             |      |  |

(8397)\* 1993 XO = 1951 RB<sub>1</sub> = 1972 VB = 1988 NG = 1996 JJ<sub>15</sub>

Discovered 1993 Dec. 8 by S. Otomo at Kiyosato.

Id. T. Kobayashi (*MPC* 27558), S. Nakano (*ibid.*)

|                                         |            |               |           |             |          |           |             |            |     |           |
|-----------------------------------------|------------|---------------|-----------|-------------|----------|-----------|-------------|------------|-----|-----------|
| Epoch 1997 Dec. 18.0 TT = JDT 2450800.5 |            |               |           |             |          | Nakano    |             |            |     |           |
| $M$                                     | 18.74733   | (2000.0)      |           |             | <b>P</b> |           |             | <b>Q</b>   |     |           |
| $n$                                     | 0.23719670 | $\omega$      | 143.17115 | +0.82240617 |          |           | −0.52842421 |            |     |           |
| $a$                                     | 2.5846215  | $\Omega$      | 250.03009 | +0.45371304 |          |           | +0.83271298 |            |     |           |
| $e$                                     | 0.1740482  | $i$           | 12.95782  | +0.34320923 |          |           | +0.16539938 |            |     |           |
| $P$                                     | 4.16       | $H$           | 12.3      | $G$         | 0.15     | $U$       | 2           |            |     |           |
| Residuals in seconds of arc             |            |               |           |             |          |           |             |            |     |           |
| 1951 09 01                              | 094        | (49.1+ 59.0−) | X         | 1996 05 24  | 327      | 0.1−      | 0.3+        | 1998 02 21 | 327 | 0.3+ 0.5+ |
| 1951 09 02                              | 094        | (1.6− 52.8−)  | X         | 1996 05 24  | 327      | 0.7−      | 0.7−        | 1998 02 21 | 327 | 0.0 0.2+  |
| 1972 11 10                              | 095        | 0.2− 0.3+     |           | 1998 01 24  | 566      | 0.1−      | 0.4−        | 1998 02 21 | 327 | 0.1− 0.3+ |
| 1988 07 12                              | 675        | 0.2+ 0.2+     |           | 1998 01 24  | 566      | 0.1−      | 0.2−        | 1998 02 22 | 327 | 0.4+ 0.2+ |
| 1993 12 08                              | 894        | 1.1+ 2.2−     |           | 1998 01 24  | 566      | 0.2−      | 0.3−        | 1998 02 22 | 327 | 0.2+ 0.5+ |
| 1993 12 08                              | 894        | (2.4+ 0.3+)   |           | 1998 02 09  | 327      | 0.2−      | 0.2+        | 1998 02 22 | 327 | 0.5− 0.3+ |
| 1993 12 09                              | 894        | 0.7− 1.1−     |           | 1998 02 09  | 327      | 0.1−      | 0.5+        | 1998 02 22 | 327 | 0.1− 0.5+ |
| 1993 12 17                              | 894        | 0.4− 0.8+     |           | 1998 02 09  | 327      | 0.4−      | 0.0         | 1998 02 23 | 327 | 0.2+ 0.5+ |
| 1993 12 17                              | 894        | (2.2− 3.1+)   |           | 1998 02 09  | 327      | 0.2+ 0.0  |             | 1998 02 23 | 327 | 0.1+ 0.3+ |
| 1993 12 18                              | 894        | 0.7+ 0.2+     |           | 1998 02 16  | 327      | 0.3−      | 0.1+        | 1998 02 23 | 327 | 0.1+ 0.2+ |
| 1993 12 18                              | 894        | 1.3− 0.1−     |           | 1998 02 16  | 327      | 0.1−      | 0.1+        | 1998 02 26 | 327 | 0.2− 0.2− |
| 1993 12 19                              | 894        | 0.6− 0.6−     |           | 1998 02 16  | 327      | 0.3−      | 0.2+        | 1998 02 26 | 327 | 0.1− 0.4− |
| 1993 12 19                              | 894        | 1.2+ 0.2−     |           | 1998 02 16  | 327      | 0.2−      | 0.1+        | 1998 02 26 | 327 | 0.1− 0.2− |
| 1996 05 15                              | 327        | 0.3+ 0.5−     |           | 1998 02 17  | 327      | 0.6+ 0.4+ |             | 1998 02 27 | 327 | 0.2− 0.5− |
| 1996 05 15                              | 327        | 0.3+ 0.1+     |           | 1998 02 17  | 327      | 0.0 0.3+  |             | 1998 02 27 | 327 | 0.1− 0.4− |
| 1996 05 15                              | 327        | 0.2+ 0.1+     |           | 1998 02 17  | 327      | 0.5+ 0.4+ |             | 1998 02 27 | 327 | 0.0 0.4−  |
| 1996 05 24                              | 327        | 0.1+ 0.5−     |           | 1998 02 17  | 327      | 0.4+ 0.3+ |             |            |     |           |

(8398)\* 1993 XY

Discovered 1993 Dec. 12 at Farra d'Isonzo.

|                                         |            |             |           |            |             |      |             |            |     |      |      |
|-----------------------------------------|------------|-------------|-----------|------------|-------------|------|-------------|------------|-----|------|------|
| Epoch 1997 Dec. 18.0 TT = JDT 2450800.5 |            |             |           |            | Williams    |      |             |            |     |      |      |
| $M$                                     | 301.99805  |             | (2000.0)  |            | <b>P</b>    |      | <b>Q</b>    |            |     |      |      |
| $n$                                     | 0.27810481 | $\omega$    | 11.37289  |            | −0.94238957 |      | +0.33429114 |            |     |      |      |
| $a$                                     | 2.3245044  | $\Omega$    | 188.18827 |            | −0.31329056 |      | −0.89488421 |            |     |      |      |
| $e$                                     | 0.1666751  | $i$         | 4.95490   |            | −0.11726433 |      | −0.29568851 |            |     |      |      |
| $P$                                     | 3.54       | $H$         | 15.5      | $G$        | 0.15        | $U$  | 1           |            |     |      |      |
| Residuals in seconds of arc             |            |             |           |            |             |      |             |            |     |      |      |
| 1993 12 11                              | 595        | 0.1−        | 0.6−      | 1994 03 07 | 595         | 0.9− | 0.3+        | 1998 01 18 | 595 | 0.3+ | 0.0  |
| 1993 12 12                              | 595        | 0.7+        | 0.1+      | 1994 03 07 | 595         | 0.9+ | 1.6−        | 1998 01 18 | 595 | 0.5− | 0.1+ |
| 1993 12 12                              | 595        | 1.3−        | 0.4−      | 1995 06 09 | 595         | 0.5+ | 0.7−        | 1998 01 25 | 566 | 0.2+ | 0.8− |
| 1993 12 12                              | 595        | (2.5+ 0.2−) |           | 1995 06 09 | 595         | 0.7+ | 0.4+        | 1998 01 25 | 566 | 0.1− | 1.9− |

|            |     |             |      |            |     |             |            |     |             |
|------------|-----|-------------|------|------------|-----|-------------|------------|-----|-------------|
| 1993 12 16 | 595 | 0.2−        | 0.5− | 1995 06 17 | 595 | (2.4+ 0.5+) | 1998 01 25 | 566 | (0.9− 2.9−) |
| 1993 12 16 | 595 | 1.2−        | 0.1− | 1995 06 17 | 595 | 1.1+ 0.6+   | 1998 01 26 | 595 | 0.3− 0.2+   |
| 1993 12 16 | 595 | 0.4−        | 0.6+ | 1995 07 18 | 595 | 0.2+ 1.0−   | 1998 01 26 | 595 | 0.5− 0.3−   |
| 1993 12 17 | 595 | (2.0+ 2.3+) |      | 1995 07 18 | 595 | 0.6− 0.5−   | 1998 02 17 | 595 | 0.4+ 1.3+   |
| 1993 12 17 | 595 | (2.8+ 2.0−) |      | 1995 07 19 | 595 | 0.6− 0.1+   | 1998 02 17 | 595 | 0.5+ 1.4+   |
| 1993 12 18 | 595 | 1.2+ 0.6−   |      | 1995 07 19 | 595 | 1.4− 0.3−   | 1998 02 18 | 595 | 0.5+ 0.2+   |
| 1993 12 18 | 595 | 0.8+ 0.1−   |      | 1995 07 20 | 595 | 0.2− 0.3+   | 1998 02 18 | 595 | 0.4+ 0.5+   |
| 1994 01 12 | 595 | 0.2+ 0.8+   |      | 1995 07 20 | 595 | 0.3− 0.2+   | 1998 02 26 | 699 | 0.6+ 0.3+   |
| 1994 01 12 | 595 | 0.1+ 0.0    |      | 1996 10 09 | 595 | 0.6+ 0.6+   | 1998 02 26 | 699 | 0.7− 0.5+   |
| 1994 01 30 | 595 | 0.3+ 1.0−   |      | 1996 10 09 | 595 | 0.1− 0.4+   | 1998 02 26 | 699 | 0.4− 0.5+   |
| 1994 01 30 | 595 | 0.1− 0.1+   |      | 1996 10 11 | 595 | 0.7− 0.5+   |            |     |             |
| 1994 03 07 | 595 | 0.3+ 0.6−   |      | 1996 10 11 | 595 | 0.5− 1.3+   |            |     |             |

(8399)\* 1994 AD = 1977 RL<sub>15</sub>

Discovered 1994 Jan. 2 by T. Kobayashi at Oizumi.

Id. T. Kobayashi (*MPC* 23241)

|                                         |                 |          |           |            |        |             |      |             |     |           |
|-----------------------------------------|-----------------|----------|-----------|------------|--------|-------------|------|-------------|-----|-----------|
| Epoch 1997 Dec. 18.0 TT = JDT 2450800.5 |                 |          |           |            | Nakano |             |      |             |     |           |
| <i>M</i>                                | 338.56506       |          | (2000.0)  |            |        | <b>P</b>    |      | <b>Q</b>    |     |           |
| <i>n</i>                                | 0.26004495      | $\omega$ | 137.45364 |            |        | −0.83461654 |      | −0.55082161 |     |           |
| <i>a</i>                                | 2.4309187       | $\Omega$ | 9.12469   |            |        | +0.49964445 |      | −0.75955480 |     |           |
| <i>e</i>                                | 0.1236108       | <i>i</i> | 1.18663   |            |        | +0.23188501 |      | −0.34593650 |     |           |
| <i>P</i>                                | 3.79            | <i>H</i> | 14.9      |            |        | <i>G</i>    | 0.15 | <i>U</i>    | 2   |           |
| Residuals in seconds of arc             |                 |          |           |            |        |             |      |             |     |           |
| 1977 09 09                              | 675             | 1.4+     | 0.1−      | 1994 01 15 | 411    | 0.6−        | 0.6− | 1998 01 26  | 566 | 0.1− 0.4+ |
| 1977 09 10                              | 675             | 0.9−     | 1.0−      | 1996 09 21 | 691    | 0.1−        | 0.2− | 1998 01 26  | 426 | 0.3− 0.2− |
| 1994 01 02                              | 411             | 0.3−     | 0.6−      | 1996 09 21 | 691    | 0.8−        | 0.5− | 1998 01 26  | 426 | 0.4+ 0.1− |
| 1994 01 02                              | 411             | 0.3−     | 0.7+      | 1996 09 21 | 691    | 0.1+        | 0.1− | 1998 01 26  | 426 | 0.5+ 0.4− |
| 1994 01 02                              | 411             | 0.1−     | 0.1+      | 1996 10 18 | 566    | 0.0         | 0.4+ | 1998 01 30  | 691 | 0.7− 0.1− |
| 1994 01 03                              | 411 (1.2+ 3.2+) |          |           | 1996 10 18 | 566    | 0.5+        | 0.5+ | 1998 01 30  | 691 | 0.8− 0.2− |
| 1994 01 03                              | 411 1.4+        | 1.2+     |           | 1996 10 18 | 566    | 0.1+        | 0.3+ | 1998 01 30  | 691 | 0.6− 0.0  |
| 1994 01 08                              | 411 0.5−        | 0.2+     |           | 1998 01 24 | 426    | 0.4+        | 0.4− | 1998 03 01  | 411 | 0.6− 0.1− |
| 1994 01 08                              | 411 0.6+        | 0.0      |           | 1998 01 24 | 426    | 0.3+        | 0.2− | 1998 03 01  | 411 | 0.0 0.0   |
| 1994 01 08                              | 411 0.1+        | 0.6−     |           | 1998 01 24 | 426    | 0.3+        | 0.2− | 1998 03 01  | 411 | 0.6+ 0.4− |
| 1994 01 15                              | 411 0.4+        | 0.1+     |           | 1998 01 26 | 566    | 0.0         | 0.3+ | 1998 03 02  | 411 | 0.2+ 0.6+ |
| 1994 01 15                              | 411 0.8−        | 0.0      |           | 1998 01 26 | 566    | 0.0         | 0.3+ | 1998 03 02  | 411 | 0.2+ 0.4− |

(8400)\* 1994 AQ = 1992 PB<sub>6</sub>

Discovered 1994 Jan. 4 by T. Kobayashi at Oizumi.

Id. T. Kobayashi (*MPC* 23241)

|                                         |            |          |           |            |             |             |             |            |     |      |      |
|-----------------------------------------|------------|----------|-----------|------------|-------------|-------------|-------------|------------|-----|------|------|
| Epoch 1997 Dec. 18.0 TT = JDT 2450800.5 | Nakano     |          |           |            |             |             |             |            |     |      |      |
| $M$                                     | 48.83632   | (2000.0) |           |            | <b>P</b>    |             | <b>Q</b>    |            |     |      |      |
| $n$                                     | 0.23532059 | $\omega$ | 254.47486 |            | +0.91052286 |             | −0.36655756 |            |     |      |      |
| $a$                                     | 2.5983407  | $\Omega$ | 126.64781 |            | +0.40678400 |             | +0.87699291 |            |     |      |      |
| $e$                                     | 0.1938685  | $i$      | 13.79180  |            | −0.07399259 |             | +0.31067507 |            |     |      |      |
| $P$                                     | 4.19       | $H$      | 11.8      |            | $G$         | 0.15        |             | $U$        | 1   |      |      |
| Residuals in seconds of arc             |            |          |           |            |             |             |             |            |     |      |      |
| 1992 06 28                              | 675        | 1.0−     | 0.4+      | 1994 01 09 | 411         | 0.1+        | 0.2−        | 1995 04 07 | 411 | 0.7+ | 0.6+ |
| 1992 06 28                              | 675        | 1.3−     | 0.3−      | 1994 01 09 | 411         | 0.4−        | 0.2+        | 1995 04 07 | 411 | 0.8− | 0.1− |
| 1992 08 01                              | 809        | 1.4+     | 0.6−      | 1994 01 15 | 411         | 0.5−        | 0.1+        | 1995 04 19 | 411 | 0.2− | 0.7+ |
| 1992 08 01                              | 809        | 1.5+     | 0.5−      | 1994 01 15 | 411         | 0.4−        | 0.3+        | 1995 04 19 | 411 | 0.0  | 0.2− |
| 1992 08 01                              | 809        | 1.5+     | 0.2−      | 1994 01 15 | 411         | 0.2−        | 0.4+        | 1995 04 26 | 411 | 0.5+ | 0.0  |
| 1992 08 02                              | 809        | 0.7−     | 1.0+      | 1995 03 04 | 801         | 0.4+        | 0.1−        | 1995 04 26 | 411 | 0.2− | 0.3+ |
| 1992 08 02                              | 809        | 0.5−     | 1.2+      | 1995 03 04 | 801         | 0.2+        | 0.5−        | 1998 01 16 | 411 | 0.3− | 0.0  |
| 1992 08 02                              | 809        | 0.5−     | 1.1+      | 1995 03 05 | 801         | 0.2+        | 0.7−        | 1998 01 16 | 411 | 0.0  | 0.2− |
| 1992 08 03                              | 809        | 0.4−     | 0.6+      | 1995 03 05 | 801         | 0.1+        | 0.3−        | 1998 01 25 | 411 | 0.2+ | 0.1+ |
| 1992 08 03                              | 809        | 0.2−     | 0.4+      | 1995 03 26 | 292         | 0.6−        | 1.4−        | 1998 01 25 | 411 | 0.5+ | 0.0  |
| 1992 08 03                              | 809        | 0.0      | 0.3+      | 1995 03 26 | 292         | (2.4+ 1.9−) |             | 1998 02 18 | 411 | 0.4− | 0.7− |
| 1992 08 27                              | 675        | 0.1−     | 1.3+      | 1995 03 27 | 801         | 0.2+        | 0.5+        | 1998 02 18 | 411 | 0.9− | 0.1+ |
| 1994 01 04                              | 411        | 0.6+     | 1.0+      | 1995 03 27 | 801         | 0.1−        | 0.7+        | 1998 02 18 | 470 | 0.6− | 0.6+ |
| 1994 01 04                              | 411        | 0.1+     | 1.0+      | 1995 03 29 | 801         | 0.0         | 0.4+        | 1998 02 18 | 470 | 1.0+ | 0.7+ |
| 1994 01 06                              | 411        | 0.2+     | 0.3+      | 1995 03 29 | 801         | 0.1−        | 0.3+        | 1998 02 18 | 470 | 0.0  | 1.1+ |
| 1994 01 06                              | 411        | 0.1+     | 0.3−      | 1995 04 01 | 411         | 0.1−        | 1.1+        |            |     |      |      |
| 1994 01 06                              | 411        | 0.3+     | 0.5+      | 1995 04 01 | 411         | 0.2+        | 0.0         |            |     |      |      |

**(8401)\* 1994 DA**

Discovered 1994 Feb. 16 at Farra d'Isonzo.

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 251.37121  |          | (2000.0)  | <b>P</b>    |             | <b>Q</b> |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.22674132 | $\omega$ | 54.54828  | −0.79932269 | +0.59889465 |          |   |
| <i>a</i> | 2.6634769  | $\Omega$ | 162.07921 | −0.58995633 | −0.76662399 |          |   |
| <i>e</i> | 0.0683687  | <i>i</i> | 9.17737   | −0.11416988 | −0.23154448 |          |   |
| <i>P</i> | 4.35       | <i>H</i> | 14.5      | <i>G</i>    | 0.15        | <i>U</i> | 1 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1994 02 12 | 675 | 0.3+ | 0.3− | 1994 03 07 | 595 | 0.0  | 0.7− | 1996 09 15 | 595 | 1.0+ | 0.2− |
| 1994 02 12 | 675 | 0.2− | 1.3− | 1994 03 30 | 595 | 0.2− | 1.7+ | 1996 10 12 | 595 | 0.2− | 0.7− |
| 1994 02 15 | 675 | 0.5+ | 0.2+ | 1994 03 30 | 595 | 0.2+ | 0.8+ | 1996 10 12 | 595 | 0.3+ | 0.9− |
| 1994 02 15 | 675 | 1.5− | 1.1− | 1994 03 30 | 595 | 0.8+ | 1.0+ | 1996 10 13 | 595 | 0.9− | 0.8− |
| 1994 02 16 | 595 | 0.1− | 0.5+ | 1995 06 10 | 595 | 0.6+ | 0.6− | 1996 10 13 | 595 | 0.9− | 0.6+ |
| 1994 02 16 | 595 | 0.6− | 0.0  | 1995 06 10 | 595 | 0.0  | 0.2+ | 1996 10 13 | 595 | 0.5− | 0.3+ |
| 1994 02 17 | 595 | 0.0  | 0.2− | 1995 06 17 | 595 | 0.5+ | 0.6− | 1996 11 09 | 595 | 0.3− | 0.1+ |
| 1994 02 17 | 595 | 0.1− | 0.4− | 1995 06 18 | 595 | 0.9+ | 0.7− | 1996 11 09 | 595 | 0.7+ | 0.7− |
| 1994 02 19 | 595 | 1.3+ | 0.5− | 1995 07 19 | 595 | 0.3− | 0.9+ | 1998 01 18 | 595 | 0.1− | 0.0  |
| 1994 02 19 | 595 | 1.9− | 0.2+ | 1995 07 19 | 595 | 0.3− | 0.2+ | 1998 01 18 | 595 | 0.9− | 0.2− |
| 1994 03 05 | 595 | 1.6+ | 0.4+ | 1995 07 21 | 595 | 1.0− | 0.3− | 1998 01 26 | 595 | 0.0  | 0.2+ |
| 1994 03 05 | 595 | 0.1− | 1.1+ | 1995 07 21 | 595 | 0.6− | 0.2− | 1998 01 26 | 595 | 0.0  | 0.5− |
| 1994 03 06 | 595 | 0.1+ | 1.1− | 1996 09 14 | 595 | 1.5+ | 0.3+ | 1998 02 18 | 595 | 1.1+ | 0.2+ |
| 1994 03 07 | 595 | 0.3+ | 0.5− | 1996 09 14 | 595 | 0.5− | 1.2+ | 1998 02 18 | 595 | 0.0  | 0.2+ |
| 1994 03 07 | 595 | 0.5− | 0.4− | 1996 09 15 | 595 | 0.3+ | 0.3+ |            |     |      |      |

**(8402)\* 1994 GH<sub>9</sub> = 1992 UU<sub>7</sub>**

Discovered 1994 Apr. 11 by E. F. Helin at Palomar.

Id. B. G. Marsden (*MPC* 23678)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Marsden

| <i>M</i> | 336.41863  |          | (2000.0)  | <b>P</b>    |             | <b>Q</b> |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.23183977 | $\omega$ | 308.33945 | −0.90633114 | −0.41199563 |          |   |
| <i>a</i> | 2.6242836  | $\Omega$ | 207.70375 | +0.42243972 | −0.87790579 |          |   |
| <i>e</i> | 0.2282840  | <i>i</i> | 11.65689  | +0.01041840 | −0.24401029 |          |   |
| <i>P</i> | 4.25       | <i>H</i> | 13.4      | <i>G</i>    | 0.15        | <i>U</i> | 1 |

Residuals in seconds of arc

|            |     |       |       |            |     |       |       |            |     |      |      |
|------------|-----|-------|-------|------------|-----|-------|-------|------------|-----|------|------|
| 1992 10 22 | 675 | 1.3−  | 1.1+  | 1994 05 06 | 675 | (1.3+ | 2.3−) | 1998 01 25 | 423 | 0.7+ | 0.3+ |
| 1992 10 23 | 010 | 1.0+  | 0.1+  | 1995 09 01 | 608 | 0.3−  | 0.1−  | 1998 01 25 | 423 | 0.3+ | 0.0  |
| 1992 10 23 | 010 | 0.1−  | 1.2−  | 1995 09 01 | 608 | 0.0   | 0.4+  | 1998 01 25 | 423 | 0.1+ | 0.1+ |
| 1992 11 02 | 010 | (1.6− | 2.5−) | 1995 09 08 | 608 | 0.6−  | 0.3+  | 1998 01 26 | 423 | 0.1− | 0.1+ |
| 1992 11 02 | 010 | (3.1− | 3.8−) | 1995 09 08 | 608 | 0.9−  | 0.1−  | 1998 01 26 | 423 | 0.0  | 0.5+ |
| 1992 11 02 | 010 | (3.0− | 2.8−) | 1995 09 08 | 608 | 0.1−  | 0.3+  | 1998 01 26 | 423 | 0.2+ | 0.3+ |
| 1992 11 03 | 010 | 1.0−  | 0.6−  | 1996 09 07 | 587 | 0.9+  | 1.4+  | 1998 01 26 | 423 | 0.6+ | 0.5+ |
| 1992 11 03 | 010 | 0.7−  | 0.5+  | 1996 09 07 | 587 | 1.6+  | 1.6+  | 1998 01 29 | 758 | 0.5− | 0.7+ |
| 1992 11 03 | 010 | 0.7+  | 1.3−  | 1996 09 08 | 587 | 0.9−  | 0.0   | 1998 01 29 | 758 | 0.6+ | 0.1− |
| 1994 04 11 | 675 | 0.3+  | 0.5−  | 1996 09 08 | 587 | 0.6+  | 0.8−  | 1998 02 14 | 423 | 0.0  | 0.3+ |
| 1994 04 11 | 675 | 1.0+  | 0.2−  | 1996 09 08 | 587 | 0.0   | 1.5+  | 1998 02 14 | 423 | 0.5− | 0.6+ |
| 1994 04 15 | 675 | (2.8+ | 1.5−) | 1998 01 17 | 423 | 0.1+  | 0.9−  | 1998 02 17 | 423 | 1.2− | 0.0  |
| 1994 04 15 | 675 | 0.1−  | 1.3+  | 1998 01 17 | 423 | 0.0   | 0.3−  | 1998 02 17 | 423 | 1.0− | 0.4+ |
| 1994 05 04 | 675 | (0.4+ | 3.6−) | 1998 01 25 | 423 | 0.1−  | 0.6−  |            |     |      |      |
| 1994 05 04 | 675 | (0.7− | 3.8−) | 1998 01 25 | 423 | 0.4+  | 0.2−  |            |     |      |      |

**(8403)\* 1994 JG = 1985 RJ<sub>6</sub>**

Discovered 1994 May 6 by T. Kobayashi at Oizumi.

Id. T. Kobayashi (*MPC* 23679)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Nakano

| <i>M</i> | 147.02364  |          | (2000.0)  | <b>P</b>    |             | <b>Q</b> |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.18937099 | $\omega$ | 151.98076 | +0.97509540 | +0.21729615 |          |   |
| <i>a</i> | 3.0032656  | $\Omega$ | 195.65943 | −0.22147194 | +0.94335631 |          |   |
| <i>e</i> | 0.0872116  | <i>i</i> | 9.46781   | −0.01179609 | +0.25072145 |          |   |
| <i>P</i> | 5.20       | <i>H</i> | 13.2      | <i>G</i>    | 0.15        | <i>U</i> | 1 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1985 09 15 | 095 | 0.3+ | 1.1− | 1995 08 25 | 411 | 0.5+ | 0.2− | 1995 10 16 | 118 | 0.4− | 0.1+ |
| 1985 09 22 | 095 | 0.3+ | 1.6− | 1995 08 27 | 411 | 0.3− | 0.1+ | 1995 10 18 | 118 | 0.0  | 0.3− |
| 1994 05 06 | 411 | 0.6− | 0.0  | 1995 08 27 | 411 | 0.6− | 0.1− | 1995 10 21 | 118 | 0.7+ | 0.1− |
| 1994 05 06 | 411 | 0.0  | 0.4− | 1995 08 28 | 801 | 0.2+ | 0.4− | 1995 10 22 | 118 | 0.1− | 0.2− |
| 1994 05 08 | 411 | 0.3+ | 1.2− | 1995 08 28 | 801 | 0.1+ | 0.3− | 1995 10 26 | 118 | 0.3− | 0.3− |
| 1994 05 08 | 411 | 0.4+ | 0.2− | 1995 08 29 | 801 | 0.0  | 0.4− | 1995 10 27 | 118 | 0.1+ | 0.1+ |
| 1994 05 08 | 411 | 0.2+ | 0.3+ | 1995 08 29 | 801 | 0.2+ | 0.5− | 1998 01 24 | 566 | 0.2+ | 0.3− |
| 1994 05 12 | 411 | 1.8+ | 0.1− | 1995 09 17 | 411 | 0.0  | 0.0  | 1998 01 24 | 566 | 0.6+ | 0.4− |
| 1994 05 12 | 411 | 0.0  | 0.7− | 1995 09 17 | 411 | 0.7+ | 0.4− | 1998 01 24 | 566 | 0.3+ | 0.3− |
| 1994 05 12 | 411 | 1.6− | 0.0  | 1995 09 17 | 411 | 0.1+ | 0.5− | 1998 02 25 | 566 | 0.1− | 0.4− |
| 1994 05 16 | 411 | 0.3− | 0.5− | 1995 09 18 | 411 | 0.1− | 0.4− | 1998 02 25 | 566 | 0.1+ | 0.6− |
| 1994 05 16 | 411 | 0.4− | 0.1− | 1995 09 18 | 411 | 0.3− | 0.2− | 1998 02 25 | 566 | 0.1+ | 0.7− |
| 1994 05 16 | 411 | 0.0  | 0.6+ | 1995 09 28 | 801 | 0.2− | 0.5+ | 1998 02 26 | 566 | 0.4− | 0.8− |
| 1995 08 18 | 411 | 0.1+ | 0.3− | 1995 09 28 | 801 | 0.2− | 0.2+ | 1998 02 26 | 566 | 0.4− | 0.6− |
| 1995 08 18 | 411 | 0.3− | 0.6+ | 1995 09 29 | 801 | 0.0  | 0.3+ | 1998 02 26 | 566 | 0.1− | 0.6− |
| 1995 08 18 | 411 | 0.6+ | 0.6+ | 1995 09 29 | 801 | 0.0  | 0.6− | 1998 03 02 | 411 | 1.0− | 0.6+ |
| 1995 08 24 | 411 | 0.5+ | 0.8− | 1995 10 14 | 118 | 0.0  | 0.2+ | 1998 03 02 | 411 | 0.3− | 0.2− |
| 1995 08 24 | 411 | 0.1− | 0.1+ | 1995 10 14 | 118 | 0.2+ | 0.1+ |            |     |      |      |
| 1995 08 24 | 411 | 0.5− | 0.9+ | 1995 10 14 | 118 | 0.1+ | 0.1+ |            |     |      |      |

**(8404)\* 1995 AN = 1977 RS<sub>8</sub>**

Discovered 1995 Jan. 1 by T. B. Spahr at the University of Arizona's Catalina

Station.

Id. B. G. Marsden (*MPC* 24755)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Marsden

| <i>M</i> | 8.90884    |          | (2000.0)  | <b>P</b>    |             | <b>Q</b> |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.35696717 | $\omega$ | 123.34282 | −0.30907467 | −0.94715577 |          |   |
| <i>a</i> | 1.9681153  | $\Omega$ | 343.97327 | +0.73606535 | −0.18107863 |          |   |
| <i>e</i> | 0.0774341  | <i>i</i> | 18.11493  | +0.60222973 | −0.26477629 |          |   |
| <i>P</i> | 2.76       | <i>H</i> | 13.7      | <i>G</i>    | 0.15        | <i>U</i> | 1 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1954 04 03 | 675 | 0.2− | 0.2+ | 1995 01 01 | 693 | 0.7− | 0.0  | 1998 02 20 | 138 | 0.2+ | 0.1− |
| 1954 04 03 | 675 | 0.1+ | 0.1− | 1995 01 01 | 693 | 1.1+ | 0.2+ | 1998 02 25 | 758 | 0.4+ | 1.4+ |
| 1977 09 08 | 675 | 0.1+ | 0.4+ | 1995 01 07 | 693 | 0.2+ | 0.3+ | 1998 02 25 | 758 | 0.5+ | 1.4+ |
| 1977 09 09 | 675 | 0.0  | 0.1+ | 1995 01 07 | 693 | 0.4− | 0.9+ | 1998 02 25 | 566 | 0.2− | 0.4− |
| 1988 09 10 | 675 | 0.6− | 0.3+ | 1995 01 10 | 817 | 0.7+ | 0.5+ | 1998 02 25 | 566 | 0.2− | 0.5− |
| 1988 09 10 | 675 | 0.6− | 0.1− | 1995 01 10 | 817 | 0.1+ | 0.7+ | 1998 02 25 | 566 | 0.2− | 0.5− |
| 1988 09 11 | 675 | 1.0+ | 0.0  | 1995 04 02 | 693 | 0.0  | 1.6− | 1998 02 26 | 758 | 0.0  | 0.1+ |
| 1988 09 11 | 675 | 0.9+ | 0.5+ | 1995 04 02 | 693 | 0.2+ | 0.4− | 1998 02 26 | 699 | 0.8+ | 0.1+ |
| 1988 09 12 | 675 | 0.0  | 0.7+ | 1998 01 25 | 566 | 0.4− | 0.5− | 1998 02 26 | 699 | 0.6+ | 0.7+ |
| 1988 09 12 | 675 | 0.7− | 0.1− | 1998 01 25 | 566 | 0.3− | 0.6− | 1998 02 26 | 699 | 0.3+ | 0.9+ |
| 1991 10 03 | 675 | 0.7− | 1.5− | 1998 01 25 | 566 | 0.4− | 0.5− | 1998 02 27 | 566 | 0.1− | 0.5+ |
| 1991 10 03 | 675 | 0.0  | 1.0− | 1998 02 18 | 127 | 0.1− | 0.2− | 1998 02 27 | 566 | 0.1+ | 0.4+ |
| 1994 11 28 | 675 | 0.0  | 1.2− | 1998 02 18 | 127 | 0.1− | 0.3− | 1998 02 27 | 566 | 0.1− | 0.5+ |
| 1994 11 28 | 675 | 0.1+ | 0.2+ | 1998 02 19 | 138 | 0.2+ | 0.1+ | 1998 02 28 | 127 | 0.9− | 1.0− |
| 1994 11 30 | 675 | 1.3− | 1.1+ | 1998 02 19 | 138 | 0.0  | 0.0  | 1998 02 28 | 127 | 1.0− | 1.0− |
| 1994 11 30 | 675 | 0.9+ | 0.4− | 1998 02 20 | 138 | 0.2+ | 0.1− |            |     |      |      |

**(8405)\* 1995 GO**

Discovered 1995 Apr. 5 by Spacewatch at Kitt Peak.

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 338.42774  |          | (2000.0)  | <b>P</b>    |             | <b>Q</b> |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.01282943 | $\omega$ | 290.17070 | +0.43828885 | +0.89825243 |          |   |
| <i>a</i> | 18.0716513 | $\Omega$ | 6.12465   | −0.66911916 | +0.35008320 |          |   |
| <i>e</i> | 0.6216319  | <i>i</i> | 17.64118  | −0.60015201 | +0.26567710 |          |   |
| <i>P</i> | 76.82      | <i>H</i> | 9.0       | <i>G</i>    | 0.15        | <i>U</i> | 1 |

Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| 1995 03 28 | 691 | 1.1−  | 1.6−  | 1996 03 21 | 608 | 0.8+ | 0.3+ | 1997 03 16 | 711 | 0.0  | 0.4+ |
| 1995 03 28 | 691 | (1.8− | 2.4−) | 1996 03 21 | 608 | 0.5+ | 0.2+ | 1997 03 16 | 711 | 0.1+ | 0.2+ |
| 1995 03 28 | 691 | 0.9−  | 1.9−  | 1996 03 24 | 104 | 0.4+ | 1.0+ | 1997 03 17 | 711 | 0.1− | 0.4+ |
| 1995 04 05 | 691 | 1.2−  | 0.2−  | 1996 03 24 | 104 | 0.1+ | 0.6+ | 1997 03 17 | 711 | 0.0  | 0.7+ |
| 1995 04 05 | 691 | 0.9−  | 0.1−  | 1996 03 24 | 104 | 0.3− | 0.5+ | 1997 03 19 | 608 | 0.6− | 0.8+ |

1998 MAR. 13

M.P.C. 31367

|            |     |      |      |            |     |       |       |            |     |      |      |
|------------|-----|------|------|------------|-----|-------|-------|------------|-----|------|------|
| 1995 04 05 | 691 | 1.1- | 0.6+ | 1996 04 13 | 684 | 0.4+  | 0.0   | 1997 03 19 | 608 | 0.5- | 0.5+ |
| 1995 04 09 | 691 | 1.0- | 0.3- | 1996 04 13 | 684 | 0.0   | 0.4-  | 1997 03 20 | 608 | 0.7- | 0.2+ |
| 1995 04 09 | 691 | 0.2+ | 0.2- | 1996 04 13 | 360 | 0.2+  | 0.2+  | 1997 03 20 | 608 | 1.1- | 0.6+ |
| 1995 04 09 | 691 | 0.5+ | 0.3- | 1996 04 13 | 360 | 0.5-  | 0.3+  | 1997 03 31 | 360 | 0.4+ | 0.7+ |
| 1995 04 09 | 691 | 0.2- | 0.8- | 1996 04 13 | 360 | 0.1-  | 0.4+  | 1997 03 31 | 360 | 0.2+ | 0.3+ |
| 1995 04 09 | 691 | 0.2- | 0.4- | 1996 04 14 | 684 | 0.7+  | 0.8-  | 1997 03 31 | 360 | 0.2- | 0.3+ |
| 1995 04 23 | 691 | 0.1+ | 0.2- | 1996 04 14 | 684 | 1.7+  | 1.2-  | 1997 04 08 | 608 | 1.2+ | 0.7+ |
| 1995 04 23 | 691 | 0.2+ | 0.1- | 1996 04 17 | 696 | 0.7+  | 0.3-  | 1997 04 08 | 608 | 1.3+ | 0.7+ |
| 1995 05 03 | 104 | 0.4- | 0.3- | 1996 04 17 | 696 | 0.7+  | 0.4-  | 1997 04 10 | 608 | 1.3+ | 0.1+ |
| 1995 05 03 | 104 | 0.7- | 0.3+ | 1996 04 18 | 696 | 0.8+  | 0.2-  | 1997 04 10 | 608 | 1.4+ | 0.0  |
| 1995 05 03 | 104 | 1.3- | 0.1+ | 1996 04 18 | 696 | 1.0+  | 0.1+  | 1997 04 30 | 784 | 0.3- | 0.4+ |
| 1995 05 04 | 691 | 1.3- | 0.1+ | 1996 04 19 | 696 | 0.7+  | 0.3-  | 1997 04 30 | 784 | 0.1+ | 0.3- |
| 1995 05 04 | 691 | 1.5- | 0.4+ | 1996 04 19 | 696 | 0.8+  | 0.1-  | 1997 05 04 | 360 | 0.2+ | 0.0  |
| 1995 05 04 | 691 | 1.3- | 0.2+ | 1996 04 23 | 711 | 0.8+  | 0.2-  | 1997 05 04 | 360 | 0.2+ | 0.4+ |
| 1995 05 25 | 691 | 0.4- | 0.1- | 1996 04 23 | 711 | 0.7+  | 0.1+  | 1997 05 04 | 360 | 0.1+ | 1.1+ |
| 1995 05 25 | 691 | 0.6- | 0.1- | 1996 04 24 | 711 | 0.7+  | 0.0   | 1997 05 14 | 711 | 0.1+ | 0.4- |
| 1995 05 29 | 568 | 0.7+ | 0.5- | 1996 04 24 | 711 | 0.4+  | 0.0   | 1997 05 14 | 711 | 0.1- | 0.4- |
| 1995 05 29 | 568 | 0.9+ | 0.6- | 1996 05 23 | 709 | 0.5+  | 0.8+  | 1997 07 05 | 711 | 0.8- | 0.1- |
| 1995 06 05 | 691 | 0.2- | 0.3- | 1996 05 23 | 709 | 0.4+  | 0.7+  | 1997 07 05 | 711 | 0.8- | 0.2- |
| 1995 06 05 | 691 | 0.0  | 0.1- | 1996 05 23 | 709 | 0.3+  | 0.7+  | 1997 07 06 | 711 | 0.6- | 0.2+ |
| 1995 12 23 | 568 | 0.2- | 0.1+ | 1996 05 23 | 709 | 0.5+  | 0.6+  | 1997 07 06 | 711 | 0.1+ | 0.2- |
| 1995 12 23 | 568 | 1.1+ | 0.4- | 1996 05 23 | 709 | 0.6+  | 0.6+  | 1997 07 07 | 711 | 0.5- | 0.1+ |
| 1995 12 23 | 568 | 0.3+ | 0.1+ | 1996 05 23 | 709 | 0.9+  | 0.6+  | 1997 07 07 | 711 | 0.7- | 0.1+ |
| 1995 12 24 | 568 | 0.4+ | 0.1- | 1996 05 23 | 709 | 0.5+  | 0.7+  | 1998 02 03 | 711 | 0.2- | 0.7- |
| 1995 12 24 | 568 | 0.6+ | 0.1+ | 1996 05 25 | 711 | 0.5+  | 0.3-  | 1998 02 03 | 711 | 0.3- | 0.6- |
| 1995 12 25 | 568 | 0.0  | 0.7+ | 1996 05 25 | 711 | 0.4+  | 0.6+  | 1998 02 04 | 711 | 1.1- | 0.0  |
| 1995 12 25 | 568 | 1.0+ | 1.0+ | 1996 06 22 | 711 | 0.4+  | 0.2-  | 1998 02 04 | 711 | 0.2- | 0.6- |
| 1995 12 27 | 568 | 0.4+ | 0.1+ | 1996 06 22 | 711 | 0.4+  | 0.5+  | 1998 02 06 | 711 | 1.3+ | 0.4- |
| 1995 12 27 | 568 | 0.3+ | 0.1+ | 1997 02 10 | 711 | 0.7-  | 0.4+  | 1998 02 06 | 711 | 0.3- | 0.4- |
| 1995 12 27 | 568 | 0.3+ | 0.1- | 1997 02 10 | 711 | 0.3+  | 0.5+  | 1998 02 24 | 954 | 1.7+ | 0.5+ |
| 1995 12 27 | 568 | 0.4+ | 0.0  | 1997 02 13 | 711 | (7.8- | 6.0+) | 1998 02 24 | 954 | 1.2+ | 0.6- |
| 1996 02 12 | 711 | 0.6+ | 0.2- | 1997 02 13 | 711 | (7.6- | 6.0+) | 1998 02 24 | 954 | 0.9+ | 0.2- |
| 1996 02 12 | 711 | 0.7+ | 0.2- | 1997 03 11 | 046 | 0.6-  | 0.3+  | 1998 03 02 | 360 | 0.6- | 1.0- |
| 1996 02 16 | 658 | 0.0  | 0.2- | 1997 03 11 | 046 | 0.8-  | 0.1-  | 1998 03 02 | 360 | 1.3- | 1.2- |
| 1996 02 16 | 658 | 0.9- | 0.6- | 1997 03 11 | 046 | 1.4-  | 0.1+  | 1998 03 02 | 360 | 0.6- | 0.7- |
| 1996 02 16 | 658 | 1.5- | 0.6- | 1997 03 11 | 046 | 0.9-  | 0.3-  | 1998 03 05 | 711 | 0.9- | 0.5- |
| 1996 02 16 | 658 | 1.6- | 1.0- | 1997 03 11 | 046 | 0.9-  | 0.1-  | 1998 03 05 | 711 | 0.6- | 0.9- |
| 1996 03 20 | 608 | 0.5+ | 0.4+ | 1997 03 15 | 711 | 0.2+  | 0.6-  |            |     |      |      |
| 1996 03 20 | 608 | 0.1+ | 0.4+ | 1997 03 15 | 711 | 0.7-  | 0.6+  |            |     |      |      |

**(8406)\* 1995 HJ = 1980 DD<sub>3</sub> = 1989 UC<sub>7</sub>**

Discovered 1995 Apr. 20 by K. Endate and K. Watanabe at Kitami.

Id. S. Nakano (*MPC* 25223)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            |          |           |             |             |          |   |  |  |  |  |
|----------|------------|----------|-----------|-------------|-------------|----------|---|--|--|--|--|
| <i>M</i> | 248.43590  |          |           |             |             |          |   |  |  |  |  |
|          |            |          |           | <b>P</b>    |             | <b>Q</b> |   |  |  |  |  |
| <i>n</i> | 0.26891057 | $\omega$ | 98.51009  | -0.62855155 | +0.77750748 |          |   |  |  |  |  |
| <i>a</i> | 2.3771913  | $\Omega$ | 132.52654 | -0.72390139 | -0.57536083 |          |   |  |  |  |  |
| <i>e</i> | 0.1501322  | <i>i</i> | 1.56494   | -0.28441119 | -0.25385436 |          |   |  |  |  |  |
| <i>P</i> | 3.67       | <i>H</i> | 14.2      | <i>G</i>    | 0.15        | <i>U</i> | 1 |  |  |  |  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1980 02 20 | 095 | 1.0- | 2.1- | 1995 05 08 | 397 | 0.9+ | 0.4+ | 1998 01 02 | 704 | 0.1- | 0.5+ |
| 1989 10 23 | 033 | 0.5- | 1.5+ | 1996 10 29 | 327 | 0.4- | 0.6- | 1998 01 02 | 704 | 0.3+ | 0.6+ |
| 1989 10 23 | 033 | 0.1+ | 0.6- | 1996 10 29 | 327 | 0.2- | 0.5- | 1998 01 02 | 704 | 0.2- | 0.2+ |
| 1989 10 25 | 033 | 1.0+ | 1.4- | 1996 10 29 | 327 | 0.2- | 0.3+ | 1998 01 08 | 704 | 0.4+ | 0.8- |
| 1989 10 25 | 033 | 1.3+ | 0.5- | 1996 10 29 | 327 | 0.1+ | 0.1- | 1998 01 08 | 704 | 0.3+ | 1.0+ |
| 1989 10 27 | 033 | 1.0- | 0.3+ | 1996 11 01 | 327 | 0.0  | 1.0+ | 1998 01 08 | 704 | 0.1- | 0.1+ |
| 1995 04 20 | 400 | 0.3+ | 0.5- | 1996 11 01 | 327 | 0.1+ | 0.4+ | 1998 01 08 | 704 | 0.4- | 0.6- |
| 1995 04 20 | 400 | 0.3+ | 1.3- | 1996 11 01 | 327 | 0.0  | 0.2- | 1998 02 20 | 557 | 0.5+ | 0.1- |
| 1995 04 24 | 400 | 0.6- | 0.5+ | 1997 12 27 | 566 | 0.6- | 1.0+ | 1998 02 20 | 557 | 0.5+ | 0.0  |
| 1995 04 24 | 400 | 1.0+ | 0.1- | 1997 12 27 | 566 | 1.0- | 0.8+ | 1998 03 04 | 557 | 0.7+ | 0.0  |
| 1995 05 07 | 397 | 1.1+ | 0.2- | 1997 12 27 | 566 | 1.4- | 0.9+ | 1998 03 04 | 557 | 1.1+ | 0.7- |
| 1995 05 07 | 397 | 1.2- | 1.7+ | 1998 01 02 | 704 | 0.2+ | 0.2+ |            |     |      |      |
| 1995 05 08 | 397 | 1.1- | 0.9+ | 1998 01 02 | 704 | 0.5+ | 0.1+ |            |     |      |      |

**(8407)\* 1995 ON = 1984 GK**

Discovered 1995 July 25 by P. G. Comba at Prescott.

Id. B. G. Marsden (*MPC* 27918)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Marsden

|          |            |          |           |             |             |          |   |  |  |  |  |
|----------|------------|----------|-----------|-------------|-------------|----------|---|--|--|--|--|
| <i>M</i> | 294.33417  |          |           |             |             |          |   |  |  |  |  |
|          |            |          |           | <b>P</b>    |             | <b>Q</b> |   |  |  |  |  |
| <i>n</i> | 0.28388604 | $\omega$ | 112.21334 | -0.46038752 | +0.88283715 |          |   |  |  |  |  |
| <i>a</i> | 2.2928379  | $\Omega$ | 130.03555 | -0.85262190 | -0.41060054 |          |   |  |  |  |  |
| <i>e</i> | 0.1279263  | <i>i</i> | 6.97384   | -0.24714213 | -0.22804772 |          |   |  |  |  |  |
| <i>P</i> | 3.47       | <i>H</i> | 14.2      | <i>G</i>    | 0.15        | <i>U</i> | 1 |  |  |  |  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1984 04 01 | 801 | 0.7+ | 2.3+ | 1995 08 22 | 684 | 0.7+ | 0.5+ | 1996 12 04 | 684 | 0.2+ | 0.3- |
| 1995 07 25 | 684 | 1.0+ | 0.3- | 1995 08 28 | 684 | 0.2+ | 0.2+ | 1997 01 10 | 684 | 0.1- | 0.1- |
| 1995 07 25 | 684 | 0.7+ | 1.1+ | 1995 08 28 | 684 | 0.8+ | 0.0  | 1997 01 10 | 684 | 0.1- | 0.1- |
| 1995 07 26 | 684 | 0.5- | 0.2+ | 1995 08 28 | 684 | 0.1- | 1.4- | 1997 01 12 | 684 | 0.6- | 0.0  |
| 1995 07 26 | 684 | 0.8+ | 0.1- | 1996 08 27 | 684 | 0.1- | 0.6+ | 1997 01 12 | 684 | 0.0  | 0.2- |
| 1995 07 27 | 684 | 1.0- | 0.5- | 1996 08 27 | 684 | 0.0  | 0.4+ | 1997 01 16 | 684 | 0.2- | 0.5- |
| 1995 07 27 | 684 | 0.2- | 0.5- | 1996 08 27 | 684 | 0.3- | 0.2- | 1997 01 16 | 684 | 0.8+ | 0.9- |
| 1995 07 28 | 684 | 0.7- | 0.3+ | 1996 08 27 | 684 | 0.8- | 0.3- | 1998 01 24 | 684 | 0.0  | 0.7- |
| 1995 07 28 | 684 | 0.1- | 0.7+ | 1996 08 28 | 684 | 0.4+ | 0.8+ | 1998 01 24 | 684 | 0.2+ | 0.8- |
| 1995 07 30 | 684 | 0.5- | 0.7- | 1996 08 28 | 684 | 0.9- | 0.2- | 1998 01 24 | 684 | 0.0  | 0.9- |
| 1995 07 30 | 684 | 0.4+ | 0.1+ | 1996 08 28 | 684 | 0.3+ | 0.1+ | 1998 01 24 | 684 | 0.1+ | 0.7- |
| 1995 07 30 | 684 | 0.1+ | 0.4- | 1996 10 13 | 684 | 0.4- | 0.3- | 1998 01 25 | 684 | 0.4+ | 0.6- |
| 1995 08 01 | 684 | 0.3- | 0.8- | 1996 10 13 | 684 | 0.2- | 0.3- | 1998 01 25 | 684 | 0.3+ | 0.6- |
| 1995 08 01 | 684 | 0.1+ | 0.6- | 1996 10 13 | 684 | 0.1- | 0.2- | 1998 02 26 | 684 | 0.5- | 0.4- |
| 1995 08 02 | 684 | 0.4- | 0.5- | 1996 11 08 | 684 | 0.3+ | 0.0  | 1998 02 26 | 684 | 0.4- | 0.4- |
| 1995 08 02 | 684 | 0.1+ | 0.2- | 1996 11 08 | 684 | 0.0  | 0.1- | 1998 02 26 | 684 | 0.3- | 0.4- |
| 1995 08 19 | 684 | 0.4- | 0.0  | 1996 11 08 | 684 | 0.0  | 0.0  | 1998 02 27 | 684 | 0.4- | 0.3- |
| 1995 08 19 | 684 | 0.2- | 0.0  | 1996 12 03 | 684 | 0.2+ | 0.3- | 1998 02 27 | 684 | 0.4- | 0.3- |
| 1995 08 19 | 684 | 0.0  | 0.5- | 1996 12 03 | 684 | 0.7+ | 0.4- | 1998 02 27 | 684 | 0.5- | 0.2- |
| 1995 08 22 | 684 | 0.1+ | 0.3+ | 1996 12 03 | 684 | 0.7+ | 0.4- |            |     |      |      |
| 1995 08 22 | 684 | 0.2- | 0.3- | 1996 12 04 | 684 | 0.1+ | 0.2- |            |     |      |      |

**(8408)\* 1995 SX<sub>12</sub> = 1972 GA<sub>2</sub> = 1996 XS<sub>36</sub>**

Discovered 1995 Sept. 18 by Spacewatch at Kitt Peak.

Id. K. Ichikawa (*MPC* 30761)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

|          |            |          |           |             |             |          |   |  |  |  |  |
|----------|------------|----------|-----------|-------------|-------------|----------|---|--|--|--|--|
| <i>M</i> | 275.65542  |          |           |             |             |          |   |  |  |  |  |
|          |            |          |           | <b>P</b>    |             | <b>Q</b> |   |  |  |  |  |
| <i>n</i> | 0.18545751 | $\omega$ | 17.63906  | -0.75493885 | +0.65579139 |          |   |  |  |  |  |
| <i>a</i> | 3.0453679  | $\Omega$ | 203.34108 | -0.60235729 | -0.69476382 |          |   |  |  |  |  |
| <i>e</i> | 0.1008316  | <i>i</i> | 0.32277   | -0.25929332 | -0.29536570 |          |   |  |  |  |  |
| <i>P</i> | 5.31       | <i>H</i> | 14.2      | <i>G</i>    | 0.15        | <i>U</i> | 1 |  |  |  |  |

Residuals in seconds of arc

|            |     |      |      |            |     |       |       |            |     |      |      |
|------------|-----|------|------|------------|-----|-------|-------|------------|-----|------|------|
| 1972 04 09 | 805 | 0.5- | 0.8+ | 1995 09 19 | 809 | 0.7+  | 0.4-  | 1996 12 17 | 691 | 0.2- | 0.0  |
| 1972 04 09 | 805 | 0.9+ | 1.1- | 1995 09 20 | 809 | 0.7+  | 0.3-  | 1996 12 17 | 691 | 0.3- | 0.1+ |
| 1972 04 10 | 805 | 0.1- | 1.4+ | 1995 09 22 | 809 | (2.3- | 3.2-) | 1996 12 17 | 691 | 0.1- | 0.1+ |
| 1972 04 10 | 805 | 0.1+ | 0.1- | 1995 09 22 | 809 | 0.7+  | 1.2-  | 1998 01 31 | 691 | 0.7- | 0.2+ |
| 1995 08 24 | 809 | 1.2+ | 0.5+ | 1995 09 22 | 691 | 0.6-  | 0.2+  | 1998 01 31 | 691 | 0.7- | 0.1+ |
| 1995 08 25 | 809 | 0.1- | 0.7+ | 1995 09 22 | 691 | 1.2-  | 0.1+  | 1998 01 31 | 691 | 0.7- | 0.3+ |
| 1995 08 25 | 809 | 0.6+ | 0.2+ | 1995 09 22 | 691 | 1.3-  | 0.1+  | 1998 02 23 | 557 | 0.3+ | 0.2- |
| 1995 08 26 | 809 | 1.7+ | 0.4+ | 1995 09 23 | 809 | 0.3+  | 1.3-  | 1998 02 23 | 557 | 0.3- | 0.5+ |
| 1995 09 01 | 809 | 0.2+ | 1.0+ | 1995 09 24 | 809 | 1.0+  | 0.5+  | 1998 02 23 | 557 | 0.7- | 0.1+ |
| 1995 09 18 | 691 | 1.3- | 0.3+ | 1995 09 27 | 691 | 1.7-  | 0.0   | 1998 02 28 | 910 | 1.1+ | 0.1- |
| 1995 09 18 | 691 | 1.5- | 0.5+ | 1995 09 27 | 691 | 1.3-  | 0.1+  | 1998 02 28 | 910 | 0.9+ | 0.0  |
| 1995 09 18 | 809 | 1.2+ | 0.3+ | 1996 12 14 | 691 | 0.2+  | 0.2-  | 1998 02 28 | 910 | 1.2+ | 0.1+ |
| 1995 09 18 | 691 | 1.5- | 0.3+ | 1996 12 14 | 691 | 0.2+  | 0.1+  |            |     |      |      |
| 1995 09 19 | 809 | 1.4+ | 0.1+ | 1996 12 14 | 691 | 0.2+  | 0.3-  |            |     |      |      |

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Marsden

| <i>M</i> | 135.50646  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.17122384 | $\omega$ | 93.29220  | +0.99606856   | +0.04649349 |
| <i>a</i> | 3.2118843  | $\Omega$ | 264.05239 | -0.07233955   | +0.91821301 |
| <i>e</i> | 0.1451669  | <i>i</i> | 4.34789   | +0.05113126   | +0.39334874 |
| <i>P</i> | 5.76       | <i>H</i> | 12.8      | <i>G</i> 0.15 | <i>U</i> 1  |

Residuals in seconds of arc

|            |     |       |       |            |     |       |       |            |     |      |      |
|------------|-----|-------|-------|------------|-----|-------|-------|------------|-----|------|------|
| 1961 11 10 | 760 | 0.6-  | 0.7-  | 1994 06 09 | 809 | (2.5+ | 4.3+) | 1995 12 22 | 704 | 0.2+ | 0.6+ |
| 1961 11 10 | 760 | 1.6+  | 0.8-  | 1994 06 09 | 809 | (1.1+ | 2.5+) | 1996 12 20 | 327 | 0.8+ | 0.0  |
| 1978 09 26 | 095 | (3.9+ | 1.5-) | 1995 11 28 | 704 | 0.3+  | 0.5-  | 1996 12 20 | 327 | 0.6+ | 0.2- |
| 1978 10 08 | 095 | (0.8- | 6.0-) | 1995 11 28 | 704 | 0.8+  | 0.8-  | 1996 12 20 | 327 | 0.3+ | 0.0  |
| 1978 11 28 | 675 | 0.3+  | 0.0   | 1995 11 28 | 704 | 1.4+  | 1.0-  | 1996 12 20 | 327 | 0.7+ | 0.9+ |
| 1978 11 29 | 675 | 0.4+  | 0.2-  | 1995 11 28 | 704 | 0.3+  | 0.9-  | 1996 12 20 | 327 | 0.4+ | 0.4+ |
| 1984 10 28 | 046 | 1.7-  | 0.8+  | 1995 12 19 | 704 | 1.0-  | 0.6+  | 1996 12 20 | 327 | 0.1+ | 0.1+ |
| 1984 10 28 | 046 | 1.3+  | 0.0   | 1995 12 19 | 704 | 0.3-  | 0.1-  | 1997 12 05 | 691 | 0.5- | 0.0  |
| 1984 10 29 | 046 | 0.2-  | 0.7+  | 1995 12 19 | 704 | 0.2-  | 0.5+  | 1997 12 05 | 691 | 0.6- | 0.1+ |
| 1984 10 29 | 046 | 0.1-  | 0.1-  | 1995 12 19 | 704 | 0.2-  | 1.2+  | 1997 12 05 | 691 | 0.5- | 0.1- |
| 1984 10 30 | 046 | 0.8-  | 1.0-  | 1995 12 19 | 704 | 1.4+  | 0.4+  | 1998 02 19 | 699 | 0.7+ | 0.4+ |
| 1984 10 31 | 046 | 1.0-  | 0.9-  | 1995 12 19 | 704 | 0.0   | 0.9+  | 1998 02 19 | 699 | 0.3- | 0.6+ |
| 1990 11 20 | 095 | 0.3-  | 0.5+  | 1995 12 20 | 704 | 0.2-  | 0.1-  | 1998 02 19 | 699 | 0.2+ | 1.3+ |
| 1990 11 20 | 095 | (2.2+ | 1.1-) | 1995 12 20 | 704 | 0.9-  | 0.0   | 1998 02 26 | 566 | 0.5- | 1.1- |
| 1994 06 08 | 809 | (1.8+ | 3.1+) | 1995 12 20 | 704 | (2.3- | 0.2+) | 1998 02 26 | 566 | 0.1- | 0.8- |
| 1994 06 08 | 809 | (2.3+ | 2.5+) | 1995 12 20 | 704 | 1.9-  | 0.9-  | 1998 02 26 | 566 | 0.5- | 1.0- |
| 1994 06 08 | 809 | (2.3+ | 3.1+) | 1995 12 20 | 704 | 0.1+  | 0.2+  |            |     |      |      |
| 1994 06 09 | 809 | (3.8+ | 5.0+) | 1995 12 22 | 704 | 0.0   | 0.6+  |            |     |      |      |

**(8410)\* 1996 QZ<sub>1</sub> = 1933 UG = 1973 UU<sub>3</sub> = 1979 WE<sub>7</sub> = 1985 VG<sub>3</sub>**  
**= 1990 SP<sub>16</sub> = 1993 CA**

Discovered 1996 Aug. 24 by S. Ueda and H. Kaneda at Kushiro.

Id. G. V. Williams (*MPC* 28305)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 50.10623   |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.16959676 | $\omega$ | 290.58102 | +0.87915104   | -0.47420412 |
| <i>a</i> | 3.2323944  | $\Omega$ | 97.75222  | +0.45302787   | +0.80096402 |
| <i>e</i> | 0.1717310  | <i>i</i> | 2.72793   | +0.14784859   | +0.36549568 |
| <i>P</i> | 5.81       | <i>H</i> | 12.4      | <i>G</i> 0.15 | <i>U</i> 1  |

Residuals in seconds of arc (or two decimals in units of degrees)

|            |     |        |        |   |            |     |      |      |            |     |      |      |
|------------|-----|--------|--------|---|------------|-----|------|------|------------|-----|------|------|
| 1933 10 20 | 012 | (0.06+ | 0.03+) | X | 1993 02 04 | 372 | 0.0  | 0.4+ | 1998 01 08 | 704 | 0.1- | 0.2- |
| 1973 10 29 | 095 | 0.2+   | 0.5-   |   | 1993 02 04 | 372 | 0.3- | 0.4+ | 1998 01 08 | 704 | 0.2+ | 0.5- |
| 1979 11 17 | 095 | 1.6-   | 1.0-   |   | 1996 08 24 | 399 | 1.0+ | 1.0+ | 1998 01 08 | 704 | 0.2+ | 0.0  |
| 1985 11 10 | 095 | 0.1+   | 0.3-   |   | 1996 08 24 | 399 | 0.5- | 0.6+ | 1998 01 08 | 704 | 1.0- | 0.7- |
| 1985 11 20 | 095 | 1.9+   | 0.0    |   | 1996 08 25 | 399 | 1.5- | 0.8+ | 1998 01 08 | 704 | 0.8- | 0.5+ |
| 1990 09 17 | 675 | 0.7+   | 0.9-   |   | 1996 08 25 | 399 | 0.8- | 0.4+ | 1998 01 08 | 704 | 0.1- | 1.0+ |
| 1990 09 17 | 675 | 1.1+   | 0.7-   |   | 1996 09 07 | 399 | 1.4- | 1.9+ | 1998 01 26 | 704 | 0.8+ | 0.2- |
| 1990 09 20 | 675 | 0.9+   | 1.2-   |   | 1996 09 07 | 399 | 1.3- | 0.8+ | 1998 01 26 | 704 | 0.5+ | 0.2- |
| 1990 09 20 | 675 | 1.4+   | 1.8-   |   | 1998 01 06 | 704 | 0.2- | 0.1- | 1998 01 26 | 704 | 0.1- | 0.4+ |
| 1993 02 02 | 372 | (3.1-  | 3.1-)  |   | 1998 01 06 | 704 | 0.3- | 0.2- | 1998 01 26 | 704 | 0.8+ | 0.2+ |
| 1993 02 02 | 372 | (1.2-  | 2.9-)  |   | 1998 01 06 | 704 | 0.5+ | 0.3+ |            |     |      |      |

**(8411)\* 1996 TO = 1978 RS<sub>7</sub> = 1995 GW<sub>8</sub>**

Discovered 1996 Oct. 3 at Farra d'Isonzo.

Id. G. V. Williams (*MPC* 28864)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 188.35496  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.27760474 | $\omega$ | 153.39101 | +0.44424779   | +0.89515280 |
| <i>a</i> | 2.3272951  | $\Omega$ | 142.95221 | -0.83244165   | +0.42756748 |
| <i>e</i> | 0.1478663  | <i>i</i> | 3.49033   | -0.33118696   | +0.12604565 |
| <i>P</i> | 3.55       | <i>H</i> | 15.0      | <i>G</i> 0.15 | <i>U</i> 2  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1978 09 02 | 809 | 0.0  | 0.8- | 1996 10 09 | 595 | 1.1- | 0.1+ | 1998 01 27 | 595 | 0.5- | 0.1- |
| 1978 09 02 | 809 | 1.0+ | 0.7- | 1996 10 09 | 595 | 0.8+ | 0.4- | 1998 01 27 | 595 | 0.8- | 0.7+ |

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1978 09 02 | 809 | 0.1+ | 0.3+ | 1996 10 31 | 595 | 1.0- | 0.1+ | 1998 02 23 | 595 | 0.1- | 0.9- |
| 1978 09 02 | 809 | 0.6- | 0.3- | 1996 10 31 | 595 | 0.3- | 0.9- | 1998 02 23 | 595 | 0.3- | 1.3+ |
| 1995 04 06 | 691 | 0.1- | 0.5- | 1996 11 01 | 595 | 0.2+ | 1.6- | 1998 02 25 | 595 | 0.6+ | 1.2- |
| 1995 04 06 | 691 | 0.1- | 0.7- | 1996 11 01 | 595 | 0.6+ | 0.1+ | 1998 02 25 | 595 | 1.2+ | 0.0  |
| 1995 04 06 | 691 | 0.2- | 0.7- | 1996 12 04 | 595 | 0.9+ | 0.2- | 1998 02 26 | 595 | 0.8- | 0.4+ |
| 1996 10 03 | 595 | 0.3- | 0.8+ | 1996 12 04 | 595 | 1.0+ | 0.3- | 1998 02 26 | 595 | 0.0  | 0.2- |
| 1996 10 03 | 595 | 0.2+ | 0.3+ | 1996 12 05 | 595 | 0.9+ | 0.1+ | 1998 03 02 | 910 | 0.8+ | 0.2- |
| 1996 10 04 | 595 | 0.7+ | 0.0  | 1996 12 05 | 595 | 0.8+ | 0.5+ | 1998 03 02 | 910 | 0.7+ | 0.1- |
| 1996 10 04 | 595 | 1.1- | 0.1+ | 1998 01 26 | 595 | 0.5- | 0.1- | 1998 03 02 | 910 | 0.3+ | 0.4- |
| 1996 10 04 | 595 | 1.1- | 0.5+ | 1998 01 26 | 595 | 0.8- | 0.5+ |            |     |      |      |

**(8412)\* 1996 TM<sub>6</sub> = 1978 WT<sub>16</sub> = 1989 UG<sub>4</sub>**

Discovered 1996 Oct. 7 by the Beijing Schmidt CCD Asteroid Program at

Xinglong.

Id. G. V. Williams (*MPC* 28081)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 95.70934   |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.26784867 | $\omega$ | 334.46742 | +0.94184312   | -0.33492622 |
| <i>a</i> | 2.3834701  | $\Omega$ | 45.12991  | +0.31459210   | +0.84997055 |
| <i>e</i> | 0.1950479  | <i>i</i> | 2.22338   | +0.11816659   | +0.40666262 |
| <i>P</i> | 3.68       | <i>H</i> | 15.8      | <i>G</i> 0.15 | <i>U</i> 2  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1978 11 30 | 675 | 0.1+ | 0.6- | 1996 10 07 | 327 | 0.4+ | 0.0  | 1998 01 22 | 691 | 0.5- | 0.6- |
| 1978 12 01 | 675 | 0.1+ | 0.3+ | 1996 10 07 | 327 | 0.7+ | 0.9+ | 1998 01 22 | 691 | 0.6- | 0.6- |
| 1989 10 23 | 033 | 0.2+ | 0.0  | 1996 10 09 | 327 | 0.3+ | 0.4+ | 1998 01 22 | 691 | 0.5- | 0.4- |
| 1989 10 23 | 033 | 0.2+ | 0.5+ | 1996 10 09 | 327 | 1.2+ | 0.0  | 1998 02 18 | 552 | 0.1+ | 0.4+ |
| 1989 10 26 | 033 | 0.8- | 0.0  | 1996 10 09 | 327 | 0.5- | 0.0  | 1998 02 18 | 552 | 0.6- | 0.7- |
| 1996 09 13 | 566 | 0.0  | 0.2- | 1996 10 18 | 327 | 0.4+ | 0.1- | 1998 02 20 | 552 | 0.7+ | 0.4+ |
| 1996 09 13 | 566 | 1.1- | 1.0- | 1996 10 18 | 327 | 0.8+ | 0.2+ | 1998 02 20 | 552 | 1.1+ | 0.2- |
| 1996 09 13 | 566 | 0.8- | 0.7- | 1996 10 18 | 327 | 0.0  | 0.1- | 1998 02 21 | 552 | 1.7+ | 0.8+ |
| 1996 10 07 | 327 | 0.6- | 0.0  | 1996 10 18 | 327 | 0.1+ | 0.2+ | 1998 02 21 | 552 | 1.5- | 0.4+ |

**(8413)\* 1996 TV<sub>10</sub> = 1976 UW<sub>14</sub> = 1986 TP<sub>5</sub> = 1986 UP<sub>1</sub>**

Discovered 1996 Oct. 9 by S. Ueda and H. Kaneda at Kushiro.

Id. S. Nakano (*MPC* 28597)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Nakano

| <i>M</i> | 230.51317  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.29514972 | $\omega$ | 221.34108 | -0.08514137   | +0.99380054 |
| <i>a</i> | 2.2341267  | $\Omega$ | 43.91509  | -0.88493002   | -0.04244929 |
| <i>e</i> | 0.1234673  | <i>i</i> | 5.91647   | -0.45787531   | -0.10275482 |
| <i>P</i> | 3.34       | <i>H</i> | 13.9      | <i>G</i> 0.15 | <i>U</i> 1  |

Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| 1976 10 22 | 381 | 1.1-  | 0.1-  | 1993 12 09 | 675 | 0.7+ | 0.2+ | 1998 01 28 | 566 | 0.2+ | 0.0  |
| 1976 10 22 | 381 | 0.1+  | 0.3-  | 1996 10 09 | 399 | 1.2- | 0.1+ | 1998 01 28 | 566 | 0.3+ | 0.1+ |
| 1976 10 24 | 381 | 0.2-  | 1.3-  | 1996 10 09 | 399 | 0.5- | 0.2+ | 1998 01 28 | 566 | 0.4+ | 0.1- |
| 1976 10 24 | 381 | 2.1+  | 1.4-  | 1996 10 10 | 399 | 0.2+ | 0.8+ | 1998 02 21 | 557 | 0.7- | 0.4- |
| 1986 10 01 | 010 | (2.1+ | 3.7-) | 1996 10 10 | 399 | 0.6- | 0.6- | 1998 02 21 | 557 | 0.4- | 0.4- |
| 1986 10 01 | 010 | (4.0+ | 1.2-) | 1996 10 16 | 399 | 0.3+ | 1.1+ | 1998 02 21 | 557 | 0.6- | 0.4- |
| 1986 10 27 | 010 | (8.0- | 1.0+) | 1996 10 16 | 399 | 0.6- | 1.1+ | 1998 02 24 | 566 | 0.1+ | 0.2+ |
| 1986 10 27 | 010 | (3.8+ | 2.9+) | 1996 11 06 | 399 | 0.2- | 0.2+ | 1998 02 24 | 566 | 0.0  | 0.1+ |
| 1986 10 27 | 010 | (5.1+ | 3.9+) | 1996 11 06 | 399 | 0.1- | 0.6- | 1998 02 24 | 566 | 0.0  | 0.2+ |
| 1989 09 04 | 675 | 1.0+  | 0.5-  | 1998 01 24 | 566 | 0.1- | 0.3- | 1998 02 27 | 557 | 0.1+ | 0.2+ |
| 1989 09 04 | 675 | 0.2+  | 0.7-  | 1998 01 24 | 566 | 0.1- | 0.4- | 1998 02 27 | 557 | 0.0  | 0.3+ |
| 1993 12 09 | 675 | 0.5+  | 0.9+  | 1998 01 24 | 566 | 0.0  | 0.6- |            |     |      |      |

**(8414)\* 1996 TW<sub>10</sub> = 1981 SZ = 1992 PP<sub>4</sub>**

Discovered 1996 Oct. 9 by S. Ueda and H. Kaneda at Kushiro.

Id. S. Nakano (*MPC* 28598)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Nakano

| <i>M</i> | 166.67249  | (2000.0)           | <i>P</i>      | <i>Q</i>    |
|----------|------------|--------------------|---------------|-------------|
| <i>n</i> | 0.26733730 | $\omega$ 194.16474 | +0.76977057   | +0.63756877 |
| <i>a</i> | 2.3865086  | $\Omega$ 126.18161 | -0.58184910   | +0.72079736 |
| <i>e</i> | 0.1043199  | <i>i</i> 2.19918   | -0.26249743   | +0.27195077 |
| <i>P</i> | 3.69       | <i>H</i> 13.8      | <i>G</i> 0.15 | <i>U</i> 2  |

Residuals in seconds of arc

|            |     |             |            |     |             |      |            |     |      |      |
|------------|-----|-------------|------------|-----|-------------|------|------------|-----|------|------|
| 1981 09 26 | 688 | (0.7- 3.1-) | 1996 10 10 | 399 | 0.7+        | 0.9+ | 1998 01 27 | 098 | 0.0  | 1.9+ |
| 1981 09 26 | 688 | 0.5+ 2.0-   | 1996 10 16 | 399 | 1.1+        | 0.4+ | 1998 01 29 | 566 | 0.7+ | 0.5- |
| 1981 10 04 | 688 | 1.1+ 2.1-   | 1996 10 16 | 399 | 0.7-        | 0.7+ | 1998 01 29 | 566 | 0.4+ | 0.8- |
| 1981 10 04 | 688 | (0.3- 4.1-) | 1996 11 06 | 399 | 0.9-        | 0.9+ | 1998 01 29 | 566 | 0.2+ | 0.6- |
| 1992 08 02 | 675 | 0.1- 0.2+   | 1996 11 06 | 399 | 1.6-        | 0.4- | 1998 02 26 | 691 | 0.0  | 1.0- |
| 1992 08 02 | 675 | 0.4+ 0.4-   | 1997 02 01 | 691 | 0.6-        | 0.4- | 1998 02 26 | 691 | 0.1- | 0.7- |
| 1992 08 06 | 675 | 0.1+ 0.7-   | 1997 02 01 | 691 | 0.8-        | 0.4- | 1998 02 26 | 691 | 0.1- | 0.7- |
| 1992 08 06 | 675 | 0.0 1.2-    | 1997 02 01 | 691 | 0.6-        | 0.3- | 1998 03 02 | 691 | 0.7- | 0.7- |
| 1996 10 09 | 399 | 0.1- 0.2+   | 1998 01 25 | 098 | 1.7-        | 0.5- | 1998 03 02 | 691 | 0.7- | 0.7- |
| 1996 10 09 | 399 | 1.4+ 0.3-   | 1998 01 25 | 098 | 1.3+        | 0.4- | 1998 03 02 | 691 | 0.8- | 0.8- |
| 1996 10 10 | 399 | 0.3+ 0.1-   | 1998 01 27 | 098 | (0.5+ 2.3-) |      |            |     |      |      |

**(8415)\* 1996 UT = 1978 NQ<sub>2</sub> = 1979 VB<sub>3</sub>**

Discovered 1996 Oct. 16 by Y. Shimizu and T. Urata at the Nachi-Katsuura Observatory.

Id. S. Nakano (*MPC* 28310)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Nakano

| <i>M</i> | 90.53084   | (2000.0)           | <i>P</i>      | <i>Q</i>    |
|----------|------------|--------------------|---------------|-------------|
| <i>n</i> | 0.17178002 | $\omega$ 208.46978 | +0.98163530   | -0.19063130 |
| <i>a</i> | 3.2049478  | $\Omega$ 162.51542 | +0.17925570   | +0.90882970 |
| <i>e</i> | 0.1719745  | <i>i</i> 1.37326   | +0.06526509   | +0.37106373 |
| <i>P</i> | 5.74       | <i>H</i> 12.1      | <i>G</i> 0.15 | <i>U</i> 1  |

Residuals in seconds of arc

|            |     |           |            |     |      |      |            |     |      |      |
|------------|-----|-----------|------------|-----|------|------|------------|-----|------|------|
| 1978 07 08 | 095 | 0.4- 1.6+ | 1996 11 02 | 327 | 0.5+ | 0.1- | 1996 11 29 | 327 | 0.2- | 0.3- |
| 1979 11 14 | 095 | 0.1- 0.8+ | 1996 11 02 | 327 | 0.3+ | 0.3+ | 1997 01 03 | 385 | 0.4- | 0.2- |
| 1996 10 16 | 905 | 0.1- 0.1+ | 1996 11 02 | 327 | 0.5- | 0.3+ | 1997 01 03 | 385 | 0.5- | 0.5- |
| 1996 10 16 | 905 | 0.4+ 0.1+ | 1996 11 09 | 385 | 0.1+ | 0.1+ | 1997 01 03 | 385 | 0.2- | 0.1- |
| 1996 10 17 | 905 | 0.8- 0.2- | 1996 11 09 | 385 | 0.3- | 0.4+ | 1998 01 02 | 886 | 0.4+ | 0.1- |
| 1996 10 17 | 905 | 1.0- 0.7- | 1996 11 09 | 385 | 0.5- | 0.2+ | 1998 01 02 | 886 | 0.0  | 0.8+ |
| 1996 10 19 | 385 | 0.2+ 0.0  | 1996 11 26 | 327 | 0.7- | 0.3- | 1998 01 19 | 886 | 0.3- | 0.3- |
| 1996 10 19 | 385 | 0.4+ 0.2- | 1996 11 26 | 327 | 0.7- | 0.2+ | 1998 01 19 | 886 | 0.3+ | 1.3+ |
| 1996 10 19 | 385 | 0.1+ 0.1+ | 1996 11 26 | 327 | 0.2- | 1.0- | 1998 01 25 | 886 | 0.2- | 0.1- |
| 1996 10 21 | 385 | 0.6+ 0.2+ | 1996 11 26 | 327 | 0.6+ | 0.6- | 1998 01 25 | 886 | 0.1+ | 0.0  |
| 1996 10 21 | 385 | 0.5+ 0.1- | 1996 11 27 | 327 | 0.6- | 0.8+ | 1998 02 21 | 725 | 0.2+ | 0.3+ |
| 1996 10 21 | 385 | 0.4+ 0.1+ | 1996 11 27 | 327 | 0.2- | 0.4+ | 1998 02 21 | 725 | 0.1+ | 0.3+ |
| 1996 10 23 | 327 | 0.6+ 0.0  | 1996 11 27 | 327 | 0.2- | 0.8+ | 1998 02 23 | 725 | 0.6+ | 0.2- |
| 1996 10 23 | 327 | 1.0+ 0.1+ | 1996 11 27 | 327 | 0.1- | 0.4+ | 1998 02 23 | 725 | 0.4+ | 0.0  |
| 1996 10 23 | 327 | 0.5+ 0.1- | 1996 11 28 | 327 | 0.2- | 0.2+ | 1998 02 27 | 566 | 0.0  | 0.6- |
| 1996 10 23 | 327 | 0.3+ 0.2- | 1996 11 28 | 327 | 0.5+ | 0.1+ | 1998 02 27 | 566 | 0.5- | 0.3- |
| 1996 10 30 | 385 | 0.2+ 0.2- | 1996 11 28 | 327 | 0.4- | 0.3- | 1998 02 27 | 566 | 0.6- | 0.2+ |
| 1996 10 30 | 385 | 0.4+ 0.2- | 1996 11 29 | 327 | 0.3- | 0.2- |            |     |      |      |
| 1996 10 30 | 385 | 0.1+ 0.2- | 1996 11 29 | 327 | 0.2- | 0.1- |            |     |      |      |

**(8416)\* 1996 VB<sub>8</sub> = 1980 RP<sub>8</sub> = 1980 TG<sub>10</sub> = 1986 LA<sub>1</sub> = 1988 AO**

Discovered 1996 Nov. 3 by S. Ueda and H. Kaneda at Kushiro.

Id. D. Asher (*MPC* 30460), G. V. Williams (d, *MPC* 30878)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Nakano

| <i>M</i> | 205.62299  | (2000.0)           | <i>P</i>      | <i>Q</i>    |
|----------|------------|--------------------|---------------|-------------|
| <i>n</i> | 0.31186120 | $\omega$ 130.16168 | +0.50563443   | +0.86269175 |
| <i>a</i> | 2.1535840  | $\Omega$ 170.19736 | -0.80808268   | +0.47755996 |
| <i>e</i> | 0.1947784  | <i>i</i> 3.31235   | -0.30221881   | +0.16643148 |
| <i>P</i> | 3.16       | <i>H</i> 14.0      | <i>G</i> 0.15 | <i>U</i> 2  |

Residuals in seconds of arc

|            |     |             |            |     |             |      |            |     |             |
|------------|-----|-------------|------------|-----|-------------|------|------------|-----|-------------|
| 1980 09 06 | 095 | 0.7+ 0.4-   | 1996 11 03 | 399 | 0.5+        | 1.2- | 1998 02 06 | 809 | (3.2+ 1.2-) |
| 1980 10 15 | 095 | 1.3+ 0.9+   | 1996 11 03 | 399 | 1.0+        | 0.4- | 1998 02 06 | 809 | (3.6+ 1.1-) |
| 1986 06 06 | 675 | (7.6+ 1.6+) | 1996 11 06 | 399 | 0.9-        | 0.5- | 1998 02 07 | 809 | 1.8+ 0.6-   |
| 1986 06 06 | 675 | 2.0- 0.8+   | 1996 11 06 | 399 | 0.9+        | 0.5+ | 1998 02 07 | 809 | 1.7+ 0.6-   |
| 1986 06 08 | 675 | 0.9+ 0.8-   | 1996 11 15 | 399 | 0.9-        | 0.7+ | 1998 02 07 | 809 | 1.7+ 1.4-   |
| 1988 01 11 | 033 | 1.4- 0.1-   | 1996 11 15 | 399 | 1.8-        | 0.7+ | 1998 02 21 | 557 | 0.4- 0.4+   |
| 1988 01 11 | 033 | 1.9- 0.2-   | 1998 01 26 | 566 | 0.2+        | 0.1+ | 1998 02 21 | 557 | 0.2- 0.4+   |
| 1995 03 27 | 691 | 0.7- 0.6+   | 1998 01 26 | 566 | 0.3+        | 0.3- | 1998 02 23 | 557 | 0.1+ 0.1+   |
| 1995 03 27 | 691 | 0.9- 0.2+   | 1998 01 26 | 566 | 0.1+        | 0.0  | 1998 02 23 | 557 | 0.3+ 0.0    |
| 1995 03 27 | 691 | 0.7- 0.1-   | 1998 02 06 | 809 | (4.5+ 1.3-) |      | 1998 02 23 | 557 | 0.2+ 0.1+   |

**(8417)\* 1996 VG<sub>8</sub> = 1986 TU<sub>5</sub>**

Discovered 1996 Nov. 7 by K. Endate and K. Watanabe at Kitami.

Id. S. Nakano (*MPC* 29632)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Nakano

| <i>M</i> | 217.85907  | (2000.0)           | <i>P</i>      | <i>Q</i>    |
|----------|------------|--------------------|---------------|-------------|
| <i>n</i> | 0.29949259 | $\omega$ 26.70442  | +0.33092724   | +0.93831154 |
| <i>a</i> | 2.2124765  | $\Omega$ 262.75938 | -0.88285573   | +0.27031938 |
| <i>e</i> | 0.1932983  | <i>i</i> 5.80245   | -0.33324603   | +0.21563598 |
| <i>P</i> | 3.29       | <i>H</i> 14.0      | <i>G</i> 0.15 | <i>U</i> 1  |

Residuals in seconds of arc

|            |     |      |      |            |     |       |       |            |     |       |       |
|------------|-----|------|------|------------|-----|-------|-------|------------|-----|-------|-------|
| 1986 10 06 | 801 | 0.0  | 0.0  | 1996 11 16 | 400 | 0.1+  | 0.1-  | 1998 02 25 | 566 | 0.0   | 0.5-  |
| 1989 08 02 | 675 | 0.4+ | 0.1- | 1996 11 16 | 400 | 0.9+  | 0.2-  | 1998 02 25 | 566 | (0.7- | 3.5-) |
| 1989 08 02 | 675 | 0.4+ | 0.1+ | 1996 12 30 | 400 | 0.2+  | 0.5+  | 1998 02 26 | 566 | 0.1+  | 0.2+  |
| 1989 08 30 | 675 | 0.4+ | 0.2- | 1997 01 01 | 400 | 0.3+  | 0.4-  | 1998 02 26 | 566 | 0.2+  | 0.2+  |
| 1989 08 30 | 675 | 0.7+ | 0.2- | 1997 01 01 | 400 | 0.8+  | 0.4+  | 1998 02 26 | 566 | 0.2-  | 0.1+  |
| 1989 09 03 | 675 | 1.5- | 0.7- | 1998 01 27 | 691 | 0.5-  | 0.2-  | 1998 02 26 | 566 | 0.2+  | 0.9+  |
| 1996 11 07 | 400 | 0.3- | 0.5+ | 1998 01 27 | 691 | 0.6-  | 0.2-  | 1998 02 26 | 566 | 0.4+  | 0.3+  |
| 1996 11 07 | 400 | 0.8- | 1.2- | 1998 01 27 | 691 | 0.6-  | 0.2-  | 1998 02 26 | 566 | 0.2+  | 0.9+  |
| 1996 11 08 | 400 | 1.2+ | 0.2- | 1998 02 25 | 566 | 0.0   | 0.4-  | 1998 02 26 | 566 | 0.1+  | 0.2-  |
| 1996 11 08 | 400 | 1.5- | 0.5+ | 1998 02 25 | 566 | 0.3-  | 1.8-  | 1998 02 26 | 566 | 0.1+  | 0.2-  |
| 1996 11 13 | 400 | 0.1- | 0.2+ | 1998 02 25 | 566 | 0.0   | 0.2-  | 1998 02 26 | 566 | 0.1+  | 0.2-  |
| 1996 11 13 | 400 | 0.3- | 0.3+ | 1998 02 25 | 566 | (2.1- | 2.5-) |            |     |       |       |

**(8418)\* 1996 VS<sub>30</sub> = 1986 OU = 1989 CT<sub>8</sub> = 1991 RM<sub>26</sub> = 1995 OM**

Discovered 1996 Nov. 10 by T. Okuni at Nanyou.

Id. S. Nakano (*MPC* 28868)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Nakano

| <i>M</i> | 202.83518  | (2000.0)           | <i>P</i>      | <i>Q</i>    |
|----------|------------|--------------------|---------------|-------------|
| <i>n</i> | 0.21579883 | $\omega$ 306.69702 | +0.41048577   | +0.91179229 |
| <i>a</i> | 2.7527704  | $\Omega$ 347.52244 | -0.81844625   | +0.36275733 |
| <i>e</i> | 0.1106701  | <i>i</i> 3.09693   | -0.40205369   | +0.19246282 |
| <i>P</i> | 4.57       | <i>H</i> 13.1      | <i>G</i> 0.15 | <i>U</i> 1  |

Residuals in seconds of arc

|            |     |             |            |     |             |      |            |     |           |
|------------|-----|-------------|------------|-----|-------------|------|------------|-----|-----------|
| 1986 07 27 | 413 | 0.4+ 0.0    | 1995 07 18 | 399 | 0.6-        | 0.1+ | 1996 12 03 | 358 | 1.4- 0.5+ |
| 1986 07 27 | 413 | (3.5- 0.2+) | 1995 07 18 | 399 | 0.9-        | 0.9+ | 1996 12 03 | 358 | 0.1+ 0.7+ |
| 1986 08 01 | 413 | 1.0- 0.9-   | 1995 07 19 | 399 | 1.0+        | 0.6- | 1996 12 07 | 358 | 1.7+ 0.9- |
| 1986 08 01 | 413 | 1.3+ 0.7+   | 1995 07 19 | 399 | 0.3-        | 0.7+ | 1996 12 07 | 358 | 0.3+ 0.9- |
| 1989 02 13 | 809 | 0.5- 0.1+   | 1996 11 10 | 358 | (0.2+ 3.6-) |      | 1998 01 25 | 566 | 0.3+ 0.0  |
| 1989 02 13 | 809 | 0.2- 0.1+   | 1996 11 10 | 358 | 1.0-        | 1.4- | 1998 01 25 | 566 | 0.3+ 0.1- |
| 1989 02 13 | 809 | 0.3+ 0.3+   | 1996 11 16 | 358 | 0.8+        | 1.8+ | 1998 01 25 | 566 | 0.2- 0.4- |
| 1991 09 11 | 675 | 2.1+ 0.6+   | 1996 11 16 | 358 | 0.0         | 0.5+ | 1998 02 26 | 566 | 0.1+ 0.0  |
| 1991 09 11 | 675 | 1.5- 0.2+   | 1996 11 19 | 358 | 0.4-        | 0.8+ | 1998 02 26 | 566 | 0.0 0.1-  |
| 1991 09 13 | 675 | 0.6- 1.5-   | 1996 11 19 | 358 | 0.1-        | 0.5+ | 1998 02 26 | 566 | 0.1- 0.1- |
| 1991 09 13 | 675 | 0.2+ 0.9-   | 1996 12 03 | 358 | (3.2+ 0.1-) |      |            |     |           |

**(8419)\* 1996 VK<sub>38</sub> = 1977 UU = 1986 RZ<sub>8</sub> = 1991 RG<sub>27</sub>**

Discovered 1996 Nov. 7 by S. Ueda and H. Kaneda at Kushiro.

Id. S. Nakano (*MPC* 28869)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Nakano

| <i>M</i> | 237.53694  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.21675787 | $\omega$ | 93.11679  | -0.12644305   | +0.99168787 |
| <i>a</i> | 2.7446447  | $\Omega$ | 169.52870 | -0.95421836   | -0.11503395 |
| <i>e</i> | 0.1018895  | <i>i</i> | 7.53070   | -0.27107097   | -0.05763998 |
| <i>P</i> | 4.55       | <i>H</i> | 12.8      | <i>G</i> 0.15 | <i>U</i> 2  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1977 10 16 | 675 | 0.1+ | 0.3+ | 1996 11 12 | 399 | 0.8- | 0.8- | 1998 01 25 | 566 | 0.6+ | 1.0- |
| 1977 10 17 | 675 | 0.1- | 0.0  | 1996 11 12 | 399 | 0.9- | 0.2+ | 1998 02 26 | 699 | 0.4+ | 0.9+ |
| 1986 09 08 | 095 | 0.5- | 0.5+ | 1996 12 06 | 399 | 0.3+ | 0.7- | 1998 02 26 | 699 | 0.1- | 0.4+ |
| 1991 09 13 | 675 | 0.7+ | 0.3- | 1996 12 06 | 399 | 0.8- | 0.9+ | 1998 02 26 | 699 | 1.1- | 0.4+ |
| 1991 09 13 | 675 | 1.3+ | 0.3- | 1996 12 12 | 691 | 1.2+ | 1.2+ | 1998 02 28 | 699 | 0.7- | 0.6+ |
| 1991 09 15 | 675 | 0.2- | 0.7+ | 1996 12 12 | 691 | 1.4+ | 1.3+ | 1998 02 28 | 699 | 0.0  | 0.4+ |
| 1991 09 15 | 675 | 1.0- | 0.1- | 1996 12 12 | 691 | 0.3- | 1.8- | 1998 02 28 | 699 | 0.3+ | 0.3+ |
| 1996 11 07 | 399 | 0.5+ | 0.4+ | 1998 01 25 | 566 | 0.4+ | 0.7- |            |     |      |      |
| 1996 11 07 | 399 | 1.1- | 0.7- | 1998 01 25 | 566 | 0.3+ | 0.7- |            |     |      |      |

**(8420)\* 1996 WQ = 1975 XL<sub>7</sub> = 1991 PX<sub>11</sub>**

Discovered 1996 Nov. 17 by P. G. Comba at Prescott.

Id. B. G. Marsden (*MPC* 28604)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Marsden

| <i>M</i> | 293.71814  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.23487499 | $\omega$ | 268.88424 | -0.82776204   | +0.53420221 |
| <i>a</i> | 2.6016260  | $\Omega$ | 303.38207 | -0.39731574   | -0.77399941 |
| <i>e</i> | 0.1378015  | <i>i</i> | 11.85726  | -0.39616941   | -0.33993075 |
| <i>P</i> | 4.20       | <i>H</i> | 13.3      | <i>G</i> 0.15 | <i>U</i> 1  |

Residuals in seconds of arc

|            |     |      |      |            |     |       |       |            |     |      |      |
|------------|-----|------|------|------------|-----|-------|-------|------------|-----|------|------|
| 1975 12 03 | 033 | 0.5+ | 0.6- | 1996 12 03 | 684 | 0.5+  | 0.1+  | 1998 02 24 | 684 | 0.0  | 0.4- |
| 1975 12 03 | 033 | 0.1- | 0.5- | 1996 12 03 | 684 | 0.5+  | 0.2+  | 1998 02 24 | 684 | 0.1+ | 0.1- |
| 1991 08 07 | 675 | 1.1+ | 0.2- | 1996 12 30 | 684 | 0.0   | 1.0-  | 1998 02 24 | 684 | 0.0  | 0.1- |
| 1991 08 07 | 675 | 0.6+ | 0.2+ | 1996 12 30 | 684 | (0.3- | 2.1-) | 1998 02 24 | 566 | 0.2- | 0.1+ |
| 1991 08 08 | 675 | 0.6- | 0.5- | 1998 01 24 | 684 | 0.3-  | 0.2-  | 1998 02 24 | 566 | 0.4- | 0.1+ |
| 1991 08 08 | 675 | 0.2+ | 1.6- | 1998 01 24 | 684 | 0.2-  | 0.3-  | 1998 02 24 | 566 | 0.0  | 0.1+ |
| 1996 11 17 | 684 | 0.3- | 0.2+ | 1998 01 24 | 684 | 0.0   | 0.3-  | 1998 02 26 | 699 | 0.7+ | 0.7+ |
| 1996 11 17 | 684 | 0.4- | 0.2+ | 1998 01 25 | 684 | 0.2-  | 0.3-  | 1998 02 26 | 699 | 0.2- | 0.1- |
| 1996 11 18 | 684 | 0.2- | 0.3+ | 1998 01 25 | 684 | 0.1-  | 0.2-  | 1998 02 26 | 699 | 0.5- | 0.2+ |
| 1996 11 18 | 684 | 0.3- | 0.4+ | 1998 01 25 | 684 | 0.3-  | 0.2-  | 1998 03 01 | 470 | 0.2+ | 0.4- |
| 1996 11 18 | 684 | 0.2- | 0.3+ | 1998 02 22 | 566 | 0.4-  | 0.0   | 1998 03 01 | 470 | 0.8+ | 0.4- |
| 1996 11 19 | 684 | 0.0  | 0.3+ | 1998 02 22 | 566 | 0.4-  | 0.2+  | 1998 03 01 | 470 | 0.5+ | 0.5- |
| 1996 11 19 | 684 | 0.1- | 0.3+ | 1998 02 22 | 566 | 0.3-  | 0.2+  |            |     |      |      |

**(8421)\* 1996 XA<sub>9</sub> = 1976 UX<sub>9</sub> = 1981 UA<sub>26</sub>**

Discovered 1996 Dec. 2 at the Osservatorio S. Vittore, Bologna.

Id. B. G. Marsden (*MPC* 28606)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Marsden

| <i>M</i> | 67.86350   |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.20225597 | $\omega$ | 289.27800 | +0.06428747   | -0.99780499 |
| <i>a</i> | 2.8743202  | $\Omega$ | 157.01854 | +0.93018209   | +0.05415042 |
| <i>e</i> | 0.0350716  | <i>i</i> | 2.33173   | +0.36142551   | +0.03811742 |
| <i>P</i> | 4.87       | <i>H</i> | 14.0      | <i>G</i> 0.15 | <i>U</i> 1  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1976 10 22 | 381 | 0.4- | 0.2- | 1996 12 02 | 552 | 0.3+ | 0.6- | 1997 01 13 | 552 | 0.1- | 0.5+ |
| 1976 10 22 | 381 | 0.2- | 0.2- | 1996 12 02 | 552 | 0.3+ | 0.8- | 1997 01 13 | 552 | 0.3- | 0.4+ |
| 1976 10 22 | 381 | 0.3- | 0.4- | 1996 12 02 | 552 | 0.1- | 0.3- | 1998 01 08 | 910 | 0.3- | 0.1+ |
| 1976 10 22 | 381 | 1.3+ | 0.2- | 1996 12 04 | 552 | 0.4+ | 0.4- | 1998 01 08 | 910 | 0.3- | 0.2- |
| 1976 10 24 | 381 | 1.1+ | 0.6+ | 1996 12 04 | 552 | 0.1- | 1.0- | 1998 01 08 | 910 | 0.4- | 0.0  |
| 1976 10 24 | 381 | 1.0- | 0.9- | 1996 12 09 | 709 | 0.0  | 0.3+ | 1998 01 09 | 910 | 0.0  | 0.1- |
| 1981 10 25 | 675 | 0.0  | 0.5- | 1996 12 09 | 709 | 0.1+ | 0.2+ | 1998 01 09 | 910 | 0.1- | 0.4- |
| 1981 10 26 | 675 | 0.3+ | 0.4- | 1996 12 09 | 709 | 0.1+ | 0.2+ | 1998 01 09 | 910 | 0.2- | 0.1- |
| 1995 09 02 | 010 | 0.9- | 0.4+ | 1996 12 09 | 709 | 0.0  | 0.1+ | 1998 02 24 | 557 | 0.0  | 0.1- |
| 1995 09 02 | 010 | 0.7- | 0.6+ | 1996 12 09 | 709 | 0.1+ | 0.3+ | 1998 02 24 | 557 | 0.0  | 0.3+ |

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1995 09 02 | 010 | 1.0+ | 0.6+ | 1997 01 12 | 552 | 0.5- | 0.3+ | 1998 02 24 | 557 | 0.3+ | 0.1- |
| 1996 11 08 | 552 | 0.3+ | 0.6+ | 1997 01 12 | 552 | 0.1- | 0.7+ | 1998 02 24 | 557 | 0.0  | 0.1- |
| 1996 11 08 | 552 | 0.3+ | 0.7+ | 1997 01 12 | 552 | 1.0- | 1.1+ | 1998 02 27 | 557 | 0.4+ | 0.3+ |
| 1996 12 02 | 552 | 0.2+ | 0.6- | 1997 01 13 | 552 | 0.5- | 0.6+ | 1998 02 27 | 557 | 0.0  | 0.3- |

**(8422)\* 1996 XJ<sub>26</sub> = 1985 RD<sub>1</sub> = 1990 QD<sub>17</sub>**

Discovered 1996 Dec. 5 at Farra d'Isonzo.

Id. A. Gnädig (*MPC* 31113)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 175.49460  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.19336434 | $\omega$ | 221.71599 | +0.74556512   | +0.66429402 |
| <i>a</i> | 2.9617731  | $\Omega$ | 96.57375  | -0.59634575   | +0.70074996 |
| <i>e</i> | 0.1225187  | <i>i</i> | 3.07837   | -0.29749688   | +0.26012104 |
| <i>P</i> | 5.10       | <i>H</i> | 13.8      | <i>G</i> 0.15 | <i>U</i> 1  |

Residuals in seconds of arc

|            |     |      |      |            |     |       |       |            |     |      |      |
|------------|-----|------|------|------------|-----|-------|-------|------------|-----|------|------|
| 1985 09 13 | 801 | 0.5+ | 1.2- | 1997 01 07 | 595 | 1.0+  | 0.5-  | 1998 01 29 | 595 | 0.8+ | 1.3+ |
| 1990 08 26 | 809 | 0.5+ | 0.2- | 1997 01 07 | 595 | 0.2-  | 0.3-  | 1998 01 29 | 595 | 0.4- | 0.9- |
| 1990 08 26 | 809 | 0.0  | 0.3- | 1997 01 13 | 595 | 0.4+  | 0.2-  | 1998 01 30 | 595 | 0.3+ | 0.5- |
| 1990 08 26 | 809 | 0.2- | 0.3- | 1997 01 13 | 595 | 0.3+  | 0.9-  | 1998 01 30 | 595 | 0.3- | 0.3- |
| 1996 12 04 | 595 | 1.0- | 0.7+ | 1997 01 30 | 595 | 0.5+  | 0.9-  | 1998 02 23 | 595 | 1.0- | 0.3- |
| 1996 12 05 | 595 | 0.3- | 0.6+ | 1997 02 01 | 595 | 0.0   | 0.5-  | 1998 02 24 | 595 | 0.5- | 0.4- |
| 1996 12 05 | 595 | 0.5- | 0.8+ | 1997 02 01 | 595 | (2.6+ | 0.8-) | 1998 02 25 | 595 | 0.0  | 0.8- |
| 1996 12 05 | 595 | 0.4- | 1.2+ | 1998 01 27 | 595 | 0.2-  | 0.2+  | 1998 02 25 | 595 | 0.2- | 0.6- |
| 1996 12 14 | 595 | 0.2- | 0.4+ | 1998 01 28 | 595 | 0.5+  | 0.7+  |            |     |      |      |
| 1996 12 14 | 595 | 0.5+ | 0.2+ | 1998 01 29 | 595 | 0.7+  | 0.7-  |            |     |      |      |

**(8423)\* 1997 AO<sub>22</sub> = 1990 VF<sub>10</sub> = 1992 EA<sub>28</sub>**

Discovered 1997 Jan. 11 by the Beijing Schmidt CCD Asteroid Program at

Xinglong.

Id. G. V. Williams (*MPC* 29126)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 123.24348  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.17686450 | $\omega$ | 242.61274 | +0.88517299   | -0.46465684 |
| <i>a</i> | 3.1432260  | $\Omega$ | 145.06064 | +0.44016406   | +0.81981339 |
| <i>e</i> | 0.2452663  | <i>i</i> | 2.37405   | +0.15074608   | +0.33466406 |
| <i>P</i> | 5.57       | <i>H</i> | 13.4      | <i>G</i> 0.15 | <i>U</i> 1  |

Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| 1990 11 14 | 675 | 0.2+  | 0.8-  | 1995 08 24 | 809 | 1.1+ | 0.1+ | 1997 01 11 | 327 | 1.1+ | 0.5+ |
| 1990 11 14 | 675 | 0.1-  | 0.8-  | 1995 08 25 | 809 | 1.0+ | 0.3- | 1997 01 18 | 327 | 0.4- | 1.1+ |
| 1992 03 06 | 691 | 0.7-  | 0.7-  | 1995 08 26 | 809 | 0.1- | 0.2+ | 1997 01 18 | 327 | 1.0- | 0.2+ |
| 1992 03 06 | 691 | 0.5-  | 0.3-  | 1995 08 27 | 809 | 0.7- | 0.0  | 1997 01 18 | 327 | 0.1- | 0.3+ |
| 1992 03 06 | 691 | 1.0-  | 1.7-  | 1995 08 27 | 809 | 1.1+ | 0.7- | 1997 01 26 | 327 | 0.1+ | 0.0  |
| 1992 03 08 | 809 | 1.2+  | 0.1+  | 1995 09 20 | 809 | 0.6- | 0.1+ | 1997 01 26 | 327 | 0.2+ | 0.2+ |
| 1992 03 09 | 809 | (3.0+ | 0.5-) | 1995 09 22 | 809 | 0.8- | 0.0  | 1997 01 26 | 327 | 0.4+ | 0.0  |
| 1995 08 19 | 809 | 0.7+  | 0.2+  | 1995 09 29 | 809 | 1.2- | 0.2+ | 1997 01 27 | 327 | 0.2- | 0.0  |
| 1995 08 20 | 809 | 0.1-  | 0.0   | 1997 01 11 | 327 | 0.8+ | 0.3+ | 1997 01 27 | 327 | 0.3- | 0.2- |
| 1995 08 22 | 809 | 0.0   | 0.3-  | 1997 01 11 | 327 | 0.1- | 0.1+ | 1997 01 27 | 327 | 0.0  | 0.0  |

**(8424)\* 1997 CP = 1976 KC<sub>2</sub> = 1980 RT<sub>4</sub> = 1982 BK<sub>13</sub> = 1984 SD<sub>4</sub>**

Discovered 1997 Feb. 1 by T. Kobayashi at Oizumi.

Id. S. Nakano (*MPC* 29639)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Nakano

| <i>M</i> | 214.01992  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.26515007 | $\omega$ | 200.66324 | +0.99944256   | +0.02281782 |
| <i>a</i> | 2.3996149  | $\Omega$ | 157.98675 | -0.01312449   | +0.93974265 |
| <i>e</i> | 0.1959051  | <i>i</i> | 3.72794   | -0.03069725   | +0.34112036 |
| <i>P</i> | 3.72       | <i>H</i> | 13.7      | <i>G</i> 0.15 | <i>U</i> 1  |

Residuals in seconds of arc

|            |     |      |      |            |     |       |       |            |     |      |      |
|------------|-----|------|------|------------|-----|-------|-------|------------|-----|------|------|
| 1976 05 29 | 413 | 0.3+ | 0.0  | 1995 08 27 | 809 | (2.8- | 3.1-) | 1995 09 29 | 809 | 0.4- | 0.2- |
| 1976 05 29 | 413 | 0.3+ | 0.3+ | 1995 08 27 | 809 | 0.1+  | 0.1-  | 1997 02 01 | 411 | 0.3- | 0.5- |

1998 MAR. 13

M.P.C. 31371

|            |     |       |       |            |     |       |       |            |     |      |      |
|------------|-----|-------|-------|------------|-----|-------|-------|------------|-----|------|------|
| 1980 09 08 | 095 | 0.3+  | 0.4-  | 1995 08 28 | 809 | 0.4+  | 0.2+  | 1997 02 01 | 411 | 0.7+ | 0.4+ |
| 1982 01 30 | 675 | 0.4+  | 0.5+  | 1995 09 01 | 809 | 0.3+  | 0.1+  | 1997 02 03 | 411 | 0.5+ | 0.2+ |
| 1982 01 31 | 675 | 0.0   | 0.0   | 1995 09 17 | 809 | (2.7- | 1.5+) | 1997 02 03 | 411 | 0.3+ | 0.1+ |
| 1984 09 28 | 033 | 0.4-  | 0.4-  | 1995 09 18 | 809 | 0.6-  | 2.0+  | 1997 02 07 | 566 | 0.0  | 0.6- |
| 1984 09 28 | 033 | 0.4-  | 0.6-  | 1995 09 18 | 809 | 0.2+  | 0.8-  | 1997 02 07 | 566 | 0.2- | 0.5- |
| 1994 03 14 | 691 | 1.0-  | 0.4-  | 1995 09 19 | 809 | 0.8+  | 0.6-  | 1997 02 07 | 566 | 0.2- | 0.7- |
| 1994 03 14 | 691 | 0.7-  | 0.8-  | 1995 09 20 | 809 | 0.0   | 0.0   | 1997 02 11 | 411 | 0.1+ | 0.2- |
| 1994 03 14 | 691 | 0.8-  | 0.3-  | 1995 09 22 | 809 | 0.2-  | 0.3-  | 1997 02 11 | 411 | 0.9- | 0.1+ |
| 1995 08 24 | 809 | 0.5+  | 0.3+  | 1995 09 22 | 809 | 0.2+  | 0.3-  | 1997 03 04 | 411 | 0.6+ | 0.3+ |
| 1995 08 25 | 809 | 0.6-  | 1.0-  | 1995 09 23 | 809 | 0.3+  | 0.2-  | 1997 03 04 | 411 | 0.0  | 0.4- |
| 1995 08 26 | 809 | (1.2- | 4.4-) | 1995 09 24 | 809 | 0.1-  | 0.0   |            |     |      |      |

**(8425)\* 1997 CJ<sub>29</sub> = 1987 EX = 1992 UF<sub>4</sub> = 1994 GJ<sub>10</sub>**

Discovered 1997 Feb. 14 by the Beijing Schmidt CCD Asteroid Program at Xinglong.

Id. G. V. Williams (*MPC* 30461)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            | Williams |           |             |             |
|----------|------------|----------|-----------|-------------|-------------|
| <i>M</i> | 63.50274   | (2000.0) | <b>P</b>  | <b>Q</b>    |             |
| <i>n</i> | 0.28939563 | $\omega$ | 12.20846  | -0.97491342 | -0.22094654 |
| <i>a</i> | 2.2636437  | $\Omega$ | 154.97755 | +0.19848250 | -0.91775482 |
| <i>e</i> | 0.0665287  | <i>i</i> | 3.65347   | +0.10073983 | -0.33001321 |
| <i>P</i> | 3.41       | <i>H</i> | 13.5      | <i>G</i>    | 0.15        |
|          |            |          |           | <i>U</i>    | 2           |

Residuals in seconds of arc

|            |     |       |       |            |     |       |       |            |     |      |      |
|------------|-----|-------|-------|------------|-----|-------|-------|------------|-----|------|------|
| 1987 03 04 | 688 | 1.9+  | 1.9-  | 1995 08 26 | 809 | 0.5+  | 0.0   | 1995 09 29 | 809 | 0.1- | 0.4+ |
| 1987 03 04 | 688 | 0.8-  | 1.6+  | 1995 08 27 | 809 | (6.1- | 3.7-) | 1997 01 31 | 691 | 1.2- | 0.7- |
| 1992 10 26 | 400 | 1.5-  | 1.4+  | 1995 08 27 | 809 | 0.2-  | 0.2+  | 1997 01 31 | 691 | 1.1- | 0.7- |
| 1992 10 26 | 400 | (4.2- | 1.5-) | 1995 08 28 | 809 | 0.4-  | 0.5+  | 1997 01 31 | 691 | 1.4- | 0.1- |
| 1992 10 28 | 400 | (2.7- | 1.7+) | 1995 08 28 | 809 | 1.2+  | 1.6-  | 1997 02 14 | 327 | 0.2- | 0.0  |
| 1992 10 28 | 400 | 1.1-  | 1.0-  | 1995 08 29 | 809 | 1.8+  | 1.2-  | 1997 02 14 | 327 | 0.4- | 0.0  |
| 1994 03 14 | 691 | 0.4+  | 0.3-  | 1995 09 01 | 809 | 0.4+  | 0.5-  | 1997 02 14 | 327 | 0.9- | 0.2+ |
| 1994 03 14 | 691 | 0.3+  | 0.3-  | 1995 09 17 | 809 | 1.5-  | 1.0+  | 1997 02 17 | 327 | 0.9+ | 0.0  |
| 1994 03 14 | 691 | 0.0   | 0.1-  | 1995 09 18 | 809 | 0.2-  | 0.9+  | 1997 02 17 | 327 | 0.1- | 0.2+ |
| 1994 04 14 | 675 | 0.5-  | 0.4+  | 1995 09 18 | 809 | 0.2+  | 0.2-  | 1997 02 17 | 327 | 0.9+ | 0.1+ |
| 1994 04 14 | 675 | 1.1-  | 0.1-  | 1995 09 19 | 809 | 0.0   | 0.7-  | 1997 03 31 | 704 | 1.0+ | 0.1+ |
| 1994 04 15 | 675 | 0.4-  | 0.2+  | 1995 09 20 | 809 | 0.2+  | 0.0   | 1997 03 31 | 704 | 0.9+ | 0.2+ |
| 1994 04 15 | 675 | 0.7-  | 0.3+  | 1995 09 22 | 809 | 0.3+  | 0.4-  | 1997 03 31 | 704 | 1.3+ | 0.9- |
| 1995 08 24 | 809 | 1.0+  | 0.1+  | 1995 09 22 | 809 | 0.0   | 0.4-  | 1997 03 31 | 704 | 1.1+ | 0.2- |
| 1995 08 25 | 809 | 0.2+  | 1.2+  | 1995 09 23 | 809 | 0.2-  | 0.3-  | 1997 04 01 | 704 | 0.4+ | 0.2- |
| 1995 08 25 | 809 | 0.1+  | 0.3-  | 1995 09 24 | 809 | 0.2-  | 0.1-  | 1997 04 01 | 704 | 1.4+ | 0.1+ |

**(8426)\* 1997 ST = 1980 WD<sub>4</sub> = 1995 BO<sub>4</sub>**

Discovered 1997 Sept. 16 by the Beijing Schmidt CCD Asteroid Program at Xinglong.

Id. G. V. Williams (*MPC* 30879)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            | Williams |           |             |             |
|----------|------------|----------|-----------|-------------|-------------|
| <i>M</i> | 1.70641    | (2000.0) | <b>P</b>  | <b>Q</b>    |             |
| <i>n</i> | 0.28843982 | $\omega$ | 208.14780 | +0.51858848 | -0.85449024 |
| <i>a</i> | 2.2686417  | $\Omega$ | 210.64290 | +0.79517070 | +0.49497058 |
| <i>e</i> | 0.0709272  | <i>i</i> | 3.39760   | +0.31427624 | +0.15764059 |
| <i>P</i> | 3.42       | <i>H</i> | 13.9      | <i>G</i>    | 0.15        |
|          |            |          |           | <i>U</i>    | 1           |

Residuals in seconds of arc

|            |     |      |      |            |     |       |       |            |     |      |      |
|------------|-----|------|------|------------|-----|-------|-------|------------|-----|------|------|
| 1980 11 29 | 675 | 0.1+ | 0.7+ | 1997 10 13 | 327 | 0.1+  | 0.7+  | 1997 12 15 | 327 | 0.1+ | 0.4+ |
| 1980 12 01 | 675 | 0.2- | 0.1- | 1997 10 19 | 327 | 0.8-  | 0.1-  | 1998 01 24 | 566 | 1.1- | 0.1- |
| 1993 07 22 | 691 | 0.1- | 1.2+ | 1997 10 19 | 327 | 0.5-  | 0.0   | 1998 01 24 | 566 | 0.9- | 0.3- |
| 1993 07 22 | 691 | 0.0  | 0.2- | 1997 10 19 | 327 | 0.4-  | 0.4+  | 1998 01 24 | 566 | 0.7- | 0.3- |
| 1993 07 22 | 691 | 0.1- | 0.1+ | 1997 10 24 | 327 | 0.1-  | 0.5-  | 1998 01 26 | 327 | 0.4- | 0.1+ |
| 1995 01 29 | 905 | 1.2- | 0.7+ | 1997 10 24 | 327 | 0.0   | 0.3-  | 1998 01 26 | 327 | 0.1- | 0.3+ |
| 1995 01 29 | 905 | 0.8+ | 0.3- | 1997 10 24 | 327 | 0.1+  | 0.6-  | 1998 01 26 | 327 | 0.5- | 0.5+ |
| 1995 01 31 | 905 | 0.0  | 0.6- | 1997 11 03 | 372 | 0.6-  | 0.6-  | 1998 01 29 | 327 | 0.8- | 0.3- |
| 1995 01 31 | 905 | 0.0  | 1.1- | 1997 11 03 | 372 | 0.0   | 0.5+  | 1998 01 29 | 327 | 0.5- | 0.2- |
| 1997 09 16 | 327 | 0.3+ | 0.8- | 1997 11 05 | 372 | 0.9-  | 0.9+  | 1998 01 29 | 327 | 0.4- | 0.7- |
| 1997 09 16 | 327 | 0.2+ | 0.1- | 1997 11 07 | 372 | (1.4- | 2.4+) | 1998 02 15 | 327 | 0.1- | 0.1- |
| 1997 09 16 | 327 | 0.3+ | 0.1- | 1997 11 29 | 704 | 0.4+  | 0.1-  | 1998 02 15 | 327 | 0.0  | 0.7+ |

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1997 09 17 | 327 | 0.2+ | 0.1- | 1997 11 29 | 704 | 0.8+ | 0.8+ | 1998 02 15 | 327 | 0.1- | 0.1- |
| 1997 09 17 | 327 | 0.2+ | 0.2- | 1997 11 29 | 704 | 1.3+ | 1.1+ | 1998 02 22 | 327 | 1.1+ | 0.8+ |
| 1997 09 17 | 327 | 0.3- | 0.0  | 1997 11 29 | 704 | 0.3+ | 0.2+ | 1998 02 22 | 327 | 0.6+ | 0.5+ |
| 1997 10 12 | 327 | 0.5+ | 0.3- | 1997 11 29 | 704 | 0.4+ | 0.3+ | 1998 02 22 | 327 | 0.3+ | 0.3+ |
| 1997 10 12 | 327 | 0.4+ | 0.5- | 1997 11 30 | 566 | 0.5- | 1.2- | 1998 02 22 | 327 | 0.7+ | 1.0+ |
| 1997 10 12 | 327 | 0.1+ | 0.4- | 1997 11 30 | 566 | 0.6- | 1.1- | 1998 02 23 | 327 | 0.9+ | 1.1+ |
| 1997 10 12 | 327 | 0.0  | 0.0  | 1997 11 30 | 566 | 0.1- | 1.2- | 1998 02 23 | 327 | 0.2+ | 0.6+ |
| 1997 10 13 | 327 | 0.3+ | 0.2- | 1997 12 15 | 327 | 0.6+ | 0.6+ | 1998 02 23 | 327 | 0.4+ | 1.0+ |
| 1997 10 13 | 327 | 0.1- | 0.2- | 1997 12 15 | 327 | 0.1+ | 0.1+ |            |     |      |      |

**(8427)\* 1997 TH<sub>17</sub> = 1978 GS<sub>2</sub> = 1983 CC<sub>4</sub> = 1991 RQ<sub>38</sub> = 1995 KS<sub>5</sub>**

Discovered 1997 Oct. 6 by Y. Shimizu and T. Urata at the Nachi-Katsuura Observatory.

Id. S. Nakano (*MPC* 30883)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            | Nakano   |           |             |             |
|----------|------------|----------|-----------|-------------|-------------|
| <i>M</i> | 265.12287  | (2000.0) | <b>P</b>  | <b>Q</b>    |             |
| <i>n</i> | 0.18180226 | $\omega$ | 349.80536 | -0.74454808 | -0.66055101 |
| <i>a</i> | 3.0860517  | $\Omega$ | 148.17970 | +0.62465146 | -0.74037465 |
| <i>e</i> | 0.0842378  | <i>i</i> | 10.55061  | +0.23549672 | -0.12457023 |
| <i>P</i> | 5.42       | <i>H</i> | 12.8      | <i>G</i>    | 0.15        |
|          |            |          |           | <i>U</i>    | 1           |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1978 04 11 | 095 | 1.8- | 1.1+ | 1995 05 25 | 693 | 0.8- | 0.2+ | 1997 10 10 | 385 | 0.0  | 0.1- |
| 1983 02 14 | 381 | 1.8+ | 0.3+ | 1995 05 25 | 693 | 0.7- | 0.1+ | 1997 10 20 | 905 | 0.2+ | 0.0  |
| 1991 08 07 | 675 | 1.0+ | 0.7+ | 1997 09 29 | 905 | 1.0- | 0.3- | 1997 10 20 | 905 | 0.6- | 1.2- |
| 1991 09 12 | 808 | 0.7+ | 0.9+ | 1997 09 29 | 905 | 1.4- | 0.3+ | 1997 10 28 | 566 | 0.3+ | 0.7- |
| 1991 09 12 | 808 | 0.2- | 1.2+ | 1997 10 06 | 905 | 0.9+ | 0.9+ | 1997 10 28 | 566 | 0.3+ | 0.9- |
| 1995 05 24 | 693 | 0.9+ | 0.8- | 1997 10 06 | 905 | 0.3+ | 0.6+ | 1997 10 28 | 566 | 0.7- | 1.4- |
| 1995 05 24 | 693 | 0.5+ | 1.1- | 1997 10 10 | 385 | 0.1+ | 0.1+ |            |     |      |      |

**(8428)\* 1997 VJ<sub>8</sub> = 1986 WG<sub>8</sub> = 1991 CB<sub>5</sub> = 1993 SA<sub>5</sub>**

Discovered 1997 Nov. 3 by T. Seki at Geisei.

Id. K. Ichikawa (*MPC* 31117)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            | Williams |           |             |             |
|----------|------------|----------|-----------|-------------|-------------|
| <i>M</i> | 346.71608  | (2000.0) | <b>P</b>  | <b>Q</b>    |             |
| <i>n</i> | 0.26874175 | $\omega$ | 239.11944 | +0.14357603 | -0.98958287 |
| <i>a</i> | 2.3781868  | $\Omega$ | 202.63294 | +0.91709336 | +0.13705650 |
| <i>e</i> | 0.1805693  | <i>i</i> | 1.57355   | +0.37192161 | +0.04405974 |
| <i>P</i> | 3.67       | <i>H</i> | 13.9      | <i>G</i>    | 0.15        |
|          |            |          |           | <i>U</i>    | 2           |

Residuals in seconds of arc

|            |     |       |       |            |     |       |       |            |     |      |      |
|------------|-----|-------|-------|------------|-----|-------|-------|------------|-----|------|------|
| 1986 11 30 | 381 | 0.3-  | 0.8-  | 1997 11 03 | 372 | 1.5-  | 0.7-  | 1997 11 29 | 704 | 1.8+ | 0.0  |
| 1986 11 30 | 381 | 0.4-  | 0.3+  | 1997 11 05 | 372 | 0.7-  | 0.7-  | 1997 11 30 | 566 | 1.4+ | 0.3+ |
| 1986 12 01 | 381 | 0.2-  | 0.1-  | 1997 11 05 | 372 | 0.8-  | 0.7-  | 1997 11 30 | 566 | 1.5+ | 0.3+ |
| 1986 12 01 | 381 | 1.1+  | 0.2+  | 1997 11 06 | 704 | 1.9-  | 0.9+  | 1997 11 30 | 566 | 1.2+ | 0.2+ |
| 1991 01 18 | 675 | 0.6-  | 0.0   | 1997 11 06 | 704 | 1.6-  | 1.3+  | 1998 02 22 | 327 | 0.4+ | 0.6- |
| 1991 01 18 | 675 | 0.1-  | 0.7-  | 1997 11 06 | 704 | (3.2- | 0.1+) | 1998 02 22 | 327 | 1.1+ | 0.0  |
| 1991 02 11 | 675 | 0.2+  | 0.5+  | 1997 11 06 | 704 | 1.5-  | 1.3+  | 1998 02 22 | 327 | 0.5+ | 0.2- |
| 1991 02 11 | 675 | 0.2+  | 0.6+  | 1997 11 06 | 704 | (2.7- | 0.7+) | 1998 02 23 | 327 | 0.3+ | 0.1+ |
| 1993 09 19 | 010 | (3.9+ | 2.5+) | 1997 11 06 | 704 | 1.1-  | 0.5+  | 1998 02 23 | 327 | 0.2+ | 0.3- |
| 1993 09 19 | 010 | (2.6+ | 2.9+) | 1997 11 06 | 704 | 1.6-  | 1.3+  | 1998 02 23 | 327 | 0.4+ | 0.2- |
| 1993 09 20 | 010 | 1.4+  | 0.5-  | 1997 11 06 | 704 | 1.3-  | 0.8+  | 1998 02 24 | 327 | 0.1+ | 0.2- |
| 1993 09 20 | 010 | 0.5+  | 0.5-  | 1997 11 06 | 704 | (4.0- | 0.4+) | 1998 02 24 | 327 | 0.3+ | 0.2- |
| 1993 09 20 | 010 | 0.3-  | 0.9-  | 1997 11 06 | 704 | (3.0- | 1.1+) | 1998 02 24 | 327 | 0.3+ | 0.3- |
| 1997 10 29 | 704 | (4.3+ | 1.2-) | 1997 11 07 | 372 | 0.4+  | 0.9-  | 1998 03 08 | 327 | 0.1+ | 0.2- |
| 1997 10 29 | 704 | (3.7+ | 0.9-) | 1997 11 07 | 372 | 0.6+  | 0.2+  | 1998 03 08 | 327 | 0.5+ | 0.5- |
| 1997 10 29 | 704 | (3.5+ | 1.2-) | 1997 11 29 | 704 | 1.5+  | 0.6-  | 1998 03 08 | 327 | 0.6+ | 0.3- |
| 1997 10 29 | 704 | (3.9+ | 0.5-) | 1997 11 29 | 704 | 1.2+  | 0.1+  | 1998 03 08 | 327 | 0.2- | 1.0- |
| 1997 10 29 | 704 | (4.7+ | 0.3-) | 1997 11 29 | 704 | 1.5+  | 0.0   |            |     |      |      |
| 1997 11 03 | 372 | 1.7-  | 0.6-  | 1997 11 29 | 704 | (2.3+ | 0.1-) |            |     |      |      |

Id. S. Nakano (*MPC* 31128), G. V. Williams (*ibid.*)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> |            | (2000.0) |           | <b>P</b>    |             | <b>Q</b> |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.18141459 | $\omega$ | 281.04632 | +0.37950868 | +0.92497244 |          |   |
| <i>a</i> | 3.0904466  | $\Omega$ | 11.31892  | -0.80413947 | +0.34045696 |          |   |
| <i>e</i> | 0.1369156  | <i>i</i> | 5.84239   | -0.45752910 | +0.16886398 |          |   |
| <i>P</i> | 5.43       | <i>H</i> | 12.5      | <i>G</i>    | 0.15        | <i>U</i> | 1 |

Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| 1979 09 23 | 095 | 1.0-  | 1.8+  | 1995 09 20 | 809 | 0.5- | 0.0  | 1998 01 06 | 411 | 1.0+ | 0.1- |
| 1988 03 18 | 054 | 0.1-  | 0.1-  | 1995 09 22 | 809 | 0.4- | 0.5- | 1998 01 06 | 411 | 0.1- | 0.0  |
| 1988 04 13 | 054 | 0.6-  | 0.0   | 1995 09 22 | 809 | 0.6+ | 0.4- | 1998 01 09 | 327 | 0.0  | 0.4+ |
| 1993 02 15 | 399 | 0.6-  | 0.3+  | 1995 09 23 | 809 | 0.7+ | 0.1+ | 1998 01 09 | 327 | 0.3- | 0.1+ |
| 1993 02 15 | 399 | (2.8- | 0.5+) | 1995 09 24 | 809 | 1.0+ | 0.5+ | 1998 01 09 | 327 | 0.2+ | 0.3+ |
| 1993 02 21 | 399 | 1.5+  | 1.0+  | 1995 09 29 | 809 | 0.1- | 0.2+ | 1998 01 09 | 327 | 0.2- | 0.4+ |
| 1993 02 21 | 399 | 0.7+  | 0.9-  | 1997 12 23 | 327 | 0.2+ | 0.5+ | 1998 01 18 | 327 | 0.4- | 0.0  |
| 1993 02 25 | 399 | (3.9- | 3.3+) | 1997 12 23 | 327 | 1.3+ | 0.1+ | 1998 01 18 | 327 | 0.1+ | 0.2- |
| 1993 02 25 | 399 | (6.1- | 1.7+) | 1997 12 23 | 327 | 0.3- | 0.2+ | 1998 01 18 | 327 | 0.2- | 0.2- |
| 1995 08 26 | 809 | 0.5-  | 0.0   | 1997 12 24 | 327 | 0.2- | 0.2+ | 1998 01 28 | 566 | 0.8- | 0.8- |
| 1995 08 27 | 809 | 0.2-  | 0.0   | 1997 12 24 | 327 | 0.5- | 0.3+ | 1998 01 28 | 566 | 1.0- | 0.1+ |
| 1995 08 27 | 809 | 0.3-  | 0.5-  | 1997 12 24 | 327 | 0.4- | 0.3+ | 1998 01 28 | 566 | 0.5- | 0.1+ |
| 1995 08 28 | 809 | 0.5-  | 0.4-  | 1998 01 04 | 327 | 0.3- | 0.1+ | 1998 02 23 | 566 | 0.1+ | 0.3+ |
| 1995 08 29 | 809 | 0.0   | 0.5-  | 1998 01 04 | 327 | 0.2- | 0.2+ | 1998 02 23 | 566 | 0.4+ | 0.1- |
| 1995 08 30 | 809 | 0.6+  | 0.1+  | 1998 01 04 | 327 | 0.3- | 0.0  | 1998 02 23 | 566 | 0.3+ | 0.1+ |
| 1995 08 30 | 809 | 0.6+  | 0.3-  | 1998 01 05 | 411 | 0.6+ | 1.8- |            |     |      |      |
| 1995 08 31 | 809 | 0.3+  | 0.6-  | 1998 01 05 | 411 | 0.2+ | 1.7- |            |     |      |      |

**(8430)\* 1997 YB<sub>5</sub> = 1978 WW<sub>7</sub> = 1980 FJ<sub>10</sub> = 1994 CB<sub>20</sub> = 1996 TX<sub>41</sub>**

Discovered 1997 Dec. 25 by F. B. Zoltowski at Woomera.

Id. G. V. Williams (*MPC* 31255)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> |            | (2000.0) |           | <b>P</b>    |             | <b>Q</b> |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.20950706 | $\omega$ | 107.69824 | -0.99127440 | +0.11588172 |          |   |
| <i>a</i> | 2.8076111  | $\Omega$ | 78.99153  | -0.13147522 | -0.90338705 |          |   |
| <i>e</i> | 0.1024192  | <i>i</i> | 3.66937   | +0.00945192 | -0.41287196 |          |   |
| <i>P</i> | 4.70       | <i>H</i> | 14.1      | <i>G</i>    | 0.15        | <i>U</i> | 1 |

Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| 1978 11 29 | 675 | 0.3-  | 1.5+  | 1996 10 08 | 809 | 0.6- | 0.9+ | 1998 01 06 | 426 | 0.2- | 0.2+ |
| 1978 11 30 | 675 | 0.5+  | 1.3+  | 1996 10 08 | 809 | 1.5- | 0.5- | 1998 01 06 | 426 | 0.0  | 0.4- |
| 1980 03 16 | 095 | 1.8-  | 2.1-  | 1996 10 08 | 809 | 1.2+ | 0.1- | 1998 01 06 | 426 | 0.6+ | 0.4- |
| 1994 02 09 | 809 | (3.6- | 0.2+) | 1996 10 10 | 809 | 0.6+ | 0.0  | 1998 01 07 | 699 | 0.2- | 0.9+ |
| 1994 02 09 | 809 | (4.1- | 0.9+) | 1996 10 10 | 809 | 0.4+ | 0.4- | 1998 01 07 | 699 | 0.6- | 0.9+ |
| 1994 02 09 | 809 | (4.3- | 0.3+) | 1996 10 10 | 809 | 0.3- | 0.3- | 1998 01 07 | 699 | 0.5- | 0.3+ |
| 1994 02 10 | 809 | 1.8+  | 0.4+  | 1997 12 25 | 426 | 0.4- | 0.5- | 1998 01 16 | 426 | 0.8- | 0.5- |
| 1994 02 10 | 809 | 0.8+  | 0.4-  | 1997 12 25 | 426 | 0.0  | 0.8- | 1998 01 16 | 426 | 0.6+ | 0.8- |
| 1994 02 10 | 809 | 0.0   | 0.3-  | 1997 12 25 | 426 | 1.0+ | 0.1- | 1998 01 19 | 426 | 0.1+ | 0.4- |
| 1994 02 13 | 809 | 0.4+  | 0.6+  | 1997 12 26 | 426 | 0.9- | 0.2+ | 1998 01 19 | 426 | 0.9- | 0.2- |
| 1994 02 13 | 809 | 0.4-  | 0.8+  | 1997 12 26 | 426 | 0.5- | 0.4+ | 1998 01 19 | 426 | 0.3+ | 0.1- |
| 1994 02 13 | 809 | 0.6-  | 0.8+  | 1997 12 26 | 426 | 0.1+ | 0.2+ | 1998 01 26 | 704 | 1.8+ | 0.3- |
| 1996 10 07 | 809 | 0.5+  | 0.1+  | 1998 01 03 | 426 | 0.3+ | 0.2- | 1998 01 26 | 704 | 0.1- | 1.3- |
| 1996 10 07 | 809 | 0.3+  | 0.0   | 1998 01 03 | 426 | 0.1+ | 0.2- | 1998 01 26 | 704 | 0.1- | 0.5- |
| 1996 10 07 | 809 | 0.1+  | 1.1-  | 1998 01 03 | 426 | 0.4+ | 0.0  | 1998 01 26 | 704 | 0.7- | 0.1- |

**(8431)\* 1997 YQ<sub>13</sub> = 1975 EG<sub>5</sub> = 1981 NH<sub>1</sub> = 1982 VG<sub>6</sub> = 1989 ER = 1991 ST<sub>1</sub>**

Discovered 1997 Dec. 31 by T. Kobayashi at Oizumi.

Id. G. V. Williams (*MPC* 31258)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> |            | (2000.0) |           | <b>P</b>    |             | <b>Q</b> |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.20961263 | $\omega$ | 218.29329 | -0.26246716 | -0.96459940 |          |   |
| <i>a</i> | 2.8066683  | $\Omega$ | 246.93639 | +0.89205132 | -0.23241191 |          |   |
| <i>e</i> | 0.0500385  | <i>i</i> | 1.59880   | +0.36790682 | -0.12463025 |          |   |
| <i>P</i> | 4.70       | <i>H</i> | 12.5      | <i>G</i>    | 0.15        | <i>U</i> | 2 |

Residuals in seconds of arc

|            |     |       |       |            |     |       |       |            |     |      |      |
|------------|-----|-------|-------|------------|-----|-------|-------|------------|-----|------|------|
| 1975 03 15 | 095 | 1.1-  | 2.3-  | 1997 12 31 | 411 | 0.0   | 1.4-  | 1998 01 29 | 711 | 1.6- | 1.2+ |
| 1981 07 02 | 805 | (1.6+ | 3.8+) | 1997 12 31 | 411 | 0.4-  | 1.0-  | 1998 02 17 | 411 | 0.1+ | 0.5+ |
| 1981 07 02 | 805 | 0.4+  | 0.6+  | 1998 01 01 | 411 | 0.2-  | 0.2-  | 1998 02 17 | 411 | 0.1- | 0.3+ |
| 1982 11 08 | 095 | 0.7+  | 1.4-  | 1998 01 01 | 411 | 0.0   | 0.2+  | 1998 02 20 | 725 | 0.3- | 0.8+ |
| 1989 03 01 | 675 | 0.9-  | 1.0-  | 1998 01 06 | 411 | 0.7+  | 0.4+  | 1998 02 20 | 725 | 0.3- | 0.7+ |
| 1991 09 11 | 675 | 0.8+  | 1.0-  | 1998 01 06 | 411 | 0.0   | 0.1+  | 1998 02 22 | 566 | 0.0  | 0.3- |
| 1991 09 11 | 675 | 1.3-  | 1.2-  | 1998 01 09 | 411 | 0.0   | 0.1+  | 1998 02 22 | 566 | 0.4- | 0.0  |
| 1991 09 14 | 675 | 0.1+  | 0.0   | 1998 01 09 | 411 | 0.1-  | 0.2+  | 1998 02 22 | 566 | 0.1- | 0.6- |
| 1991 09 14 | 675 | 0.0   | 1.1-  | 1998 01 25 | 566 | 0.8+  | 0.8-  | 1998 02 23 | 725 | 0.7+ | 0.9+ |
| 1991 09 16 | 675 | (1.5- | 3.7-) | 1998 01 25 | 566 | 0.7+  | 0.7-  | 1998 02 23 | 725 | 0.7+ | 0.8+ |
| 1991 09 16 | 675 | (0.6- | 3.6-) | 1998 01 25 | 566 | 1.1+  | 1.0-  | 1998 02 23 | 566 | 0.2- | 0.1+ |
| 1991 09 17 | 675 | 0.5-  | 0.6+  | 1998 01 28 | 711 | 0.5-  | 0.9+  | 1998 02 23 | 566 | 0.2+ | 0.3+ |
| 1991 09 17 | 675 | 0.7+  | 1.6+  | 1998 01 29 | 711 | (2.3- | 0.6+) | 1998 02 23 | 566 | 0.3+ | 0.2+ |

**(8432)\* 1997 YD<sub>18</sub> = 1976 GV<sub>5</sub> = 1981 AQ<sub>1</sub> = 1987 CD = 1993 FL<sub>36</sub> = 1994 NX<sub>9</sub>**

Discovered 1997 Dec. 27 by A. Nakamura at Kuma.

Id. S. Nakano (*MPC* 31259)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> |            | (2000.0) |          | <b>P</b>    |             | <b>Q</b> |   |
|----------|------------|----------|----------|-------------|-------------|----------|---|
| <i>n</i> | 0.17442635 | $\omega$ | 81.33304 | -0.97634787 | -0.21229349 |          |   |
| <i>a</i> | 3.1724490  | $\Omega$ | 86.40275 | +0.17871183 | -0.89901000 |          |   |
| <i>e</i> | 0.1654025  | <i>i</i> | 2.35114  | +0.12168365 | -0.38303067 |          |   |
| <i>P</i> | 5.65       | <i>H</i> | 13.0     | <i>G</i>    | 0.15        | <i>U</i> | 1 |

Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| 1976 04 02 | 095 | (3.6+ | 5.0+) | 1997 12 27 | 360 | 0.0  | 0.2+ | 1998 01 23 | 704 | 0.3- | 0.2+ |
| 1981 01 08 | 381 | (4.0+ | 0.9+) | 1997 12 27 | 360 | 0.0  | 0.2+ | 1998 01 24 | 704 | 0.2+ | 0.6- |
| 1981 01 08 | 381 | 0.3-  | 0.2+  | 1998 01 06 | 360 | 0.4- | 0.1- | 1998 01 24 | 704 | 0.2+ | 0.6- |
| 1981 01 08 | 381 | 0.2+  | 1.8-  | 1998 01 06 | 360 | 0.3- | 0.2- | 1998 01 24 | 704 | 0.1- | 0.1- |
| 1981 01 08 | 381 | 1.5-  | 1.0+  | 1998 01 06 | 360 | 0.1- | 0.2- | 1998 01 24 | 704 | 0.2+ | 0.2+ |
| 1987 02 02 | 033 | 2.0+  | 0.6-  | 1998 01 16 | 360 | 0.2+ | 0.1+ | 1998 01 24 | 704 | 0.5- | 0.3- |
| 1987 02 02 | 033 | 0.8+  | 0.3-  | 1998 01 16 | 360 | 0.0  | 0.2+ | 1998 01 25 | 704 | 0.1+ | 0.2- |
| 1993 03 19 | 809 | 1.3-  | 1.6+  | 1998 01 16 | 360 | 0.3+ | 0.1- | 1998 01 25 | 704 | 0.1+ | 0.3- |
| 1993 03 20 | 809 | 0.9-  | 0.3-  | 1998 01 22 | 704 | 0.2- | 1.0- | 1998 01 25 | 704 | 0.2+ | 0.0  |
| 1993 03 24 | 809 | 0.6+  | 0.2-  | 1998 01 22 | 704 | 0.3+ | 0.4+ | 1998 01 25 | 704 | 0.1+ | 0.2- |
| 1994 07 08 | 809 | 0.1-  | 1.1-  | 1998 01 22 | 704 | 0.3+ | 0.0  | 1998 01 25 | 704 | 0.4+ | 0.2- |
| 1994 07 08 | 809 | 0.1-  | 0.8-  | 1998 01 22 | 704 | 0.1+ | 0.2+ | 1998 01 27 | 360 | 0.4- | 0.1- |
| 1994 07 08 | 809 | 0.6-  | 1.3-  | 1998 01 22 | 704 | 0.7- | 0.0  | 1998 01 27 | 360 | 0.4- | 0.1+ |
| 1994 07 09 | 809 | 1.6+  | 0.8+  | 1998 01 23 | 704 | 0.2+ | 0.2+ | 1998 02 15 | 360 | 0.2+ | 0.1+ |
| 1994 07 09 | 809 | 0.3+  | 0.4+  | 1998 01 23 | 704 | 0.2- | 0.7+ | 1998 02 15 | 360 | 0.2+ | 0.0  |
| 1994 07 09 | 809 | 0.4-  | 0.1+  | 1998 01 23 | 704 | 0.1- | 0.0  | 1998 02 21 | 360 | 0.2+ | 0.2- |
| 1997 12 27 | 360 | 0.1+  | 0.2+  | 1998 01 23 | 704 | 0.2- | 0.1+ | 1998 02 21 | 360 | 0.2+ | 0.3- |

**(8433)\* 2561 P-L = 1978 TT<sub>4</sub> = 1978 WB<sub>21</sub>**

Discovered 1960 Sept. 24 by C. J. van Houten and I. van Houten-Groeneveld on Palomar Schmidt plates taken by T. Gehrels.

Id. E. Bowell (*MPC* 20829), G. V. Williams (d, *ibid.*)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> |            | (2000.0) |           | <b>P</b>    |             | <b>Q</b> |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.22066647 | $\omega$ | 159.60834 | -0.99420833 | +0.05427363 |          |   |
| <i>a</i> | 2.7121382  | $\Omega$ | 24.07769  | -0.09814051 | -0.81024830 |          |   |
| <i>e</i> | 0.0654826  | <i>i</i> | 13.14190  | +0.04379760 | -0.58356838 |          |   |
| <i>P</i> | 4.47       | <i>H</i> | 13.2      | <i>G</i>    | 0.15        | <i>U</i> | 2 |

Residuals in seconds of arc

|            |     |      |      |            |     |       |       |            |     |       |       |
|------------|-----|------|------|------------|-----|-------|-------|------------|-----|-------|-------|
| 1960 09 24 | 675 | 0.1+ | 0.4- | 1978 11 29 | 675 | 0.4+  | 0.0   | 1996 10 12 | 689 | 0.1-  | 0.4+  |
| 1960 09 26 | 675 | 0.8+ | 0.6- | 1991 09 14 | 675 | 0.6-  | 0.3+  | 1996 10 13 | 689 | (2.6- | 1.4-) |
| 1960 09 28 | 675 | 0.9+ | 1.6- | 1991 10 06 | 675 | 0.1+  | 1.2+  | 1998 02 03 | 127 | 1.2+  | 1.0+  |
| 1960 09 29 | 675 | 0.8+ | 0.8- | 1991 10 06 | 675 | (3.2+ | 1.6+) | 1998 02 03 | 127 | 1.1+  | 0.8+  |
| 1960 10 17 | 675 | 0.6+ | 0.0  | 1994 04 03 | 675 | 1.5-  | 0.4+  | 1998 02 18 | 127 | 0.4+  | 0.3-  |
| 1960 10 22 | 675 | 0.4- | 0.2- | 1994 04 03 | 675 | 0.2+  | 1.0+  | 1998 02 18 | 127 | 0.3+  | 0.4-  |
| 1960 10 25 | 675 | 0.8+ | 0.8- | 1994 05 06 | 560 | 0.6-  | 1.5-  | 1998 02 23 | 566 | 0.8-  | 0.6-  |
| 1960 10 26 | 675 | 0.1+ | 0.3+ | 1994 05 06 | 560 | 0.3+  | 1.0-  | 1998 02 23 | 566 | 0.9-  | 0.7-  |
| 1978 10 07 | 095 | 2.1- | 0.1+ | 1994 05 06 | 560 | 0.4+  | 0.8-  | 1998 02 23 | 566 | 1.0-  | 0.6-  |
| 1978 11 28 | 675 | 0.8+ | 0.5- | 1994 05 06 | 560 | 0.9-  | 0.5-  |            |     |       |       |

(8434)\* 6571 P-L = 1976 YZ<sub>2</sub> = 1981 WH<sub>8</sub> = 1986 VL<sub>8</sub> = 1988 GZ<sub>1</sub>  
= 1991 RK<sub>27</sub>

Discovered 1960 Sept. 24 by C. J. van Houten and I. van Houten-Groeneveld  
on Palomar Schmidt plates taken by T. Gehrels.

Id. G. V. Williams (*MPC* 20346)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            | Williams           |               |             |  |
|----------|------------|--------------------|---------------|-------------|--|
| <i>M</i> | 25.34349   | (2000.0)           | P             | Q           |  |
| <i>n</i> | 0.19215553 | $\omega$ 337.55543 | -0.10184983   | -0.99363776 |  |
| <i>a</i> | 2.9741815  | $\Omega$ 118.26141 | +0.92079879   | -0.11245124 |  |
| <i>e</i> | 0.2475642  | <i>i</i> 3.12844   | +0.37650524   | +0.00622334 |  |
| <i>P</i> | 5.13       | <i>H</i> 13.6      | <i>G</i> 0.15 | <i>U</i> 1  |  |

Residuals in seconds of arc

|            |     |       |       |            |     |       |       |            |     |      |      |
|------------|-----|-------|-------|------------|-----|-------|-------|------------|-----|------|------|
| 1960 09 24 | 675 | 0.2+  | 0.5-  | 1991 09 15 | 675 | 0.7-  | 1.2-  | 1997 12 07 | 910 | 0.5+ | 0.1+ |
| 1960 09 26 | 675 | 0.2+  | 0.2+  | 1991 09 15 | 675 | 0.7-  | 0.9-  | 1998 02 06 | 809 | 1.5- | 0.1- |
| 1960 09 27 | 675 | 0.7+  | 0.4+  | 1993 02 25 | 372 | (3.1+ | 3.7+) | 1998 02 06 | 809 | 1.7- | 0.0  |
| 1960 09 28 | 675 | 0.9+  | 0.0   | 1993 02 25 | 372 | (0.8+ | 3.6+) | 1998 02 06 | 809 | 1.1- | 1.0- |
| 1960 10 17 | 675 | 0.1+  | 0.3+  | 1993 02 28 | 372 | 1.2+  | 0.2+  | 1998 02 07 | 809 | 1.2- | 0.8- |
| 1960 10 22 | 675 | 1.9-  | 0.5-  | 1993 02 28 | 372 | 0.6-  | 0.9-  | 1998 02 07 | 809 | 0.8- | 1.0- |
| 1960 10 24 | 675 | 0.2+  | 0.2-  | 1993 04 14 | 675 | 0.8+  | 0.1+  | 1998 02 07 | 809 | 0.8- | 0.8- |
| 1960 10 26 | 675 | 0.2+  | 0.6-  | 1993 04 14 | 675 | 0.4+  | 1.2-  | 1998 02 22 | 691 | 0.1+ | 0.3+ |
| 1976 12 16 | 095 | 1.5-  | 2.3+  | 1997 12 06 | 910 | 0.2+  | 0.3+  | 1998 02 22 | 691 | 0.2+ | 0.2+ |
| 1981 11 25 | 095 | 0.3+  | 1.3-  | 1997 12 06 | 910 | 0.4+  | 0.3+  | 1998 02 22 | 691 | 0.0  | 0.3+ |
| 1986 11 04 | 675 | 1.0+  | 0.4+  | 1997 12 06 | 910 | 0.3+  | 0.4+  | 1998 02 23 | 691 | 1.1+ | 0.2+ |
| 1986 11 04 | 675 | 1.7+  | 0.4+  | 1997 12 07 | 910 | 0.5+  | 0.4+  | 1998 02 23 | 691 | 1.0+ | 0.2+ |
| 1988 04 09 | 054 | (3.7+ | 0.1-) | 1997 12 07 | 910 | 0.2-  | 0.0   | 1998 02 23 | 691 | 1.1+ | 0.1+ |

(8435)\* 6643 P-L = 1990 VA<sub>1</sub>

Discovered 1960 Sept. 26 by C. J. van Houten and I. van Houten-Groeneveld  
on Palomar Schmidt plates taken by T. Gehrels.

Id. S. Nakano (*MPC* 17651), R. Nagata (*ibid.*)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            | Nakano            |               |             |  |
|----------|------------|-------------------|---------------|-------------|--|
| <i>M</i> | 55.97860   | (2000.0)          | P             | Q           |  |
| <i>n</i> | 0.29785125 | $\omega$ 18.70427 | +0.64212406   | -0.76536084 |  |
| <i>a</i> | 2.2205971  | $\Omega$ 31.38911 | +0.69223752   | +0.55447128 |  |
| <i>e</i> | 0.1683946  | <i>i</i> 4.79995  | +0.32936895   | +0.32677880 |  |
| <i>P</i> | 3.31       | <i>H</i> 14.5     | <i>G</i> 0.15 | <i>U</i> 1  |  |

Residuals in seconds of arc

|            |     |       |       |              |     |       |       |            |     |      |      |
|------------|-----|-------|-------|--------------|-----|-------|-------|------------|-----|------|------|
| 1960 09 26 | 675 | 1.3+  | 0.2+  | 1990 11 14   | 896 | 1.0+  | 1.4-  | 1998 01 25 | 566 | 0.4- | 0.0  |
| 1960 09 27 | 675 | 0.9+  | 0.3+  | 1990 11 14   | 896 | 0.2-  | 0.6+  | 1998 01 25 | 566 | 0.7- | 0.0  |
| 1960 09 28 | 675 | 0.9+  | 0.3-  | 1990 11 22   | 898 | (5.6- | 2.1-) | 1998 01 29 | 627 | 0.3+ | 0.3+ |
| 1960 10 17 | 675 | 0.4-  | 0.4-  | 1990 11 22   | 898 | (4.1- | 0.8-) | 1998 01 29 | 627 | 0.6+ | 0.5+ |
| 1960 10 22 | 675 | 1.0-  | 0.3-  | 1990 12 08   | 896 | 0.2+  | 1.0+  | 1998 01 29 | 627 | 0.0  | 0.1+ |
| 1960 10 24 | 675 | 0.2-  | 0.7+  | 1993 08 14   | 675 | 0.0   | 0.8-  | 1998 02 25 | 566 | 0.2+ | 0.4- |
| 1960 10 25 | 675 | 0.7-  | 0.9-  | 1993 08 14   | 675 | 0.3+  | 0.6+  | 1998 02 25 | 566 | 0.2+ | 0.3- |
| 1960 10 26 | 675 | 0.7-  | 0.3-  | 1993 09 21   | 675 | 1.0+  | 0.2+  | 1998 02 25 | 566 | 0.5+ | 0.3- |
| 1990 11 11 | 896 | 0.2+  | 0.8+  | 1993 10 12   | 801 | 0.4-  | 1.7+  | 1998 02 26 | 699 | 0.8- | 0.1+ |
| 1990 11 11 | 896 | 1.0-  | 1.1-  | 1993 10 12   | 801 | 0.2-  | 0.5+  | 1998 02 26 | 699 | 0.2- | 0.0  |
| 1990 11 12 | 896 | (1.7+ | 2.6-) | Y 1993 10 14 | 801 | 1.6-  | 1.1-  | 1998 02 26 | 699 | 0.7+ | 0.1+ |
| 1990 11 12 | 896 | (2.7+ | 0.2+) | Y 1998 01 25 | 566 | 0.5-  | 0.1-  |            |     |      |      |

(8436)\* 2259 T-1 = 1985 VH<sub>4</sub> = 1990 RV<sub>13</sub> = 1990 SJ<sub>8</sub>

Discovered 1971 Mar. 25 by C. J. van Houten and I. van Houten-Groeneveld  
on Palomar Schmidt plates taken by T. Gehrels.

Id. D. W. E. Green (*MPC* 19322)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            | Green              |               |             |  |
|----------|------------|--------------------|---------------|-------------|--|
| <i>M</i> | 53.77096   | (2000.0)           | P             | Q           |  |
| <i>n</i> | 0.18045965 | $\omega$ 306.00006 | +0.24202659   | -0.96864404 |  |
| <i>a</i> | 3.1013395  | $\Omega$ 129.89547 | +0.91209490   | +0.20740007 |  |
| <i>e</i> | 0.1170832  | <i>i</i> 4.19640   | +0.33091694   | +0.13679889 |  |
| <i>P</i> | 5.46       | <i>H</i> 13.8      | <i>G</i> 0.15 | <i>U</i> 1  |  |

Residuals in seconds of arc

|            |     |       |       |            |     |       |       |            |     |      |      |
|------------|-----|-------|-------|------------|-----|-------|-------|------------|-----|------|------|
| 1971 03 24 | 675 | 1.1-  | 1.5-  | 1990 09 14 | 809 | 0.4-  | 0.2-  | 1993 03 24 | 691 | 0.6- | 0.1+ |
| 1971 03 25 | 675 | 0.5+  | 0.2+  | 1990 09 22 | 809 | 0.4+  | 0.1+  | 1997 12 06 | 910 | 0.1- | 0.1- |
| 1971 03 25 | 675 | 0.1-  | 1.3-  | 1990 09 22 | 809 | (2.5+ | 0.6+) | 1997 12 06 | 910 | 0.1+ | 0.2+ |
| 1971 03 26 | 675 | 0.5-  | 0.8+  | 1990 09 22 | 809 | 1.5+  | 1.3-  | 1997 12 06 | 910 | 0.3+ | 0.6+ |
| 1971 03 27 | 675 | 2.1-  | 0.9-  | 1990 09 25 | 809 | 0.7+  | 1.4-  | 1998 01 09 | 910 | 0.7+ | 0.5- |
| 1971 04 02 | 675 | (3.8+ | 1.3-) | 1990 09 25 | 809 | 0.4+  | 1.7-  | 1998 01 09 | 910 | 0.3+ | 0.4- |
| 1971 04 16 | 675 | 0.7+  | 0.1+  | 1990 09 25 | 809 | 1.0-  | 1.1-  | 1998 01 09 | 910 | 0.5+ | 0.5- |
| 1971 04 16 | 675 | 1.9+  | 0.5-  | 1993 03 19 | 809 | 1.0+  | 0.4-  | 1998 02 28 | 691 | 0.2+ | 0.2+ |
| 1971 05 13 | 675 | 0.2-  | 0.6-  | 1993 03 20 | 809 | 1.3+  | 0.7-  | 1998 02 28 | 691 | 0.1+ | 0.1+ |
| 1971 05 14 | 675 | 0.4-  | 0.1+  | 1993 03 23 | 809 | (2.6+ | 3.4+) | 1998 02 28 | 691 | 0.0  | 0.2+ |
| 1985 11 11 | 095 | 0.1+  | 0.4-  | 1993 03 24 | 809 | (3.4- | 4.9-) | 1998 03 04 | 691 | 0.7- | 0.0  |
| 1990 09 14 | 809 | 0.7-  | 0.6+  | 1993 03 24 | 691 | 0.8-  | 0.0   | 1998 03 04 | 691 | 0.6- | 0.3+ |
| 1990 09 14 | 809 | 0.6+  | 1.3+  | 1993 03 24 | 691 | 0.8-  | 0.0   | 1998 03 04 | 691 | 0.7- | 0.1+ |

(8437)\* 3057 T-1 = 1977 XA<sub>3</sub> = 1991 EK<sub>7</sub>

Discovered 1971 Mar. 26 by C. J. van Houten and I. van Houten-Groeneveld  
on Palomar Schmidt plates taken by T. Gehrels.

Id. S. J. Bus (*MPC* 20831), G. V. Williams (*MPC* 21601)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            | Williams           |               |             |  |
|----------|------------|--------------------|---------------|-------------|--|
| <i>M</i> | 154.65794  | (2000.0)           | P             | Q           |  |
| <i>n</i> | 0.24526869 | $\omega$ 40.32376  | +0.02128087   | +0.99922245 |  |
| <i>a</i> | 2.5275979  | $\Omega$ 230.92196 | -0.92792843   | +0.00738321 |  |
| <i>e</i> | 0.0451934  | <i>i</i> 2.45046   | -0.37215045   | +0.03872959 |  |
| <i>P</i> | 4.02       | <i>H</i> 14.8      | <i>G</i> 0.15 | <i>U</i> 1  |  |

Residuals in seconds of arc

|            |     |      |      |            |     |       |       |            |     |      |      |
|------------|-----|------|------|------------|-----|-------|-------|------------|-----|------|------|
| 1971 03 24 | 675 | 1.2+ | 1.2- | 1977 12 07 | 675 | 1.0-  | 0.1+  | 1996 08 16 | 566 | 0.5- | 0.1+ |
| 1971 03 25 | 675 | 1.5+ | 0.3+ | 1977 12 08 | 675 | 0.1+  | 0.5+  | 1996 08 16 | 566 | 0.8- | 0.1- |
| 1971 03 26 | 675 | 0.4+ | 0.4- | 1991 02 11 | 675 | (3.1- | 1.3+) | 1998 01 03 | 910 | 0.4+ | 0.1- |
| 1971 03 26 | 675 | 0.4- | 0.5- | 1991 02 11 | 675 | 1.6-  | 1.6+  | 1998 01 03 | 910 | 0.4+ | 0.0  |
| 1971 03 27 | 675 | 0.3- | 1.1+ | 1991 03 12 | 809 | 0.3-  | 0.1+  | 1998 01 03 | 910 | 0.2+ | 0.3+ |
| 1971 04 02 | 675 | 0.2- | 1.4- | 1991 03 12 | 809 | 0.6+  | 0.0   | 1998 02 27 | 327 | 0.3- | 0.4- |
| 1971 04 16 | 675 | 1.0- | 1.4- | 1991 03 12 | 809 | 1.5+  | 0.1+  | 1998 02 27 | 327 | 0.2+ | 0.3+ |
| 1971 04 16 | 675 | 2.0- | 0.7+ | 1992 06 28 | 675 | 0.3+  | 1.5+  | 1998 02 27 | 327 | 0.2- | 0.1+ |
| 1971 05 13 | 675 | 0.2+ | 1.3+ | 1992 08 27 | 675 | 1.1+  | 0.9-  |            |     |      |      |
| 1971 05 14 | 675 | 0.5+ | 0.7+ | 1996 08 16 | 566 | 0.4-  | 0.2+  |            |     |      |      |

(8438)\* 4825 T-1 = 1986 TH<sub>15</sub> = 1991 AX<sub>2</sub>

Discovered 1971 May 13 by C. J. van Houten and I. van Houten-Groeneveld  
on Palomar Schmidt plates taken by T. Gehrels.

Id. T. Kobayashi (*MPC* 24115)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            | Williams           |               |             |  |
|----------|------------|--------------------|---------------|-------------|--|
| <i>M</i> | 80.36895   | (2000.0)           | P             | Q           |  |
| <i>n</i> | 0.28857545 | $\omega$ 275.58257 | +0.79422616   | -0.60581600 |  |
| <i>a</i> | 2.2679308  | $\Omega$ 121.71404 | +0.57700034   | +0.72780701 |  |
| <i>e</i> | 0.1583112  | <i>i</i> 3.15481   | +0.19046106   | +0.32137818 |  |
| <i>P</i> | 3.42       | <i>H</i> 14.6      | <i>G</i> 0.15 | <i>U</i> 2  |  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1971 04 16 | 675 | 0.1+ | 0.2- | 1991 01 15 | 033 | 0.2- | 0.4- | 1997 12 06 | 910 | 0.7- | 0.4+ |
| 1971 04 16 | 675 | 0.1+ | 1.7+ | 1991 01 15 | 033 | 0.5+ | 0.7- | 1997 12 06 | 910 | 1.3- | 1.4+ |
| 1971 05 13 | 675 | 0.7+ | 0.2+ | 1991 01 15 | 033 | 0.1+ | 0.8- | 1997 12 07 | 910 | 1.0- | 0.4+ |
| 1971 05 14 | 675 | 0.6- | 0.1+ | 1991 01 16 | 033 | 0.4+ | 0.2+ | 1997 12 07 | 910 | 0.7- | 0.5+ |
| 1971 05 16 | 675 | 1.1+ | 1.3+ | 1991 01 22 | 675 | 1.3- | 0.9- | 1997 12 07 | 910 | 1.0- | 0.4+ |
| 1986 10 06 | 095 | 0.6- | 0.1- | 1991 01 22 | 675 | 0.2+ | 0.0  | 1998 02 19 | 699 | 1.2+ | 1.2- |
| 1986 10 10 | 095 | 0.1- | 2.1+ | 1996 08 13 | 566 | 0.0  | 1.4- | 1998 02 19 | 699 | 1.3+ | 0.4+ |
| 1988 03 18 | 675 | 0.3- | 0.9+ | 1996 08 13 | 566 | 0.1+ | 0.8- | 1998 02 19 | 699 | 1.9+ | 0.5- |
| 1988 03 18 | 675 | 1.2- | 2.0- | 1996 08 13 | 566 | 0.4+ | 0.7- |            |     |      |      |
| 1991 01 15 | 033 | 0.2- | 0.5- | 1997 12 06 | 910 | 1.1- | 0.4+ |            |     |      |      |

**(8439)\* 2034 T-2 = 1996 TV<sub>5</sub>**

Discovered 1973 Sept. 29 by C. J. van Houten and I. van Houten-Groeneveld on Palomar Schmidt plates taken by T. Gehrels.

Id. G. V. Williams (*MPC* 28082)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> |            | (2000.0) |          | <b>P</b>    |             | <b>Q</b> |   |
|----------|------------|----------|----------|-------------|-------------|----------|---|
| <i>n</i> | 0.17538870 | $\omega$ | 69.35753 | -0.58830629 | -0.80850882 |          |   |
| <i>a</i> | 3.1608336  | $\Omega$ | 56.68768 | +0.73531981 | -0.54232153 |          |   |
| <i>e</i> | 0.1399028  | <i>i</i> | 0.99168  | +0.33645280 | -0.22847503 |          |   |
| <i>P</i> | 5.62       | <i>H</i> | 14.5     | <i>G</i>    | 0.15        | <i>U</i> | 1 |

Residuals in seconds of arc

|            |     |       |       |            |     |       |       |            |     |      |      |
|------------|-----|-------|-------|------------|-----|-------|-------|------------|-----|------|------|
| 1973 09 19 | 675 | 0.5+  | 1.1+  | 1973 09 30 | 675 | 0.2+  | 0.1+  | 1995 08 01 | 691 | 0.1- | 0.8+ |
| 1973 09 19 | 675 | 1.2-  | 1.2+  | 1973 09 30 | 675 | 1.8-  | 1.1-  | 1996 10 03 | 327 | 0.6+ | 0.2+ |
| 1973 09 19 | 675 | 0.2-  | 0.8+  | 1973 09 30 | 675 | 1.1+  | 1.1-  | 1996 10 03 | 327 | 0.2+ | 0.1+ |
| 1973 09 19 | 675 | (2.6- | 0.1+) | 1973 09 30 | 675 | 1.1+  | 1.0+  | 1996 10 03 | 327 | 0.3+ | 0.1+ |
| 1973 09 20 | 675 | 0.4-  | 0.7+  | 1973 10 04 | 675 | 0.9+  | 2.0+  | 1996 10 05 | 327 | 0.8+ | 1.0+ |
| 1973 09 24 | 675 | 0.1+  | 0.9-  | 1973 10 04 | 675 | 1.2-  | 0.9-  | 1996 10 05 | 327 | 0.2+ | 0.8+ |
| 1973 09 24 | 675 | 0.2+  | 0.5+  | 1973 10 04 | 675 | (2.7+ | 1.1-) | 1996 10 05 | 327 | 0.9+ | 0.4+ |
| 1973 09 24 | 675 | 1.0+  | 0.7-  | 1973 10 04 | 675 | 0.5+  | 1.2+  | 1996 10 08 | 691 | 1.3- | 0.4+ |
| 1973 09 24 | 675 | 0.5+  | 0.0   | 1973 10 05 | 675 | (0.2+ | 2.6-) | 1996 10 08 | 691 | 1.3- | 0.5+ |
| 1973 09 25 | 675 | 2.0+  | 1.0-  | 1973 10 05 | 675 | 1.5+  | 0.8-  | 1996 10 08 | 691 | 1.1- | 0.5+ |
| 1973 09 25 | 675 | 1.3-  | 0.6-  | 1973 10 05 | 675 | 1.4-  | 0.3+  | 1997 11 08 | 910 | 0.8- | 1.2+ |
| 1973 09 25 | 675 | 1.3+  | 1.6-  | 1973 10 05 | 675 | 0.9+  | 1.9-  | 1997 11 08 | 910 | 0.5- | 1.0+ |
| 1973 09 25 | 675 | 1.4-  | 0.3-  | 1973 10 05 | 675 | 0.6-  | 0.3-  | 1997 11 08 | 910 | 0.2- | 1.1+ |
| 1973 09 29 | 675 | 0.4-  | 0.7-  | 1973 10 05 | 675 | 0.9-  | 0.5-  | 1998 01 25 | 566 | 0.3+ | 0.3- |
| 1973 09 29 | 675 | (1.1+ | 3.2-) | 1995 07 24 | 691 | 0.7-  | 0.7+  | 1998 01 25 | 566 | 0.2+ | 0.2- |
| 1973 09 29 | 675 | 0.3-  | 0.4-  | 1995 07 24 | 691 | 0.8-  | 0.9+  | 1998 01 25 | 566 | 0.0  | 0.3- |
| 1973 09 29 | 675 | 1.3+  | 2.1-  | 1995 07 24 | 691 | 0.8-  | 0.9+  | 1998 02 26 | 566 | 0.1+ | 0.2- |
| 1973 09 30 | 675 | 0.9-  | 1.5-  | 1995 08 01 | 691 | 0.1+  | 0.9+  | 1998 02 26 | 566 | 0.1+ | 0.2- |
| 1973 09 30 | 675 | 1.9+  | 0.6+  | 1995 08 01 | 691 | 0.1-  | 1.0+  | 1998 02 26 | 566 | 0.5+ | 0.0  |

**(8440)\* 1017 T-3 = 1986 RZ<sub>2</sub>**

Discovered 1977 Oct. 17 by C. J. van Houten and I. van Houten-Groeneveld on Palomar Schmidt plates taken by T. Gehrels.

Id. S. Nakano (*MPC* 12700), K. Hurukawa (unpublished)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> |            | (2000.0) |           | <b>P</b>    |             | <b>Q</b> |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.21251353 | $\omega$ | 26.87795  | +0.65866919 | +0.74104895 |          |   |
| <i>a</i> | 2.7810684  | $\Omega$ | 284.62505 | -0.71231024 | +0.55828114 |          |   |
| <i>e</i> | 0.1387513  | <i>i</i> | 7.74448   | -0.24242322 | +0.37305312 |          |   |
| <i>P</i> | 4.64       | <i>H</i> | 13.8      | <i>G</i>    | 0.15        | <i>U</i> | 2 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1977 10 07 | 675 | 0.6+ | 0.1- | 1986 10 04 | 688 | 1.0+ | 1.0- | 1995 09 29 | 801 | 0.6+ | 0.6- |
| 1977 10 11 | 675 | 2.2+ | 0.1- | 1986 10 04 | 688 | 0.4+ | 0.2+ | 1995 09 29 | 801 | 0.2+ | 0.5+ |
| 1977 10 11 | 675 | 2.2+ | 0.4- | 1991 11 03 | 801 | 0.3- | 0.7+ | 1998 01 24 | 566 | 0.4+ | 0.4- |
| 1977 10 12 | 675 | 0.0  | 0.6+ | 1991 11 03 | 801 | 0.4- | 0.6+ | 1998 01 24 | 566 | 0.1- | 0.5- |
| 1977 10 12 | 675 | 0.4- | 1.6+ | 1992 01 05 | 801 | 0.0  | 0.2+ | 1998 01 24 | 566 | 0.1+ | 0.5- |
| 1977 10 16 | 675 | 1.1- | 1.8- | 1992 01 06 | 801 | 0.2- | 0.3+ | 1998 02 20 | 557 | 0.4+ | 0.5+ |
| 1977 10 16 | 675 | 0.5- | 0.4- | 1995 07 21 | 033 | 0.7- | 0.5- | 1998 02 20 | 557 | 0.2+ | 0.5+ |
| 1977 10 17 | 675 | 0.8+ | 0.8+ | 1995 07 23 | 033 | 0.6- | 1.1- | 1998 02 25 | 566 | 0.4- | 0.8- |

|            |     |       |       |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| 1977 10 17 | 675 | 0.9+  | 0.6+  | 1995 07 23 | 033 | 0.5- | 1.7- | 1998 02 25 | 566 | 0.2- | 1.2- |
| 1977 10 22 | 675 | 1.9-  | 1.9-  | 1995 08 26 | 801 | 0.1- | 0.4+ | 1998 02 25 | 566 | 0.7- | 1.3- |
| 1977 10 22 | 675 | (2.4- | 0.4-) | 1995 08 26 | 801 | 0.3+ | 0.8+ | 1998 03 04 | 557 | 0.2+ | 0.9+ |
| 1986 09 06 | 095 | (8.6- | 1.9+) | 1995 08 28 | 801 | 0.1+ | 0.6+ | 1998 03 04 | 557 | 0.3- | 0.6+ |
| 1986 09 11 | 688 | 1.2+  | 0.6-  | 1995 08 28 | 801 | 0.1+ | 0.3+ | 1998 03 04 | 557 | 0.4- | 0.0  |
| 1986 09 11 | 688 | 0.4+  | 0.3-  | 1995 09 24 | 801 | 0.6+ | 0.7+ |            |     |      |      |
| 1986 09 29 | 095 | 2.0-  | 0.1+  | 1995 09 24 | 801 | 0.3+ | 0.9+ |            |     |      |      |

**(8441)\* 4008 T-3 = 1953 EC<sub>1</sub> = 1989 LP**

Discovered 1977 Oct. 16 by C. J. van Houten and I. van Houten-Groeneveld on Palomar Schmidt plates taken by T. Gehrels.

Id. H. Kaneda (*MPC* 17221), G. V. Williams (*MPC* 29651)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> |            | (2000.0) |          | <b>P</b>    |             | <b>Q</b> |   |
|----------|------------|----------|----------|-------------|-------------|----------|---|
| <i>n</i> | 0.30415296 | $\omega$ | 86.59113 | -0.99295247 | +0.08137763 |          |   |
| <i>a</i> | 2.1898180  | $\Omega$ | 98.06379 | -0.10852270 | -0.91648492 |          |   |
| <i>e</i> | 0.1392904  | <i>i</i> | 4.99206  | +0.04762584 | -0.39170533 |          |   |
| <i>P</i> | 3.24       | <i>H</i> | 13.6     | <i>G</i>    | 0.15        | <i>U</i> | 2 |

Residuals in seconds of arc

|            |     |      |      |            |     |       |       |            |     |      |      |
|------------|-----|------|------|------------|-----|-------|-------|------------|-----|------|------|
| 1953 03 10 | 760 | 1.4- | 0.0  | 1989 06 05 | 675 | 1.2-  | 0.8-  | 1997 12 27 | 560 | 0.7+ | 0.1+ |
| 1953 03 10 | 760 | 2.2+ | 0.0  | 1989 06 05 | 675 | 0.3+  | 1.4-  | 1997 12 27 | 952 | 0.9- | 0.3- |
| 1977 10 07 | 675 | 1.9+ | 0.8+ | 1989 06 12 | 399 | (2.9- | 4.0+) | 1998 01 06 | 704 | 0.8+ | 0.1- |
| 1977 10 11 | 675 | 0.7- | 2.4- | 1989 06 12 | 399 | (3.8- | 3.5+) | 1998 01 06 | 704 | 0.7+ | 0.0  |
| 1977 10 11 | 675 | 0.2+ | 1.7- | 1993 09 21 | 675 | 1.7+  | 0.8+  | 1998 01 06 | 704 | 0.8+ | 0.1- |
| 1977 10 12 | 675 | 0.6- | 1.9- | 1993 09 21 | 675 | 0.7+  | 0.9+  | 1998 01 26 | 704 | 0.4+ | 0.2- |
| 1977 10 12 | 675 | 1.9- | 1.6- | 1995 02 22 | 033 | 0.9-  | 0.2-  | 1998 01 26 | 704 | 0.1+ | 0.3- |
| 1977 10 16 | 675 | 0.8- | 0.8+ | 1995 02 22 | 033 | 1.1-  | 0.2-  | 1998 01 26 | 704 | 0.0  | 0.2- |
| 1977 10 16 | 675 | 0.0  | 0.9+ | 1997 12 27 | 952 | 0.0   | 0.8-  | 1998 01 26 | 704 | 0.1+ | 0.5- |
| 1989 06 03 | 675 | 0.2+ | 1.5- | 1997 12 27 | 952 | 0.5-  | 1.2-  | 1998 01 26 | 704 | 0.2+ | 0.5- |
| 1989 06 03 | 675 | 0.8- | 1.3- | 1997 12 27 | 560 | 0.1+  | 0.4+  |            |     |      |      |

**(8442)\* 4237 T-3 = 1994 LG<sub>8</sub> = 1996 WR<sub>2</sub>**

Discovered 1977 Oct. 16 by C. J. van Houten and I. van Houten-Groeneveld on Palomar Schmidt plates taken by T. Gehrels.

Id. S. Nakano (*MPC* 29131)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> |            | (2000.0) |          | <b>P</b>    |             | <b>Q</b> |   |
|----------|------------|----------|----------|-------------|-------------|----------|---|
| <i>n</i> | 0.27051873 | $\omega$ | 35.23400 | -0.58542536 | -0.80644540 |          |   |
| <i>a</i> | 2.3677608  | $\Omega$ | 90.74056 | +0.72342598 | -0.56595502 |          |   |
| <i>e</i> | 0.1483801  | <i>i</i> | 4.77318  | +0.36596721 | -0.17129138 |          |   |
| <i>P</i> | 3.64       | <i>H</i> | 14.9     | <i>G</i>    | 0.15        | <i>U</i> | 2 |

Residuals in seconds of arc

|            |     |       |       |            |     |        |       |            |     |        |       |
|------------|-----|-------|-------|------------|-----|--------|-------|------------|-----|--------|-------|
| 1977 10 07 | 675 | (1.5+ | 3.0-) | 1977 10 22 | 675 | 1.5-   | 0.6+  | 1996 11 21 | 327 | (19.9- | 5.8+) |
| 1977 10 11 | 675 | 1.7+  | 2.1-  | 1977 10 22 | 675 | 0.7-   | 1.5+  | 1996 11 21 | 327 | (19.6- | 5.7+) |
| 1977 10 11 | 675 | 0.3+  | 1.3-  | 1994 06 08 | 809 | (5.2-  | 0.3-) | 1996 11 21 | 327 | (20.1- | 6.3+) |
| 1977 10 12 | 675 | 0.4+  | 0.9+  | 1994 06 08 | 809 | (3.4-  | 0.8-) | 1997 02 11 | 411 | 0.1+   | 0.0   |
| 1977 10 12 | 675 | 0.7+  | 1.2-  | 1994 06 08 | 809 | 2.0-   | 0.5+  | 1997 02 11 | 411 | 0.6+   | 0.4+  |
| 1977 10 16 | 675 | 0.2+  | 0.7+  | 1994 06 09 | 809 | 1.8+   | 0.1+  | 1997 02 12 | 411 | 0.3+   | 0.4-  |
| 1977 10 16 | 675 | 0.4+  | 0.5+  | 1994 06 09 | 809 | 0.3+   | 0.8+  | 1997 02 12 | 411 | 0.7+   | 0.1-  |
| 1977 10 17 | 675 | 0.1+  | 0.8+  | 1994 06 09 | 809 | 0.0    | 0.3-  | 1997 03 12 | 691 | 0.8-   | 0.3-  |
| 1977 10 17 | 675 | 0.1+  | 0.2-  | 1995 08 31 | 809 | 0.6+   | 0.4-  | 1997 03 12 | 691 | 0.7-   | 0.2-  |
| 1977 10 21 | 675 | 1.0-  | 0.3+  | 1995 09 01 | 809 | 0.1-   | 0.7-  | 1997 03 12 | 691 | 0.6-   | 0.4-  |
| 1977 10 21 | 675 | 0.6-  | 0.4-  | 1996 11 21 | 327 | (19.8- | 5.6+) |            |     |        |       |

**(8443)\* 4343 T-3 = 1980 LH**

Discovered 1977 Oct. 16 by C. J. van Houten and I. van Houten-Groeneveld on Palomar Schmidt plates taken by T. Gehrels.

Id. S. Nakano (*MPC* 12703), K. Hurukawa (*MPC* 29651)

1998 MAR. 13

M.P.C. 31375

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Nakano

| <i>M</i> | 308.94535  | (2000.0) | <b>P</b>  | <b>Q</b>                 |
|----------|------------|----------|-----------|--------------------------|
| <i>n</i> | 0.21108116 | $\omega$ | 15.55105  | -0.97342986 +0.22886463  |
| <i>a</i> | 2.7936355  | $\Omega$ | 177.64079 | -0.22460178 -0.94796748  |
| <i>e</i> | 0.2354972  | <i>i</i> | 10.40726  | -0.04459098 -0.22131119  |
| <i>P</i> | 4.67       | <i>H</i> | 12.5      | <i>G</i> 0.15 <i>U</i> 1 |

Residuals in seconds of arc

|            |     |             |            |     |             |            |     |           |
|------------|-----|-------------|------------|-----|-------------|------------|-----|-----------|
| 1977 10 07 | 675 | (3.6+ 0.7-) | 1980 06 14 | 046 | 0.6- 0.0    | 1995 09 02 | 010 | 0.7+ 1.9+ |
| 1977 10 12 | 675 | 0.2+ 1.0-   | 1980 06 14 | 046 | (3.1- 0.2+) | 1998 01 27 | 713 | 0.4+ 0.9+ |
| 1977 10 12 | 675 | 0.8+ 1.3-   | 1989 03 29 | 675 | 0.4- 0.1-   | 1998 01 27 | 713 | 0.5- 0.0  |
| 1977 10 16 | 675 | 0.6- 1.3-   | 1989 03 29 | 675 | 0.1+ 0.2+   | 1998 01 27 | 713 | 0.6- 0.0  |
| 1977 10 16 | 675 | 1.3+ 0.3-   | 1989 05 09 | 675 | 0.5- 0.2-   | 1998 01 29 | 713 | 0.5+ 0.7+ |
| 1977 10 17 | 675 | 0.8+ 0.3-   | 1989 05 09 | 675 | 1.4- 0.1+   | 1998 01 29 | 713 | 0.3+ 0.5+ |
| 1977 10 17 | 675 | 0.9+ 1.1-   | 1991 10 07 | 691 | 1.1- 0.2+   | 1998 01 29 | 713 | 0.4+ 0.5+ |
| 1977 10 21 | 675 | 0.8- 0.1+   | 1991 10 07 | 691 | 1.1- 0.3+   | 1998 02 20 | 631 | 0.7+ 0.2- |
| 1977 10 21 | 675 | 0.2- 0.3-   | 1991 10 07 | 691 | 1.1- 0.0    | 1998 02 20 | 631 | 0.2- 0.0  |
| 1977 10 22 | 675 | (3.0- 0.6+) | 1994 05 09 | 675 | 0.5+ 0.4-   | 1998 03 01 | 631 | 0.4+ 0.1- |
| 1977 10 22 | 675 | (0.3- 2.8+) | 1994 05 09 | 675 | 0.2- 0.7+   | 1998 03 01 | 631 | 0.6+ 0.2- |
| 1980 06 13 | 046 | 1.4+ 1.5-   | 1995 09 02 | 010 | 1.6- 1.6+   |            |     |           |
| 1980 06 13 | 046 | (4.2- 1.5-) | 1995 09 02 | 010 | 0.6+ 1.6+   |            |     |           |

1977 EU<sub>1</sub> = 1998 CT<sub>3</sub>

Id. B. G. Marsden

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 333.81881  | (2000.0) | <b>P</b>  | <b>Q</b>                 |
|----------|------------|----------|-----------|--------------------------|
| <i>n</i> | 0.23223496 | $\omega$ | 15.17221  | -0.98588841 -0.16675251  |
| <i>a</i> | 2.6213056  | $\Omega$ | 155.21417 | +0.14969383 -0.91760937  |
| <i>e</i> | 0.1046313  | <i>i</i> | 2.01668   | +0.07493864 -0.36081387  |
| <i>P</i> | 4.24       | <i>H</i> | 14.0      | <i>G</i> 0.15 <i>U</i> 5 |

Residuals in seconds of arc

|            |     |           |            |     |           |            |     |             |
|------------|-----|-----------|------------|-----|-----------|------------|-----|-------------|
| 1977 03 13 | 095 | 0.5- 0.4+ | 1998 02 06 | 809 | 1.0+ 0.1- | 1998 02 07 | 809 | (1.8- 2.4-) |
| 1977 03 22 | 095 | 0.6- 0.1- | 1998 02 06 | 809 | 0.1+ 0.4+ | 1998 02 25 | 566 | 0.0 0.7+    |
| 1977 03 25 | 095 | 1.0+ 0.5- | 1998 02 07 | 809 | 0.5- 1.8- | 1998 02 25 | 566 | 0.0 0.6+    |
| 1998 02 06 | 809 | 1.0+ 1.2+ | 1998 02 07 | 809 | 1.4- 1.4- | 1998 02 25 | 566 | 0.0 0.6+    |

1979 MT<sub>1</sub> = 1979 OM<sub>8</sub> = 1997 WA<sub>46</sub>Id. H. Oishi (d, *JAM* 2062), K. Ichikawa

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Ichikawa

| <i>M</i> | 63.54378   | (2000.0) | <b>P</b>  | <b>Q</b>                 |
|----------|------------|----------|-----------|--------------------------|
| <i>n</i> | 0.28252250 | $\omega$ | 219.08305 | +0.97595838 +0.20870902  |
| <i>a</i> | 2.3002093  | $\Omega$ | 128.75498 | -0.17426791 +0.92031267  |
| <i>e</i> | 0.1795608  | <i>i</i> | 4.62019   | -0.13090429 +0.33085516  |
| <i>P</i> | 3.49       | <i>H</i> | 15.2      | <i>G</i> 0.15 <i>U</i> 5 |

Residuals in seconds of arc

|            |     |             |            |     |             |            |     |           |
|------------|-----|-------------|------------|-----|-------------|------------|-----|-----------|
| 1979 06 23 | 413 | 1.9+ 0.8+   | 1997 11 26 | 704 | 2.1- 1.6+   | 1997 11 29 | 704 | 1.7- 1.6- |
| 1979 06 24 | 413 | 1.1- 0.3-   | 1997 11 26 | 704 | (5.0- 2.0+) | 1997 12 05 | 704 | 2.0+ 1.7+ |
| 1979 06 25 | 413 | 0.7- 0.6+   | 1997 11 29 | 704 | 0.1+ 0.2-   | 1997 12 05 | 704 | 0.8+ 1.9- |
| 1979 07 24 | 413 | 2.2- 0.0    | 1997 11 29 | 704 | 1.4- 0.7-   | 1997 12 05 | 704 | 1.0+ 1.3+ |
| 1979 07 27 | 675 | 2.0+ 0.9-   | 1997 11 29 | 704 | 0.8- 0.4-   | 1997 12 05 | 704 | 1.1+ 0.6+ |
| 1997 11 26 | 704 | (4.0- 1.7+) | 1997 11 29 | 704 | 0.5- 0.1-   | 1997 12 05 | 704 | 1.5+ 0.1+ |

1980 KK = 1990 SQ<sub>12</sub>Id. G. V. Williams (*MPC* 17816)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 169.13114  | (2000.0) | <b>P</b>  | <b>Q</b>                 |
|----------|------------|----------|-----------|--------------------------|
| <i>n</i> | 0.31147207 | $\omega$ | 142.87144 | +0.14760292 +0.98897022  |
| <i>a</i> | 2.1553773  | $\Omega$ | 135.61282 | -0.91160209 +0.14085867  |
| <i>e</i> | 0.1699638  | <i>i</i> | 1.00749   | -0.38366002 +0.04579010  |
| <i>P</i> | 3.16       | <i>H</i> | 14.0      | <i>G</i> 0.15 <i>U</i> 4 |

Residuals in seconds of arc

|            |     |           |            |     |           |            |     |           |
|------------|-----|-----------|------------|-----|-----------|------------|-----|-----------|
| 1980 05 22 | 809 | 0.8- 1.0+ | 1980 06 01 | 809 | 0.1- 0.7- | 1980 06 12 | 809 | 0.2+ 0.3+ |
| 1980 05 22 | 809 | 1.1- 0.6+ | 1980 06 02 | 809 | 0.4- 0.5- | 1990 09 18 | 809 | 0.4- 0.7- |
| 1980 05 22 | 809 | 0.9- 1.2+ | 1980 06 03 | 809 | 0.2+ 1.2- | 1990 09 18 | 809 | 0.1- 0.8- |
| 1980 05 23 | 809 | 0.5+ 0.3+ | 1980 06 03 | 809 | 0.5+ 0.7- | 1990 09 18 | 809 | 0.4+ 0.7- |
| 1980 05 23 | 809 | 0.1+ 0.2+ | 1980 06 03 | 809 | 0.3+ 0.5- | 1990 09 20 | 809 | 0.4- 0.1+ |
| 1980 05 23 | 809 | 0.4- 0.2+ | 1980 06 03 | 809 | 0.1+ 0.0  | 1990 09 20 | 809 | 0.3+ 0.2+ |
| 1980 05 24 | 809 | 1.0- 0.2+ | 1980 06 03 | 809 | 0.0 0.5-  | 1990 09 20 | 809 | 1.0+ 0.3+ |
| 1980 05 24 | 809 | 0.8- 0.4+ | 1980 06 03 | 809 | 1.0+ 0.9- | 1998 01 06 | 704 | 0.2+ 0.5- |
| 1980 05 25 | 809 | 0.5+ 0.2+ | 1980 06 04 | 809 | 0.1- 0.2- | 1998 01 06 | 704 | 0.4- 0.0  |
| 1980 05 25 | 809 | 1.1+ 0.3+ | 1980 06 04 | 809 | 0.4+ 0.0  | 1998 01 06 | 704 | 1.6- 0.6- |
| 1980 05 26 | 809 | 0.3- 0.1+ | 1980 06 04 | 809 | 1.2+ 0.3- | 1998 01 26 | 704 | 0.1- 1.0- |
| 1980 05 26 | 809 | 0.6+ 0.2+ | 1980 06 11 | 809 | 1.3- 0.2+ | 1998 01 26 | 704 | 1.4+ 0.8- |
| 1980 05 31 | 809 | 0.1+ 1.1- | 1980 06 11 | 809 | 0.8- 0.4+ | 1998 01 26 | 704 | 0.0 0.6+  |
| 1980 05 31 | 809 | 0.1+ 0.7- | 1980 06 11 | 809 | 0.6- 0.0  | 1998 01 26 | 704 | 0.8+ 1.0- |
| 1980 05 31 | 809 | 0.8+ 1.2- | 1980 06 12 | 809 | 0.1+ 0.0  |            |     |           |
| 1980 06 01 | 809 | 0.1- 0.8- | 1980 06 12 | 809 | 0.0 0.6+  |            |     |           |

1981 EQ<sub>8</sub> = 1998 DH<sub>3</sub>

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 33.15763   | (2000.0) | <b>P</b>  | <b>Q</b>                 |
|----------|------------|----------|-----------|--------------------------|
| <i>n</i> | 0.22678671 | $\omega$ | 190.22462 | +0.40823764 -0.91143152  |
| <i>a</i> | 2.6631215  | $\Omega$ | 235.69898 | +0.84187315 +0.39763072  |
| <i>e</i> | 0.2222657  | <i>i</i> | 3.56233   | +0.35297539 +0.10574684  |
| <i>P</i> | 4.35       | <i>H</i> | 14.5      | <i>G</i> 0.15 <i>U</i> 5 |

Residuals in seconds of arc

|            |     |           |            |     |           |            |     |           |
|------------|-----|-----------|------------|-----|-----------|------------|-----|-----------|
| 1981 02 09 | 413 | 0.3+ 1.1+ | 1981 03 15 | 413 | 0.6- 0.1+ | 1998 02 22 | 566 | 0.2- 0.2- |
| 1981 03 01 | 413 | 1.9- 0.9+ | 1981 04 05 | 413 | 1.9- 1.7+ | 1998 02 22 | 566 | 0.1- 0.4+ |
| 1981 03 01 | 413 | 1.0+ 0.9- | 1981 04 05 | 413 | 1.1+ 1.4- | 1998 02 22 | 566 | 0.4- 0.2+ |
| 1981 03 07 | 413 | 1.2+ 0.2- | 1981 04 06 | 413 | 2.1- 0.6+ | 1998 02 23 | 566 | 0.1+ 0.4- |
| 1981 03 07 | 413 | 1.6+ 0.1- | 1981 04 06 | 413 | 1.8+ 1.1- | 1998 02 23 | 566 | 0.1- 0.0  |
| 1981 03 11 | 413 | 2.9- 2.0+ | 1981 04 12 | 413 | 0.1- 0.9- | 1998 02 23 | 566 | 0.5+ 0.7- |
| 1981 03 11 | 413 | 0.9+ 0.3- | 1981 04 30 | 413 | 0.4+ 1.2- |            |     |           |
| 1981 03 15 | 413 | 1.2+ 0.5+ | 1981 05 02 | 413 | 0.2+ 0.5- |            |     |           |

1981 ES<sub>19</sub> = 1998 EH<sub>7</sub>

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 281.40196  | (2000.0) | <b>P</b>  | <b>Q</b>                 |
|----------|------------|----------|-----------|--------------------------|
| <i>n</i> | 0.28795665 | $\omega$ | 227.11791 | -0.77375458 +0.63336733  |
| <i>a</i> | 2.2711787  | $\Omega$ | 352.15342 | -0.55196049 -0.68352963  |
| <i>e</i> | 0.0364487  | <i>i</i> | 5.14141   | -0.31087534 -0.36281272  |
| <i>P</i> | 3.42       | <i>H</i> | 17.0      | <i>G</i> 0.15 <i>U</i> 5 |

Residuals in seconds of arc

|            |     |             |            |     |           |            |     |           |
|------------|-----|-------------|------------|-----|-----------|------------|-----|-----------|
| 1981 03 02 | 413 | 0.6+ 0.3-   | 1981 03 29 | 413 | 2.0- 0.5- | 1998 03 01 | 691 | 0.2+ 0.2- |
| 1981 03 02 | 413 | (9.0+ 2.1-) | 1981 04 30 | 413 | 0.5+ 0.4+ | 1998 03 05 | 691 | 0.5- 0.1- |
| 1981 03 07 | 413 | 2.3+ 0.3+   | 1981 05 02 | 413 | 0.2+ 0.1- | 1998 03 05 | 691 | 0.2- 0.0  |
| 1981 03 11 | 413 | 0.1+ 0.3-   | 1998 03 01 | 691 | 0.2+ 0.1+ | 1998 03 05 | 691 | 0.1+ 0.0  |
| 1981 03 29 | 413 | 1.5- 0.6+   | 1998 03 01 | 691 | 0.2+ 0.1- |            |     |           |

1981 EG<sub>23</sub>

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 21.85525   | (2000.0) | <b>P</b>  | <b>Q</b>                 |
|----------|------------|----------|-----------|--------------------------|
| <i>n</i> | 0.17151895 | $\omega$ | 101.76097 | -0.26029641 -0.96552832  |
| <i>a</i> | 3.2081991  | $\Omega$ | 3.32711   | +0.87954471 -0.23751038  |
| <i>e</i> | 0.1769990  | <i>i</i> | 0.91155   | +0.39830501 -0.10650770  |
| <i>P</i> | 5.75       | <i>H</i> | 14.5      | <i>G</i> 0.15 <i>U</i> 4 |

Residuals in seconds of arc

|            |     |           |            |     |             |            |     |           |
|------------|-----|-----------|------------|-----|-------------|------------|-----|-----------|
| 1981 02 02 | 413 | 0.8- 0.6- | 1981 04 07 | 413 | 0.7+ 0.4-   | 1998 02 07 | 809 | 0.5- 0.8- |
| 1981 02 13 | 413 | 0.5- 0.2+ | 1981 04 08 | 413 | 0.2- 1.4+   | 1998 02 07 | 809 | 0.0 1.2-  |
| 1981 03 03 | 413 | 1.3- 0.3+ | 1981 04 08 | 413 | 2.0+ 0.7-   | 1998 02 07 | 809 | 0.4- 1.3- |
| 1981 03 07 | 413 | 0.5- 0.4+ | 1981 04 11 | 413 | 1.0- 0.1+   | 1998 02 26 | 699 | 0.2- 0.1- |
| 1981 03 07 | 413 | 0.4+ 0.3- | 1981 04 11 | 413 | (3.1+ 0.7-) | 1998 02 26 | 699 | 0.6- 0.9+ |

|            |     |       |       |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| 1981 03 11 | 413 | 0.0   | 0.5+  | 1981 04 30 | 413 | 1.0- | 0.4- | 1998 02 26 | 699 | 0.6- | 1.1+ |
| 1981 03 11 | 413 | 1.3+  | 0.3-  | 1981 05 02 | 413 | 0.8+ | 0.5- | 1998 02 26 | 699 | 0.6- | 0.1+ |
| 1981 03 16 | 413 | (2.8+ | 0.3-) | 1998 02 06 | 809 | 1.7+ | 0.0  | 1998 02 26 | 699 | 0.3- | 0.4+ |
| 1981 03 29 | 413 | 0.7+  | 0.2+  | 1998 02 06 | 809 | 0.9+ | 0.7+ | 1998 02 26 | 699 | 0.8- | 0.5+ |
| 1981 04 07 | 413 | 0.9-  | 0.2-  | 1998 02 06 | 809 | 1.6+ | 0.1+ |            |     |      |      |

**1981 EB<sub>26</sub> = 1995 QL<sub>10</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 58.62265   |          | (2000.0)  | <b>P</b>    | <b>Q</b>    | Williams |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.17465772 | $\omega$ | 103.54618 | -0.05098179 | -0.99860825 |          |   |
| <i>a</i> | 3.1696467  | $\Omega$ | 349.34857 | +0.88571046 | -0.03896144 |          |   |
| <i>e</i> | 0.1574778  | <i>i</i> | 4.19041   | +0.46143021 | -0.03554662 |          |   |
| <i>P</i> | 5.64       | <i>H</i> | 15.0      | <i>G</i>    | 0.15        | <i>U</i> | 5 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1981 02 09 | 413 | 0.0  | 0.7+ | 1981 03 11 | 413 | 2.1- | 0.8+ | 1995 08 19 | 809 | 1.0+ | 0.0  |
| 1981 02 12 | 413 | 1.4- | 2.6- | 1981 03 11 | 413 | 1.6- | 1.3+ | 1995 09 17 | 809 | 0.1- | 0.2- |
| 1981 02 13 | 413 | 0.1- | 0.5+ | 1981 03 15 | 413 | 0.9+ | 0.8- | 1995 09 18 | 809 | 0.2+ | 0.7- |
| 1981 03 02 | 413 | 1.0- | 0.1+ | 1981 03 15 | 413 | 1.3+ | 0.5- | 1995 09 20 | 809 | 0.3- | 0.3+ |
| 1981 03 02 | 413 | 1.6+ | 1.3- | 1981 04 05 | 413 | 1.2- | 1.5+ | 1995 09 22 | 809 | 0.3- | 0.4- |
| 1981 03 06 | 413 | 0.5- | 0.6- | 1981 05 01 | 413 | 1.7+ | 0.4- |            |     |      |      |
| 1981 03 06 | 413 | 2.4+ | 0.3+ | 1981 05 03 | 413 | 0.4- | 0.3- |            |     |      |      |

**1981 EN<sub>42</sub> = 1995 SH<sub>55</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 295.57354  |          | (2000.0)  | <b>P</b>    | <b>Q</b>    | Williams |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.29800340 | $\omega$ | 79.92023  | +0.29982951 | +0.95395251 |          |   |
| <i>a</i> | 2.2198412  | $\Omega$ | 207.53205 | -0.88253168 | +0.27386848 |          |   |
| <i>e</i> | 0.1653301  | <i>i</i> | 1.08678   | -0.36227076 | +0.12235463 |          |   |
| <i>P</i> | 3.31       | <i>H</i> | 15.0      | <i>G</i>    | 0.15        | <i>U</i> | 5 |

Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| 1981 02 12 | 413 | 0.6-  | 0.5+  | 1981 03 15 | 413 | 1.2- | 0.2- | 1995 09 18 | 809 | 1.5- | 2.0- |
| 1981 02 12 | 413 | 0.0   | 0.3-  | 1981 03 15 | 413 | 0.1+ | 1.2+ | 1995 09 19 | 809 | 0.4- | 1.3- |
| 1981 02 13 | 413 | 0.3-  | 1.2-  | 1981 04 05 | 413 | 2.9+ | 1.4- | 1995 09 19 | 809 | 1.4+ | 0.9+ |
| 1981 03 02 | 413 | 2.6-  | 1.6+  | 1981 04 06 | 413 | 0.2- | 0.5+ | 1995 09 20 | 809 | 1.2+ | 0.5+ |
| 1981 03 02 | 413 | 0.6+  | 0.2-  | 1981 04 26 | 413 | 1.4+ | 1.3- | 1995 09 29 | 691 | 0.4- | 1.1+ |
| 1981 03 06 | 413 | 1.8+  | 0.4+  | 1981 05 01 | 413 | 0.2+ | 0.5+ | 1995 09 29 | 691 | 0.4- | 0.9+ |
| 1981 03 11 | 413 | (5.6- | 2.5+) | 1981 05 03 | 413 | 2.1- | 1.0+ | 1995 09 29 | 691 | 0.4- | 0.9+ |

**1981 EC<sub>43</sub>**

Id. A. Nakamura (1998 observations)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 178.77163  |          | (2000.0)  | <b>P</b>    | <b>Q</b>    | Nakano   |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.28456714 | $\omega$ | 132.49461 | +0.78009386 | +0.62551480 |          |   |
| <i>a</i> | 2.2891779  | $\Omega$ | 188.81537 | -0.59690552 | +0.73755179 |          |   |
| <i>e</i> | 0.1907271  | <i>i</i> | 5.08903   | -0.18750298 | +0.25445745 |          |   |
| <i>P</i> | 3.46       | <i>H</i> | 15.0      | <i>G</i>    | 0.15        | <i>U</i> | 5 |

Residuals in seconds of arc

|            |     |       |       |            |     |       |       |            |     |      |      |
|------------|-----|-------|-------|------------|-----|-------|-------|------------|-----|------|------|
| 1981 02 12 | 413 | 1.1+  | 0.0   | 1981 03 15 | 413 | 0.1+  | 1.4-  | 1998 02 21 | 360 | 0.0  | 0.1+ |
| 1981 03 02 | 413 | (2.1- | 3.9+) | 1981 03 15 | 413 | 1.4-  | 1.7+  | 1998 02 21 | 360 | 0.1- | 0.2+ |
| 1981 03 02 | 413 | (2.7- | 3.7+) | 1981 04 05 | 413 | 2.1-  | 1.6+  | 1998 02 21 | 360 | 0.0  | 0.2+ |
| 1981 03 06 | 413 | 0.1+  | 0.3-  | 1981 04 05 | 413 | 1.6+  | 1.8-  | 1998 02 26 | 360 | 0.0  | 0.2+ |
| 1981 03 06 | 413 | 2.5+  | 0.1-  | 1981 04 06 | 413 | 2.3-  | 0.1+  | 1998 02 26 | 360 | 0.0  | 0.3- |
| 1981 03 11 | 413 | 0.8-  | 0.4-  | 1981 04 06 | 413 | (3.7+ | 3.0-) | 1998 02 26 | 360 | 0.1+ | 0.2- |
| 1981 03 11 | 413 | 0.1+  | 0.2-  | 1981 05 01 | 413 | 1.4+  | 0.8+  |            |     |      |      |

**1984 HH<sub>1</sub> = 1991 EV<sub>8</sub> = 1998 CT<sub>4</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Marsden

| <i>M</i> | 267.29368  |          | (2000.0)  | <b>P</b>    | <b>Q</b>    |          |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.27456719 | $\omega$ | 83.03928  | -0.34564688 | +0.93831362 |          |   |
| <i>a</i> | 2.3444283  | $\Omega$ | 166.72678 | -0.87688813 | -0.31927139 |          |   |
| <i>e</i> | 0.1949534  | <i>i</i> | 2.44309   | -0.33405903 | -0.13279054 |          |   |
| <i>P</i> | 3.59       | <i>H</i> | 14.5      | <i>G</i>    | 0.15        | <i>U</i> | 5 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1984 04 23 | 809 | 0.0  | 0.3+ | 1984 04 27 | 809 | 0.5- | 0.2- | 1998 02 06 | 809 | 0.2+ | 0.2- |
| 1984 04 23 | 809 | 0.1+ | 0.1+ | 1984 04 27 | 809 | 0.3- | 0.4+ | 1998 02 06 | 809 | 0.4- | 1.0- |
| 1984 04 24 | 809 | 0.3+ | 0.3+ | 1984 04 30 | 809 | 0.3- | 0.6+ | 1998 02 06 | 809 | 0.1- | 0.2+ |
| 1984 04 24 | 809 | 0.1+ | 0.3+ | 1984 04 30 | 809 | 0.1- | 0.3+ | 1998 02 07 | 809 | 0.6+ | 0.6+ |
| 1984 04 25 | 809 | 0.6- | 0.1- | 1991 03 12 | 675 | 0.1+ | 1.6- | 1998 02 07 | 809 | 0.4+ | 1.2+ |
| 1984 04 25 | 809 | 1.8+ | 0.7- | 1991 03 12 | 675 | 0.9- | 1.0- | 1998 02 07 | 809 | 0.1- | 1.1+ |

**1985 UT = 1975 XM<sub>1</sub> = 1998 BO<sub>33</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Nakano

| <i>M</i> | 190.82735  |          | (2000.0)  | <b>P</b>    | <b>Q</b>    |          |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.19093427 | $\omega$ | 254.08661 | +0.66336963 | +0.73864011 |          |   |
| <i>a</i> | 2.9868503  | $\Omega$ | 58.09934  | -0.62118113 | +0.63284518 |          |   |
| <i>e</i> | 0.1034940  | <i>i</i> | 8.11210   | -0.41722265 | +0.23220199 |          |   |
| <i>P</i> | 5.16       | <i>H</i> | 11.9      | <i>G</i>    | 0.15        | <i>U</i> | 4 |

Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| 1975 12 01 | 095 | 0.0   | 0.0   | 1985 10 24 | 046 | 1.1+ | 0.1+ | 1998 02 02 | 012 | 0.2+ | 0.2+ |
| 1985 10 18 | 095 | (1.0+ | 2.8+) | 1998 01 31 | 411 | 0.0  | 0.2+ | 1998 02 04 | 411 | 0.1- | 0.5+ |
| 1985 10 20 | 046 | 1.0+  | 0.9+  | 1998 01 31 | 411 | 0.4+ | 1.2+ | 1998 02 04 | 411 | 0.6- | 0.5+ |
| 1985 10 20 | 046 | 0.2+  | 0.4-  | 1998 02 01 | 411 | 1.1+ | 1.1- | 1998 02 23 | 411 | 0.1- | 0.5- |
| 1985 10 21 | 046 | 0.7-  | 0.3-  | 1998 02 01 | 411 | 0.4- | 1.7- | 1998 02 23 | 411 | 0.6- | 0.6+ |
| 1985 10 21 | 046 | 0.4-  | 0.5-  | 1998 02 02 | 012 | 0.4+ | 0.1+ |            |     |      |      |
| 1985 10 24 | 046 | 1.2-  | 0.2+  | 1998 02 02 | 012 | 0.2- | 0.0  |            |     |      |      |

**1986 QU = 1997 PQ<sub>3</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Gnädig

| <i>M</i> | 26.31448   |          | (2000.0)  | <b>P</b>    | <b>Q</b>    |          |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.18106979 | $\omega$ | 322.21815 | +0.92631435 | +0.37638132 |          |   |
| <i>a</i> | 3.0943687  | $\Omega$ | 15.69734  | -0.32887666 | +0.82943270 |          |   |
| <i>e</i> | 0.1552565  | <i>i</i> | 3.53845   | -0.18379845 | +0.41276930 |          |   |
| <i>P</i> | 5.44       | <i>H</i> | 13.0      | <i>G</i>    | 0.15        | <i>U</i> | 5 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1986 08 26 | 809 | 1.6- | 0.7+ | 1986 09 02 | 809 | 0.6+ | 0.6- | 1986 09 09 | 809 | 0.0  | 0.2+ |
| 1986 08 26 | 809 | 1.4- | 0.7+ | 1986 09 02 | 809 | 0.7+ | 0.7- | 1986 09 09 | 809 | 0.1- | 0.3+ |
| 1986 08 26 | 809 | 1.6- | 1.0+ | 1986 09 02 | 809 | 0.8+ | 0.7- | 1986 09 09 | 809 | 0.0  | 0.4+ |
| 1986 08 27 | 809 | 1.3- | 0.3+ | 1986 09 04 | 809 | 0.2+ | 0.9- | 1986 09 11 | 809 | 0.5+ | 0.7+ |
| 1986 08 27 | 809 | 1.1- | 0.3+ | 1986 09 04 | 809 | 0.1+ | 0.9- | 1986 09 11 | 809 | 0.4+ | 0.6+ |
| 1986 08 27 | 809 | 1.1- | 0.3+ | 1986 09 04 | 809 | 0.1+ | 0.8- | 1986 09 11 | 809 | 0.5+ | 0.6+ |
| 1986 08 29 | 809 | 0.7- | 0.1+ | 1986 09 05 | 809 | 0.5+ | 0.3- | 1997 08 05 | 327 | 0.3- | 0.3+ |
| 1986 08 29 | 809 | 0.5- | 0.0  | 1986 09 05 | 809 | 0.7+ | 0.4- | 1997 08 05 | 327 | 0.1- | 0.6+ |
| 1986 08 29 | 809 | 0.3- | 0.0  | 1986 09 05 | 809 | 0.8+ | 0.6- | 1997 08 05 | 327 | 0.4- | 0.2+ |
| 1986 09 01 | 809 | 0.9+ | 0.5- | 1986 09 09 | 809 | 0.2+ | 0.2- | 1997 08 10 | 327 | 0.1- | 0.6+ |
| 1986 09 01 | 809 | 1.2+ | 0.6- | 1986 09 09 | 809 | 0.1+ | 0.3- | 1997 08 10 | 327 | 0.1- | 0.3+ |
| 1986 09 01 | 809 | 1.1+ | 0.6- | 1986 09 09 | 809 | 0.6+ | 0.1- |            |     |      |      |

**1986 VA = 1997 WJ<sub>53</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Gnädig

| <i>M</i> | 98.94240   |          | (2000.0)  | <b>P</b>    | <b>Q</b>    |          |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.18740414 | $\omega$ | 54.88091  | +0.83368514 | +0.53031285 |          |   |
| <i>a</i> | 3.0242424  | $\Omega$ | 272.62661 | -0.54345424 | +0.73827864 |          |   |
| <i>e</i> | 0.1005930  | <i>i</i> | 8.87222   | -0.09811512 | +0.41678884 |          |   |
| <i>P</i> | 5.26       | <i>H</i> | 13.5      | <i>G</i>    | 0.15        | <i>U</i> | 6 |

## 1998 MAR. 13

## M.P.C. 31377

Residuals in seconds of arc

|            |      |      |       |            |     |      |      |            |     |      |      |
|------------|------|------|-------|------------|-----|------|------|------------|-----|------|------|
| 1986 11 04 | 010  | 0.9− | 0.6+  | 1986 11 08 | 413 | 3.6− | 0.3+ | 1997 12 04 | 704 | 0.5+ | 0.5− |
| 1986 11 04 | 010  | 2.2+ | 1.9+  | 1986 11 09 | 413 | 0.4+ | 0.2− | 1997 12 04 | 704 | 0.4+ | 0.2+ |
| 1986 11 04 | 010  | 1.2+ | 1.0+  | 1986 12 02 | 413 | 0.3− | 0.2+ | 1997 12 04 | 704 | 2.2+ | 0.6+ |
| 1986 11 04 | 413  | 1.2+ | 2.8+  | 1986 12 03 | 413 | 0.3+ | 1.2− | 1997 12 04 | 704 | 3.6− | 1.8+ |
| 1986 11 04 | 413  | 1.3+ | 2.1−  | 1997 11 29 | 704 | 1.1− | 0.2+ | 1997 12 05 | 704 | 1.1+ | 0.2− |
| 1986 11 05 | 413  | 0.2− | 1.0−  | 1997 11 29 | 704 | 0.3− | 0.2− | 1997 12 05 | 704 | 0.8+ | 0.4− |
| 1986 11 05 | 413  | 0.8+ | 2.6−  | 1997 11 29 | 704 | 0.9− | 0.2+ | 1997 12 05 | 704 | 1.3+ | 0.4− |
| 1986 11 05 | 010( | 9.5− | 0.7−) | 1997 11 29 | 704 | 1.2− | 0.3− | 1997 12 05 | 704 | 1.7+ | 0.0  |
| 1986 11 05 | 010  | 2.6− | 0.0   | 1997 11 29 | 704 | 1.8− | 0.3− | 1997 12 05 | 704 | 1.0+ | 0.6− |

**1987 HD<sub>2</sub> = 1934 GP = 1969 TC<sub>6</sub> = 1983 EJ<sub>3</sub> = 1998 CF<sub>5</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Nakano

|          |            |          |           |               |             |
|----------|------------|----------|-----------|---------------|-------------|
| <i>M</i> | 277.79653  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
| <i>n</i> | 0.26003788 | $\omega$ | 76.96151  | −0.42920588   | +0.90319308 |
| <i>a</i> | 2.4309628  | $\Omega$ | 167.61778 | −0.83737559   | −0.39586017 |
| <i>e</i> | 0.2246555  | <i>i</i> | 1.32446   | −0.33850323   | −0.16594270 |
| <i>P</i> | 3.79       | <i>H</i> | 13.5      | <i>G</i> 0.15 | <i>U</i> 2  |

Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |       |       |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|-------|-------|
| 1934 04 15 | 024 | 0.2+  | 1.5+  | 1987 05 04 | 688 | 0.3+ | 0.3− | 1998 02 18 | 399 | 0.2−  | 0.1+  |
| 1969 10 15 | 095 | 0.5+  | 0.9−  | 1987 05 04 | 688 | 0.1− | 0.8− | 1998 02 19 | 399 | 1.3−  | 1.5+  |
| 1983 03 14 | 095 | 0.6+  | 2.4−  | 1998 02 06 | 809 | 1.3+ | 1.0+ | 1998 02 19 | 399 | (2.8− | 2.0+) |
| 1987 04 21 | 675 | 0.0   | 1.0−  | 1998 02 06 | 809 | 1.6+ | 0.5+ | 1998 02 22 | 399 | 0.8−  | 1.0+  |
| 1987 04 21 | 675 | 0.0   | 1.0−  | 1998 02 06 | 809 | 1.4+ | 0.6+ | 1998 02 22 | 399 | 1.5−  | 0.3−  |
| 1987 04 29 | 046 | 0.6−  | 0.5+  | 1998 02 07 | 809 | 1.3+ | 0.1+ | 1998 02 27 | 566 | 1.6−  | 1.0−  |
| 1987 04 29 | 046 | 0.9+  | 0.4−  | 1998 02 07 | 809 | 1.3+ | 0.0  | 1998 02 27 | 566 | 1.3−  | 1.2−  |
| 1987 04 29 | 046 | 0.9−  | 2.5+  | 1998 02 07 | 809 | 1.7+ | 0.1− | 1998 02 27 | 566 | 1.5−  | 1.1−  |
| 1987 04 29 | 046 | (1.8− | 3.2+) | 1998 02 18 | 399 | 0.9− | 0.1+ |            |     |       |       |

**1987 QO<sub>5</sub> = 1987 QE<sub>2</sub> = 1997 YC<sub>4</sub> = 1997 SA<sub>14</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Ichikawa

|          |            |          |           |               |             |
|----------|------------|----------|-----------|---------------|-------------|
| <i>M</i> | 7.60400    |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
| <i>n</i> | 0.30352143 | $\omega$ | 63.49045  | +0.79250803   | −0.60909564 |
| <i>a</i> | 2.1928545  | $\Omega$ | 333.99933 | +0.53179468   | +0.71471778 |
| <i>e</i> | 0.1394255  | <i>i</i> | 3.99653   | +0.29853883   | +0.34377462 |
| <i>P</i> | 3.25       | <i>H</i> | 14.6      | <i>G</i> 0.15 | <i>U</i> 4  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1987 08 21 | 809 | 0.5+ | 0.9− | 1987 08 29 | 809 | 1.7− | 0.7+ | 1997 12 23 | 327 | 0.4+ | 0.3− |
| 1987 08 21 | 809 | 0.6+ | 0.5− | 1987 08 29 | 809 | 1.8− | 0.4+ | 1997 12 23 | 327 | 0.1+ | 0.0  |
| 1987 08 21 | 809 | 0.4− | 0.2− | 1987 08 29 | 809 | 2.6− | 0.4− | 1997 12 24 | 327 | 0.1− | 0.1− |
| 1987 08 24 | 809 | 0.1− | 1.5− | 1997 09 28 | 691 | 0.1− | 0.1+ | 1997 12 24 | 327 | 0.4− | 0.1− |
| 1987 08 24 | 809 | 1.1+ | 1.2− | 1997 09 28 | 691 | 0.1− | 0.1+ | 1997 12 24 | 327 | 0.2− | 0.3− |
| 1987 08 25 | 809 | 1.4+ | 0.9+ | 1997 09 28 | 691 | 0.1− | 0.2+ | 1997 12 31 | 327 | 0.0  | 0.1+ |
| 1987 08 25 | 809 | 0.3− | 0.3− | 1997 09 30 | 691 | 0.0  | 0.3+ | 1997 12 31 | 327 | 0.3+ | 0.1− |
| 1987 08 25 | 809 | 1.4+ | 0.5+ | 1997 09 30 | 691 | 0.1− | 0.1+ | 1997 12 31 | 327 | 0.1+ | 0.2− |
| 1987 08 26 | 809 | 0.1− | 0.1+ | 1997 09 30 | 691 | 0.1+ | 0.3+ | 1998 01 03 | 327 | 0.6+ | 0.3− |
| 1987 08 26 | 809 | 0.7+ | 0.8+ | 1997 12 23 | 327 | 0.1+ | 0.0  | 1998 01 03 | 327 | 0.2− | 0.0  |
| 1987 08 26 | 809 | 1.6+ | 1.0+ | 1997 12 23 | 327 | 0.4− | 0.2− | 1998 01 03 | 327 | 0.1+ | 0.2+ |

**1987 RU<sub>5</sub> = 1998 DD<sub>20</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

|          |            |          |           |               |             |
|----------|------------|----------|-----------|---------------|-------------|
| <i>M</i> | 171.42365  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
| <i>n</i> | 0.23011316 | $\omega$ | 309.91633 | +0.69559134   | +0.71835131 |
| <i>a</i> | 2.6373944  | $\Omega$ | 4.21004   | −0.60415622   | +0.59326403 |
| <i>e</i> | 0.2101459  | <i>i</i> | 8.72739   | −0.38877750   | +0.36333069 |
| <i>P</i> | 4.28       | <i>H</i> | 13.5      | <i>G</i> 0.15 | <i>U</i> 5  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1987 09 04 | 095 | 0.2− | 0.1− | 1998 02 27 | 589 | 0.4+ | 0.3− | 1998 03 02 | 589 | 0.1− | 0.7+ |
| 1987 09 24 | 095 | 1.2+ | 0.1+ | 1998 02 27 | 589 | 0.2− | 0.6+ | 1998 03 02 | 589 | 0.1− | 0.6− |
| 1987 09 27 | 095 | 0.9− | 0.1− | 1998 02 27 | 589 | 0.4− | 0.2+ | 1998 03 03 | 589 | 0.7+ | 0.0  |
| 1998 02 24 | 589 | 0.1− | 0.3+ | 1998 02 27 | 589 | 0.0  | 0.3− | 1998 03 03 | 589 | 0.1− | 0.0  |
| 1998 02 24 | 589 | 0.4− | 0.0  | 1998 02 28 | 589 | 0.2− | 1.2− | 1998 03 03 | 589 | 0.7+ | 0.8+ |

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1998 02 24 | 589 | 0.8+ | 0.1− | 1998 02 28 | 589 | 0.8− | 0.0  | 1998 03 06 | 589 | 0.3− | 0.5+ |
| 1998 02 26 | 589 | 0.5+ | 0.2+ | 1998 02 28 | 589 | 1.0+ | 0.6− | 1998 03 06 | 589 | 1.0− | 0.2− |
| 1998 02 26 | 589 | 0.1+ | 0.5+ | 1998 02 28 | 589 | 1.4− | 0.7− | 1998 03 06 | 589 | 0.0  | 0.2− |
| 1998 02 26 | 589 | 0.8+ | 0.4+ | 1998 03 02 | 589 | 0.1+ | 0.1+ | 1998 03 06 | 589 | 0.1+ | 0.3− |

**1988 DF<sub>3</sub> = 1998 DH<sub>4</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

|          |            |          |           |               |             |
|----------|------------|----------|-----------|---------------|-------------|
| <i>M</i> | 88.85038   |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
| <i>n</i> | 0.29329598 | $\omega$ | 120.80552 | +0.88548402   | −0.45038995 |
| <i>a</i> | 2.2435305  | $\Omega$ | 266.17930 | +0.37751547   | +0.84072499 |
| <i>e</i> | 0.1273127  | <i>i</i> | 6.57856   | +0.27092456   | +0.30055013 |
| <i>P</i> | 3.36       | <i>H</i> | 14.0      | <i>G</i> 0.15 | <i>U</i> 6  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1988 02 22 | 413 | 1.0− | 0.2+ | 1988 02 25 | 413 | 0.0  | 0.3+ | 1988 02 22 | 566 | 0.1+ | 0.3+ |
| 1988 02 22 | 413 | 1.8+ | 0.7− | 1988 03 10 | 413 | 0.5− | 0.3+ | 1988 02 23 | 566 | 0.2− | 0.2− |
| 1988 02 23 | 413 | 0.9− | 0.1− | 1988 03 10 | 413 | 1.3+ | 0.3+ | 1988 02 23 | 566 | 0.2+ | 0.1− |
| 1988 02 23 | 413 | 0.9+ | 0.3+ | 1988 02 22 | 566 | 0.4− | 0.4+ | 1988 02 23 | 566 | 0.1+ | 0.2− |
| 1988 02 25 | 413 | 1.7− | 0.9− | 1988 02 22 | 566 | 0.3+ | 0.2+ |            |     |      |      |

**1989 CE<sub>8</sub> = 1992 WL<sub>5</sub>**Id. S. Nakano (*MPC* 21571)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

|          |            |          |           |               |             |
|----------|------------|----------|-----------|---------------|-------------|
| <i>M</i> | 45.47381   |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
| <i>n</i> | 0.21861314 | $\omega$ | 179.61611 | +0.27608000   | −0.94794546 |
| <i>a</i> | 2.7290943  | $\Omega$ | 254.35225 | +0.88138405   | +0.31554343 |
| <i>e</i> | 0.0931039  | <i>i</i> | 9.48486   | +0.38333014   | −0.04279904 |
| <i>P</i> | 4.51       | <i>H</i> | 12.5      | <i>G</i> 0.15 | <i>U</i> 4  |

Residuals in seconds of arc

|            |     |      |      |            |     |       |       |            |     |      |      |
|------------|-----|------|------|------------|-----|-------|-------|------------|-----|------|------|
| 1989 02 08 | 809 | 0.6− | 0.2− | 1989 02 14 | 809 | 0.8−  | 0.2−  | 1998 01 24 | 566 | 0.0  | 0.0  |
| 1989 02 08 | 809 | 0.4− | 0.3− | 1989 02 26 | 809 | 0.4+  | 0.0   | 1998 01 24 | 566 | 0.1− | 0.2+ |
| 1989 02 08 | 809 | 0.1− | 0.1+ | 1989 02 26 | 809 | 0.3+  | 0.3+  | 1998 01 24 | 566 | 0.2− | 0.0  |
| 1989 02 09 | 809 | 0.4− | 0.0  | 1989 02 26 | 809 | 0.3+  | 0.1+  | 1998 02 18 | 732 | 1.2− | 0.3− |
| 1989 02 09 | 809 | 0.4− | 0.3+ | 1989 02 27 | 809 | 0.5+  | 0.8+  | 1998 02 18 | 732 | 1.1− | 0.3− |
| 1989 02 09 | 809 | 0.3− | 0.3+ | 1989 02 27 | 809 | 0.6+  | 0.6+  | 1998 02 18 | 732 | 0.4+ | 0.2+ |
| 1989 02 10 | 809 | 0.1+ | 0.1+ | 1989 02 27 | 809 | 0.9+  | 0.5+  | 1998 02 19 | 732 | 0.5+ | 0.1− |
| 1989 02 10 | 809 | 0.2− | 0.0  | 1989 02 28 | 809 | 1.1+  | 0.5−  | 1998 02 19 | 732 | 0.3− | 0.0  |
| 1989 02 10 | 809 | 0.0  | 0.1− | 1989 02 28 | 809 | 1.0+  | 0.2−  | 1998 02 19 | 732 | 0.2+ | 0.5− |
| 1989 02 11 | 809 | 0.0  | 0.0  | 1989 02 28 | 809 | 1.1+  | 0.5−  | 1998 02 19 | 138 | 0.1− | 1.1+ |
| 1989 02 11 | 809 | 0.1+ | 0.0  | 1989 03 02 | 809 | 0.0   | 0.2+  | 1998 02 19 | 138 | 0.2+ | 0.7+ |
| 1989 02 11 | 809 | 0.3+ | 0.1+ | 1989 03 02 | 809 | 0.0   | 0.5+  | 1998 02 20 | 627 | 0.6+ | 0.2+ |
| 1989 02 12 | 809 | 0.5− | 0.4− | 1989 03 02 | 809 | 0.1+  | 0.1+  | 1998 02 20 | 627 | 0.0  | 0.2− |
| 1989 02 12 | 809 | 0.1− | 0.5− | 1992 11 25 | 877 | 0.7+  | 0.4−  | 1998 02 20 | 627 | 0.1+ | 0.3− |
| 1989 02 12 | 809 | 0.1− | 0.5− | 1992 11 25 | 877 | (0.5− | 3.1−) | 1998 02 25 | 566 | 0.5+ | 0.0  |
| 1989 02 13 | 809 | 1.0− | 0.4− | 1992 12 04 | 877 | 0.9−  | 0.4−  | 1998 02 25 | 566 | 0.4+ | 0.1+ |
| 1989 02 13 | 809 | 0.9− | 0.5− | 1992 12 04 | 877 | 0.2+  | 0.3+  | 1998 02 25 | 566 | 0.6+ | 0.0  |
| 1989 02 13 | 809 | 0.8− | 0.5− | 1992 12 05 | 877 | (5.1+ | 2.8+) |            |     |      |      |
| 1989 02 14 | 809 | 0.4− | 0.0  | 1992 12 05 | 877 | (4.8+ | 3.4+) |            |     |      |      |

**1989 SN<sub>3</sub> = 1997 EK<sub>45</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Gnädig

|          |            |          |           |               |             |
|----------|------------|----------|-----------|---------------|-------------|
| <i>M</i> | 196.90514  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
| <i>n</i> | 0.18159435 | $\omega$ | 185.43370 | +0.99978873   | +0.01765867 |
| <i>a</i> | 3.0884068  | $\Omega$ | 173.52642 | −0.01351276   | +0.95032044 |
| <i>e</i> | 0.1732350  | <i>i</i> | 5.35390   | −0.01548880   | +0.31077200 |
| <i>P</i> | 5.43       | <i>H</i> | 14.0      | <i>G</i> 0.15 | <i>U</i> 5  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1989 09 26 | 809 | 0.3+ | 0.6+ | 1989 09 29 | 675 | 1.2+ | 0.1− | 1989 10 08 | 809 | 0.2− | 0.0  |
| 1989 09 26 | 809 | 0.3+ | 1.0− | 1989 09 29 | 675 | 0.5+ | 0.5− | 1989 10 08 | 809 | 0.6− | 0.1+ |
| 1989 09 26 | 809 | 0.2− | 1.2− | 1989 10 07 | 809 | 1.4+ | 0.2− | 1997 03 11 | 704 | 0.4− | 0.7− |
| 1989 09 28 | 809 | 0.8− | 0.2− | 1989 10 07 | 809 | 0.5+ | 0.3− | 1997 03 11 | 704 | 0.1+ | 0.5+ |
| 1989 09 28 | 809 | 0.2− | 1.4+ | 1989 10 07 | 809 | 0.9− | 0.0  | 1997 03 12 | 704 | 0.4+ | 1.0− |
| 1989 09 28 | 809 | 1.1− | 1.3+ | 1989 10 08 | 809 | 0.1− | 0.1+ | 1997 03 12 | 704 | 0.2− | 1.2+ |

**1989 UO = 1978 VV<sub>12</sub> = 1994 BM<sub>5</sub> = 1995 KL<sub>4</sub> = 1998 DL<sub>20</sub>**

Id. S. Nakano, G. V. Williams, A. Gnädig

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Nakano

| <i>M</i> | 74.12961   |          | (2000.0)  |             | <b>P</b> |          | <b>Q</b>    |
|----------|------------|----------|-----------|-------------|----------|----------|-------------|
| <i>n</i> | 0.26951567 | $\omega$ | 334.43658 | +0.67702871 |          |          | -0.73393472 |
| <i>a</i> | 2.3736319  | $\Omega$ | 72.89924  | +0.68463946 |          |          | +0.60091433 |
| <i>e</i> | 0.2036417  | <i>i</i> | 3.26977   | +0.27000174 |          |          | +0.31660985 |
| <i>P</i> | 3.66       | <i>H</i> | 14.4      | <i>G</i>    | 0.15     | <i>U</i> | 2           |

Residuals in seconds of arc

|            |     |       |        |            |           |        |      |            |     |      |      |
|------------|-----|-------|--------|------------|-----------|--------|------|------------|-----|------|------|
| 1978 11 02 | 095 | 1.2+  | 2.8-   | 1994 01 18 | 033       | 0.2+   | 0.2- | 1995 05 27 | 691 | 0.1- | 0.1- |
| 1989 10 23 | 403 | 2.1+  | 0.5-   | 1994 01 18 | 033       | 0.6-   | 0.1- | 1998 02 23 | 411 | 0.0  | 0.8- |
| 1989 10 23 | 403 | 1.2-  | 2.4+ Y | 1994 01 19 | 033(69.3- | 14.6+) |      | 1998 02 23 | 411 | 0.3- | 0.4+ |
| 1989 10 26 | 403 | 0.5-  | 0.5+   | 1995 05 26 | 691       | 0.2-   | 0.5- | 1998 02 23 | 411 | 0.2- | 0.0  |
| 1989 10 26 | 403 | 0.4-  | 0.7-   | 1995 05 26 | 691       | 0.0    | 0.9- | 1998 03 01 | 411 | 0.4+ | 0.8- |
| 1989 11 02 | 403 | 1.5+  | 1.9+   | 1995 05 26 | 691       | 0.2-   | 0.5- | 1998 03 01 | 411 | 1.1+ | 0.8- |
| 1989 11 02 | 046 | (3.6- | 3.4-)  | 1995 05 27 | 691       | 0.6-   | 0.4- | 1998 03 06 | 411 | 0.8- | 0.3+ |
| 1989 11 02 | 046 | 1.7-  | 2.9-   | 1995 05 27 | 691       | 0.2-   | 0.6- | 1998 03 06 | 411 | 0.2+ | 1.3+ |

**1989 VD<sub>1</sub> = 1998 DK<sub>9</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 48.44724   |          | (2000.0)  |             | <b>P</b> |          | <b>Q</b>    |
|----------|------------|----------|-----------|-------------|----------|----------|-------------|
| <i>n</i> | 0.27450273 | $\omega$ | 352.06160 | -0.06430631 |          |          | -0.98963370 |
| <i>a</i> | 2.3447953  | $\Omega$ | 101.55841 | +0.92263297 |          |          | -0.10799550 |
| <i>e</i> | 0.0664051  | <i>i</i> | 7.53147   | +0.38028030 |          |          | +0.09466838 |
| <i>P</i> | 3.59       | <i>H</i> | 15.0      | <i>G</i>    | 0.15     | <i>U</i> | 6           |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1989 11 03 | 809 | 0.7+ | 0.2- | 1989 12 02 | 809 | 0.6+ | 0.6- | 1998 02 22 | 566 | 0.0  | 0.1+ |
| 1989 11 03 | 809 | 0.4+ | 0.5+ | 1989 12 02 | 809 | 0.4+ | 0.0  | 1998 02 22 | 566 | 0.3+ | 0.3+ |
| 1989 11 03 | 809 | 1.1- | 0.6- | 1989 12 02 | 809 | 1.2+ | 0.0  | 1998 02 22 | 566 | 0.0  | 0.0  |
| 1989 11 06 | 809 | 0.1- | 0.2+ | 1989 12 03 | 809 | 0.1+ | 0.4+ | 1998 02 23 | 566 | 0.1- | 0.0  |
| 1989 11 06 | 809 | 0.1- | 0.4+ | 1989 12 03 | 809 | 0.5- | 0.3- | 1998 02 23 | 566 | 0.1- | 0.1- |
| 1989 11 06 | 809 | 1.3- | 0.1+ | 1989 12 03 | 809 | 0.2- | 0.0  | 1998 02 23 | 566 | 0.0  | 0.2- |

**1990 QV<sub>2</sub> = 1998 DL<sub>10</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 176.47702  |          | (2000.0)  |             | <b>P</b> |          | <b>Q</b>    |
|----------|------------|----------|-----------|-------------|----------|----------|-------------|
| <i>n</i> | 0.18926584 | $\omega$ | 133.66342 | +0.66296564 |          |          | +0.74861874 |
| <i>a</i> | 3.0043779  | $\Omega$ | 177.82875 | -0.72821078 |          |          | +0.64695386 |
| <i>e</i> | 0.1010791  | <i>i</i> | 10.37368  | -0.17374009 |          |          | +0.14498512 |
| <i>P</i> | 5.21       | <i>H</i> | 12.5      | <i>G</i>    | 0.15     | <i>U</i> | 4           |

Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| 1990 08 24 | 675 | 0.7+  | 0.3+  | 1990 10 22 | 675 | 1.2+ | 0.9+ | 1998 02 24 | 566 | 0.4- | 1.0- |
| 1990 08 24 | 675 | 0.3+  | 0.6+  | 1990 10 22 | 675 | 1.2+ | 1.4+ | 1998 02 24 | 566 | 0.3- | 0.1- |
| 1990 08 29 | 675 | 0.5+  | 0.2+  | 1998 02 23 | 566 | 0.5- | 0.8+ | 1998 02 24 | 566 | 0.1- | 0.1- |
| 1990 08 29 | 675 | (2.7+ | 1.8+) | 1998 02 23 | 566 | 0.3- | 0.0  | 1998 02 27 | 566 | 1.2+ | 0.3+ |
| 1990 09 14 | 675 | 1.2-  | 1.6-  | 1998 02 23 | 566 | 0.3- | 0.5+ | 1998 02 27 | 566 | 0.7+ | 0.6+ |
| 1990 09 14 | 675 | 0.9-  | 1.5-  | 1998 02 24 | 566 | 0.3- | 0.3- | 1998 02 27 | 566 | 1.0+ | 0.2- |
| 1990 09 20 | 675 | 0.8-  | 0.4+  | 1998 02 24 | 566 | 0.2- | 0.3- |            |     |      |      |
| 1990 09 20 | 675 | 0.5-  | 0.7-  | 1998 02 24 | 566 | 0.4- | 0.5- |            |     |      |      |

**1990 QO<sub>4</sub> = 1998 CY<sub>1</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 184.87078  |          | (2000.0)  |             | <b>P</b> |          | <b>Q</b>    |
|----------|------------|----------|-----------|-------------|----------|----------|-------------|
| <i>n</i> | 0.18973035 | $\omega$ | 302.85341 | +0.45719981 |          |          | +0.88920747 |
| <i>a</i> | 2.9994722  | $\Omega$ | 354.27710 | -0.74980572 |          |          | +0.37529905 |
| <i>e</i> | 0.0764889  | <i>i</i> | 9.63247   | -0.47828831 |          |          | +0.26164995 |
| <i>P</i> | 5.19       | <i>H</i> | 13.0      | <i>G</i>    | 0.15     | <i>U</i> | 5           |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1990 08 23 | 675 | 0.7- | 0.9- | 1990 09 12 | 809 | 0.2+ | 0.5- | 1990 09 18 | 675 | 0.5- | 0.2+ |
| 1990 08 23 | 675 | 0.7- | 2.2- | 1990 09 13 | 675 | 1.6- | 0.4- | 1998 02 06 | 327 | 0.1+ | 0.1+ |

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1990 08 26 | 809 | 1.8+ | 2.6+ | 1990 09 14 | 809 | 0.2+ | 0.2+ | 1998 02 06 | 327 | 0.3+ | 0.2- |
| 1990 08 26 | 809 | 1.3+ | 1.5+ | 1990 09 14 | 809 | 0.3+ | 0.2+ | 1998 02 06 | 327 | 1.7- | 0.1- |
| 1990 08 26 | 809 | 1.1+ | 1.4+ | 1990 09 14 | 809 | 0.1+ | 0.1- | 1998 02 13 | 327 | 0.3+ | 0.0  |
| 1990 08 26 | 675 | 1.4- | 1.1- | 1990 09 15 | 809 | 0.1+ | 0.2+ | 1998 02 13 | 327 | 0.8+ | 0.2+ |
| 1990 08 26 | 675 | 0.9- | 0.1- | 1990 09 15 | 809 | 0.2+ | 0.0  | 1998 02 13 | 327 | 0.2+ | 0.1+ |
| 1990 09 12 | 809 | 0.4- | 0.7- | 1990 09 15 | 809 | 0.3+ | 0.1- |            |     |      |      |
| 1990 09 12 | 809 | 0.1- | 0.6- | 1990 09 18 | 675 | 0.4+ | 0.5+ |            |     |      |      |

**1990 QM<sub>5</sub> = 1998 EN<sub>8</sub>**

Id. A. Miyamoto

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Nakano

| <i>M</i> | 118.70742  |          | (2000.0)  |             | <b>P</b> |          | <b>Q</b>    |
|----------|------------|----------|-----------|-------------|----------|----------|-------------|
| <i>n</i> | 0.18316359 | $\omega$ | 224.81919 | +0.99127928 |          |          | +0.12545663 |
| <i>a</i> | 3.0707416  | $\Omega$ | 127.93143 | -0.10196107 |          |          | +0.92404986 |
| <i>e</i> | 0.2359370  | <i>i</i> | 2.93047   | -0.08348249 |          |          | +0.36109900 |
| <i>P</i> | 5.38       | <i>H</i> | 13.7      | <i>G</i>    | 0.15     | <i>U</i> | 5           |

Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| 1990 08 22 | 675 | 0.5+  | 0.8+  | 1990 08 29 | 675 | 1.2- | 0.5+ | 1998 03 02 | 867 | 0.5- | 0.3- |
| 1990 08 22 | 675 | 0.1-  | 0.8+  | 1990 08 29 | 675 | 0.6- | 0.7+ | 1998 03 03 | 867 | 1.4+ | 0.9+ |
| 1990 08 27 | 675 | 0.4+  | 1.5-  | 1990 09 16 | 675 | 0.5+ | 0.4- | 1998 03 03 | 867 | 0.4- | 0.3- |
| 1990 08 27 | 675 | 1.1+  | 0.8-  | 1990 09 16 | 675 | 0.1+ | 0.2- | 1998 03 03 | 867 | 0.2- | 0.2- |
| 1990 08 28 | 095 | 0.8-  | 0.5+  | 1998 03 02 | 867 | 0.1- | 0.2+ |            |     |      |      |
| 1990 08 28 | 095 | (1.9- | 3.5-) | 1998 03 02 | 867 | 0.1- | 0.2+ |            |     |      |      |

**1990 QZ<sub>5</sub> = 1998 EO<sub>5</sub>**

Id. G. V. Williams, E. Bowell (1988 observations)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 131.75632  |          | (2000.0)  |             | <b>P</b> |          | <b>Q</b>    |
|----------|------------|----------|-----------|-------------|----------|----------|-------------|
| <i>n</i> | 0.20388886 | $\omega$ | 246.06173 | +0.68728399 |          |          | -0.72228382 |
| <i>a</i> | 2.8589532  | $\Omega$ | 159.88799 | +0.72089897 |          |          | +0.66520756 |
| <i>e</i> | 0.1574129  | <i>i</i> | 12.95974  | +0.08913690 |          |          | +0.18922203 |
| <i>P</i> | 4.83       | <i>H</i> | 13.0      | <i>G</i>    | 0.15     | <i>U</i> | 3           |

Residuals in seconds of arc

|            |     |       |       |            |     |       |       |            |     |      |      |
|------------|-----|-------|-------|------------|-----|-------|-------|------------|-----|------|------|
| 1988 03 18 | 675 | 0.1-  | 0.3-  | 1990 09 12 | 809 | 1.0-  | 0.7-  | 1990 09 26 | 809 | 0.6+ | 0.7+ |
| 1988 03 18 | 675 | 0.2-  | 0.8-  | 1990 09 13 | 809 | 0.9-  | 0.5-  | 1990 09 26 | 809 | 0.1+ | 0.3+ |
| 1990 08 22 | 675 | (4.4- | 6.9+) | 1990 09 13 | 809 | 0.6-  | 0.5-  | 1990 09 26 | 809 | 0.5- | 0.1- |
| 1990 08 22 | 675 | 0.9-  | 1.8-  | 1990 09 13 | 675 | 0.2+  | 0.5-  | 1990 09 27 | 809 | 0.6+ | 1.0+ |
| 1990 08 26 | 809 | 1.1-  | 0.2+  | 1990 09 13 | 675 | 1.6-  | 0.6+  | 1990 09 27 | 809 | 0.8+ | 1.3+ |
| 1990 08 26 | 809 | 0.5+  | 1.2+  | 1990 09 13 | 809 | 0.2+  | 0.7+  | 1990 09 27 | 809 | 1.1+ | 1.1+ |
| 1990 08 26 | 809 | 0.6+  | 0.7+  | 1990 09 14 | 809 | 0.4+  | 0.6+  | 1990 09 28 | 809 | 0.5+ | 0.2+ |
| 1990 08 29 | 675 | 0.0   | 0.9-  | 1990 09 14 | 809 | 0.6+  | 0.6+  | 1990 09 28 | 809 | 0.7+ | 0.1- |
| 1990 08 29 | 675 | 0.1-  | 0.7-  | 1990 09 15 | 809 | 0.6-  | 0.9-  | 1990 09 28 | 809 | 0.7+ | 0.2- |
| 1990 09 10 | 809 | 0.3-  | 0.1+  | 1990 09 15 | 809 | 0.1-  | 1.0-  | 1998 03 01 | 691 | 0.6+ | 0.5+ |
| 1990 09 10 | 809 | 0.2+  | 0.2-  | 1990 09 15 | 809 | 0.1+  | 1.0-  | 1998 03 01 | 691 | 0.6+ | 0.3+ |
| 1990 09 10 | 809 | 0.5+  | 0.0   | 1990 09 16 | 809 | 0.6-  | 0.6-  | 1998 03 01 | 691 | 0.7+ | 0.3+ |
| 1990 09 11 | 809 | 0.3+  | 0.3+  | 1990 09 16 | 809 | 0.4-  | 0.9-  | 1998 03 04 | 691 | 0.2- | 0.0  |
| 1990 09 11 | 809 | 0.8+  | 0.1+  | 1990 09 16 | 809 | 0.4-  | 1.4-  | 1998 03 04 | 691 | 0.2- | 0.0  |
| 1990 09 11 | 809 | 1.3+  | 0.2+  | 1990 09 16 | 675 | (0.0  | 2.8-) | 1998 03 04 | 691 | 0.2- | 0.0  |
| 1990 09 12 | 809 | 0.8-  | 1.4+  | 1990 09 16 | 675 | (0.3- | 2.3-) | 1998 03 05 | 691 | 0.4- | 0.0  |
| 1990 09 12 | 809 | 0.6-  | 1.3+  | 1990 09 18 | 675 | 0.5+  | 0.7-  | 1998 03 05 | 691 | 0.1- | 0.0  |
| 1990 09 12 | 809 | 0.3-  | 1.4+  | 1990 09 18 | 675 | 0.3-  | 1.4-  | 1998 03 05 | 691 | 0.4- | 0.1- |

**1990 QK<sub>9</sub> = 1996 DC<sub>5</sub> = 1997 NE<sub>8</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Gnädig

| <i>M</i> | 48.61068   |          | (2000.0)  |             | <b>P</b> |          | <b>Q</b>    |
|----------|------------|----------|-----------|-------------|----------|----------|-------------|
| <i>n</i> | 0.27235862 | $\omega$ | 148.03988 | +0.29190742 |          |          | +0.95294916 |
| <i>a</i> | 2.3570853  | $\Omega$ | 138.77110 | -0.90156106 |          |          | +0.30267700 |
| <i>e</i> | 0.1183598  | <i>i</i> | 7.12251   | -0.31933949 |          |          | +0.01656899 |
| <i>P</i> | 3.62       | <i>H</i> | 16.0      | <i>G</i>    | 0.15     | <i>U</i> | 5           |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1990 08 16 | 809 | 0.3- | 2.0+ | 1990 08 24 | 809 | 4.7+ | 2.2- | 1996 02 17 | 010 | 0.3+ | 0.0  |
| 1990 08 16 | 809 | 0.7- | 0.0  | 1990 08 26 | 809 | 4.2- | 1.8+ | 1996 02 17 | 010 | 0.7+ | 1.7+ |

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1990 08 16 | 809 | 2.3− | 0.9− | 1990 08 26 | 809 | 0.8− | 2.8+ | 1997 07 11 | 327 | 0.5− | 0.2+ |
| 1990 08 18 | 809 | 0.7− | 0.7+ | 1990 08 26 | 809 | 2.8− | 1.9+ | 1997 07 11 | 327 | 0.1+ | 0.8+ |
| 1990 08 18 | 809 | 1.0− | 1.1+ | 1996 02 16 | 010 | 1.1+ | 1.6+ | 1997 07 11 | 327 | 0.4− | 0.7+ |
| 1990 08 18 | 809 | 0.5− | 1.2+ | 1996 02 16 | 010 | 0.6+ | 1.6+ | 1997 07 12 | 327 | 0.1+ | 0.1+ |
| 1990 08 24 | 809 | 3.0+ | 1.0− | 1996 02 16 | 010 | 0.2+ | 2.3+ | 1997 07 12 | 327 | 0.6+ | 0.3+ |
| 1990 08 24 | 809 | 4.3+ | 2.0− | 1996 02 17 | 010 | 1.2− | 0.9+ | 1997 07 12 | 327 | 0.1− | 0.1+ |

**1990 RD<sub>1</sub> = 1985 VU = 1996 TR<sub>27</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 46.95474   |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.17475034 | $\omega$ | 245.23101 | +0.57242288   | −0.81941802 |
| <i>a</i> | 3.1685266  | $\Omega$ | 169.69128 | +0.79950513   | +0.54971797 |
| <i>e</i> | 0.0716761  | <i>i</i> | 9.57552   | +0.18199888   | +0.16237074 |
| <i>P</i> | 5.64       | <i>H</i> | 12.5      | <i>G</i> 0.15 | <i>U</i> 4  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1985 11 06 | 691 | 0.8− | 0.3− | 1990 09 21 | 809 | 0.9+ | 0.1+ | 1990 09 25 | 809 | 1.3− | 0.4+ |
| 1985 11 06 | 691 | 0.8− | 0.4+ | 1990 09 22 | 809 | 0.4+ | 1.0+ | 1990 09 26 | 809 | 0.4+ | 1.4− |
| 1985 11 06 | 691 | 0.9+ | 0.1− | 1990 09 22 | 809 | 0.5+ | 1.0+ | 1990 09 26 | 809 | 0.6− | 0.9− |
| 1990 09 14 | 675 | 0.3− | 1.3− | 1990 09 22 | 809 | 0.9+ | 1.0+ | 1990 09 26 | 809 | 1.7− | 0.6− |
| 1990 09 14 | 675 | 0.2− | 1.2− | 1990 09 23 | 809 | 0.9+ | 0.5− | 1996 10 07 | 691 | 0.6− | 0.2− |
| 1990 09 15 | 809 | 0.4− | 0.5+ | 1990 09 23 | 809 | 1.1+ | 0.5− | 1996 10 07 | 691 | 0.4− | 0.3− |
| 1990 09 15 | 809 | 0.2− | 0.2+ | 1990 09 23 | 809 | 1.3+ | 0.7− | 1996 10 07 | 691 | 0.5− | 0.3− |
| 1990 09 15 | 809 | 0.2+ | 0.3+ | 1990 09 24 | 809 | 0.4− | 1.0+ | 1996 10 17 | 691 | 0.5+ | 0.6+ |
| 1990 09 20 | 675 | 0.2− | 0.1− | 1990 09 24 | 809 | 0.2− | 1.0+ | 1996 10 17 | 691 | 0.8+ | 0.4− |
| 1990 09 20 | 675 | 0.4− | 1.1− | 1990 09 24 | 809 | 0.1+ | 1.0+ | 1996 10 17 | 691 | 0.2+ | 0.2+ |
| 1990 09 21 | 809 | 0.2+ | 0.0  | 1990 09 25 | 809 | 2.0− | 0.0  |            |     |      |      |
| 1990 09 21 | 809 | 0.5+ | 0.2+ | 1990 09 25 | 809 | 1.6− | 0.1+ |            |     |      |      |

**1990 RO<sub>6</sub> = 1990 QD<sub>9</sub> = 1990 RU<sub>5</sub> = 1986 XC<sub>4</sub> = 1998 DB<sub>5</sub>**Id. G. V. Williams (d, *MPC* 17796; unpublished), S. Nakano (d, *MPC* 17943),

T. B. Spahr

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 200.79130  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.19705470 | $\omega$ | 302.61750 | +0.47948365   | +0.87754841 |
| <i>a</i> | 2.9246789  | $\Omega$ | 356.03251 | −0.79487343   | +0.43331757 |
| <i>e</i> | 0.0858804  | <i>i</i> | 1.69964   | −0.37184898   | +0.20529166 |
| <i>P</i> | 5.00       | <i>H</i> | 14.3      | <i>G</i> 0.15 | <i>U</i> 5  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1986 12 04 | 010 | 0.1+ | 0.9− | 1990 08 26 | 809 | 1.2+ | 0.0  | 1990 09 13 | 809 | 0.2+ | 0.2− |
| 1990 08 16 | 809 | 0.8+ | 0.4+ | 1990 08 26 | 809 | 0.1+ | 0.6+ | 1990 09 13 | 809 | 0.3+ | 0.0  |
| 1990 08 16 | 809 | 0.5+ | 0.3+ | 1990 09 10 | 809 | 2.1− | 2.2+ | 1990 09 13 | 809 | 0.2+ | 0.3− |
| 1990 08 16 | 809 | 0.2− | 0.8+ | 1990 09 10 | 809 | 1.5− | 2.3+ | 1990 09 13 | 675 | 0.5+ | 0.9− |
| 1990 08 18 | 809 | 1.0+ | 0.1− | 1990 09 10 | 809 | 0.9− | 2.2+ | 1990 09 13 | 675 | 0.4− | 1.7− |
| 1990 08 18 | 809 | 0.4− | 0.1+ | 1990 09 11 | 809 | 0.4+ | 0.7− | 1998 02 22 | 566 | 0.8+ | 0.5+ |
| 1990 08 18 | 809 | 1.0− | 0.8+ | 1990 09 11 | 809 | 0.4+ | 0.6− | 1998 02 22 | 566 | 0.5− | 0.7+ |
| 1990 08 24 | 809 | 0.6+ | 0.8− | 1990 09 11 | 809 | 0.8+ | 0.5− | 1998 02 22 | 566 | 0.2+ | 0.3− |
| 1990 08 24 | 809 | 0.7+ | 1.4− | 1990 09 12 | 809 | 1.4− | 0.3+ | 1998 02 23 | 566 | 0.5+ | 0.8+ |
| 1990 08 24 | 809 | 0.2+ | 0.7− | 1990 09 12 | 809 | 0.7− | 0.5+ | 1998 02 23 | 566 | 0.2− | 0.6+ |
| 1990 08 26 | 809 | 0.1+ | 0.4− | 1990 09 12 | 809 | 0.5− | 0.4+ | 1998 02 23 | 566 | 0.3+ | 0.9+ |

**1990 SE<sub>6</sub> = 1992 EL<sub>28</sub>**

Id. A. Gnädig

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 358.45164  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.27692571 | $\omega$ | 219.84836 | +0.93270291   | −0.35832095 |
| <i>a</i> | 2.3310980  | $\Omega$ | 161.02721 | +0.35457243   | +0.89036959 |
| <i>e</i> | 0.1150925  | <i>i</i> | 7.22384   | +0.06590653   | +0.28079903 |
| <i>P</i> | 3.56       | <i>H</i> | 15.5      | <i>G</i> 0.15 | <i>U</i> 5  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1990 09 15 | 809 | 1.2− | 0.4+ | 1990 09 16 | 809 | 0.6+ | 1.3+ | 1990 09 25 | 809 | 1.0+ | 1.2− |
| 1990 09 15 | 809 | 1.3− | 0.1+ | 1990 09 16 | 809 | 1.2+ | 1.6+ | 1992 03 08 | 809 | 0.4+ | 0.7− |

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1990 09 15 | 809 | 1.4− | 0.2− | 1990 09 22 | 809 | 1.2− | 0.1+ | 1992 03 09 | 809 | 0.6− | 0.0  |
| 1990 09 15 | 809 | 1.2+ | 1.5− | 1990 09 22 | 809 | 1.7− | 1.0+ | 1992 03 11 | 691 | 0.6+ | 0.4+ |
| 1990 09 15 | 809 | 1.0+ | 1.5− | 1990 09 22 | 809 | 1.9− | 0.4+ | 1992 03 11 | 691 | 0.1+ | 0.2+ |
| 1990 09 15 | 809 | 1.2+ | 1.4− | 1990 09 25 | 809 | 1.3+ | 0.3− | 1992 03 11 | 691 | 0.4− | 0.2+ |
| 1990 09 16 | 809 | 0.2+ | 1.3+ | 1990 09 25 | 809 | 1.0+ | 0.0  |            |     |      |      |

**1990 SS<sub>6</sub> = 1998 DH<sub>14</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 90.92212   |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.30896673 | $\omega$ | 227.11239 | +0.97841724   | −0.20380994 |
| <i>a</i> | 2.1670133  | $\Omega$ | 144.60750 | +0.20256384   | +0.91340066 |
| <i>e</i> | 0.1494306  | <i>i</i> | 3.37302   | +0.04083617   | +0.35236449 |
| <i>P</i> | 3.19       | <i>H</i> | 15.0      | <i>G</i> 0.15 | <i>U</i> 4  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1990 09 15 | 809 | 0.3− | 0.2− | 1990 09 25 | 809 | 0.6+ | 0.3+ | 1998 02 23 | 595 | 0.5− | 0.0  |
| 1990 09 15 | 809 | 0.6+ | 0.1− | 1990 09 25 | 809 | 0.3− | 0.2− | 1998 02 25 | 595 | 0.5+ | 0.1− |
| 1990 09 15 | 809 | 0.4+ | 0.5− | 1998 01 25 | 566 | 0.2− | 0.9+ | 1998 02 25 | 595 | 0.0  | 0.6− |
| 1990 09 22 | 809 | 0.2− | 0.4+ | 1998 01 25 | 566 | 0.2− | 0.4+ | 1998 02 25 | 595 | 0.0  | 0.1− |
| 1990 09 22 | 809 | 0.1− | 0.1− | 1998 01 25 | 566 | 0.3− | 0.4+ | 1998 02 28 | 910 | 0.9+ | 0.3− |
| 1990 09 22 | 809 | 0.4− | 0.0  | 1998 02 23 | 595 | 0.2− | 0.4− | 1998 02 28 | 910 | 0.7+ | 0.4− |
| 1990 09 25 | 809 | 0.3− | 0.1− | 1998 02 23 | 595 | 0.3− | 0.3− | 1998 02 28 | 910 | 0.2− | 0.0  |

**1990 SA<sub>7</sub> = 1997 YJ<sub>1</sub>**

Id. A. Gnädig

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 183.97696  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.29607094 | $\omega$ | 194.78377 | −0.56097924   | +0.82355186 |
| <i>a</i> | 2.2294900  | $\Omega$ | 41.18776  | −0.74597588   | −0.45887773 |
| <i>e</i> | 0.0736142  | <i>i</i> | 7.33295   | −0.35891820   | −0.33345698 |
| <i>P</i> | 3.33       | <i>H</i> | 15.5      | <i>G</i> 0.15 | <i>U</i> 5  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1990 09 15 | 809 | 0.9+ | 0.1− | 1990 09 22 | 809 | 0.5− | 0.0  | 1997 12 17 | 327 | 0.6− | 0.6+ |
| 1990 09 15 | 809 | 0.1− | 0.2+ | 1990 09 25 | 809 | 0.2+ | 1.1− | 1997 12 17 | 327 | 0.2− | 0.0  |
| 1990 09 15 | 809 | 0.1− | 0.3+ | 1990 09 25 | 809 | 0.7+ | 0.1− | 1997 12 22 | 327 | 0.4+ | 0.1− |
| 1990 09 22 | 809 | 0.5− | 1.6+ | 1990 09 25 | 809 | 0.0  | 1.0− | 1997 12 22 | 327 | 0.6+ | 0.6− |
| 1990 09 22 | 809 | 0.5− | 0.3+ | 1997 12 17 | 327 | 0.6− | 0.7+ | 1997 12 22 | 327 | 0.5+ | 0.6− |

**1990 UZ = 1978 JF<sub>3</sub> = 1998 DX<sub>12</sub>**

Id. G. V. Williams, T. B. Spahr

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 171.55538  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.18789509 | $\omega$ | 262.51384 | +0.96054393   | +0.19689983 |
| <i>a</i> | 3.0189720  | $\Omega$ | 85.98168  | −0.10407731   | +0.90941827 |
| <i>e</i> | 0.1143288  | <i>i</i> | 11.35672  | −0.25792107   | +0.36631799 |
| <i>P</i> | 5.25       | <i>H</i> | 11.5      | <i>G</i> 0.15 | <i>U</i> 3  |

Residuals in seconds of arc

|            |     |      |      |            |     |       |       |            |     |      |      |
|------------|-----|------|------|------------|-----|-------|-------|------------|-----|------|------|
| 1978 05 09 | 095 | 0.1+ | 0.2+ | 1990 10 20 | 402 | 0.2+  | 0.0   | 1998 02 23 | 960 | 0.0  | 0.0  |
| 1990 10 14 | 095 | 0.7+ | 0.5+ | 1990 10 21 | 402 | (3.3− | 1.0−) | 1998 02 24 | 960 | 0.4+ | 0.2+ |
| 1990 10 14 | 095 | 0.5− | 0.8− | 1990 10 21 | 402 | 0.9−  | 0.9−  | 1998 02 24 | 960 | 0.0  | 0.1− |
| 1990 10 15 | 402 | 0.0  | 1.6− | 1990 10 28 | 402 | 0.1−  | 0.2−  | 1998 02 28 | 960 | 0.1− | 0.1− |
| 1990 10 15 | 402 | 0.1+ | 1.0+ | 1990 10 28 | 402 | 1.2−  | 0.1−  | 1998 03 01 | 960 | 0.2− | 0.4− |
| 1990 10 16 | 095 | 1.0− | 1.2− | 1990 11 13 | 402 | 0.8+  | 0.5+  | 1998 03 01 | 960 | 0.2+ | 0.2− |
| 1990 10 16 | 095 | 0.3+ | 1.5+ | 1990 11 13 | 402 | 0.7+  | 0.6+  | 1998 03 02 | 954 | 0.1− | 0.1− |
| 1990 10 19 | 402 | 0.1+ | 0.3+ | 1998 02 23 | 960 | 0.1+  | 0.4−  | 1998 03 02 | 954 | 0.1− | 0.2− |
| 1990 10 19 | 402 | 0.0  | 0.6+ | 1998 02 23 | 960 | 1.4+  | 1.6+  | 1998 03 05 | 960 | 1.1− | 0.2+ |
| 1990 10 20 | 402 | 0.5+ | 0.1+ | 1998 02 23 | 960 | 0.3+  | 0.2−  | 1998 03 05 | 960 | 0.8− | 0.2− |

**1990 WM = 1982 BV<sub>6</sub> = 1998 DY<sub>2</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i>                    |           | (2000.0) |           | <b>P</b>    |             | <b>Q</b> |      |
|-----------------------------|-----------|----------|-----------|-------------|-------------|----------|------|
| <i>n</i>                    | 262.45192 | $\omega$ | 159.82842 | -0.19363129 | +0.95830648 |          |      |
| <i>a</i>                    | 3.0021131 | $\Omega$ | 98.55163  | -0.92675119 | -0.10838179 |          |      |
| <i>e</i>                    | 0.0778543 | <i>i</i> | 12.26860  | -0.32193034 | -0.26439001 |          |      |
| <i>P</i>                    | 5.20      | <i>H</i> | 12.0      | <i>G</i>    | 0.15        | <i>U</i> | 3    |
| Residuals in seconds of arc |           |          |           |             |             |          |      |
| 1982 01 26                  | 381       | 0.1-     | 0.8+      | 1990 11 26  | 413         | 1.0+     | 1.0- |
| 1982 01 26                  | 381       | 0.2+     | 0.1+      | 1998 02 17  | 327         | 0.5+     | 0.1- |
| 1990 10 18                  | 808       | 1.7-     | 0.9+      | 1998 02 17  | 327         | 0.0      | 0.1- |
| 1990 10 18                  | 808       | (2.2-    | 2.0+)     | 1998 02 17  | 327         | 0.2+     | 0.2+ |
| 1990 11 20                  | 413       | (2.4+    | 1.4+)     | 1998 02 21  | 327         | 0.0      | 0.2- |
| 1990 11 23                  | 413       | 1.0+     | 0.3-      | 1998 02 21  | 327         | 0.0      | 0.1- |

**1990 WV = 1997 YN<sub>20</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i>                    |           | (2000.0) |           | <b>P</b>    |             | <b>Q</b> |      |
|-----------------------------|-----------|----------|-----------|-------------|-------------|----------|------|
| <i>n</i>                    | 57.33267  | $\omega$ | 280.01644 | +0.88721882 | -0.45150886 |          |      |
| <i>a</i>                    | 2.2475997 | $\Omega$ | 106.87665 | +0.45250846 | +0.81163379 |          |      |
| <i>e</i>                    | 0.1576675 | <i>i</i> | 5.68399   | +0.08988242 | +0.37066203 |          |      |
| <i>P</i>                    | 3.37      | <i>H</i> | 15.5      | <i>G</i>    | 0.15        | <i>U</i> | 5    |
| Residuals in seconds of arc |           |          |           |             |             |          |      |
| 1990 11 11                  | 809       | 0.0      | 0.4+      | 1990 11 20  | 809         | 0.1-     | 0.4+ |
| 1990 11 11                  | 809       | 0.5-     | 0.4+      | 1990 11 20  | 809         | 0.3-     | 0.5- |
| 1990 11 11                  | 809       | 0.4-     | 0.4-      | 1997 12 26  | 566         | 1.6-     | 0.9- |
| 1990 11 18                  | 809       | 0.4+     | 0.2-      | 1997 12 26  | 566         | 0.4-     | 0.8- |
| 1990 11 18                  | 809       | 0.3+     | 0.5+      | 1997 12 26  | 566         | 0.5+     | 1.0- |
| 1990 11 18                  | 809       | 0.6+     | 0.1-      | 1998 01 02  | 704         | 1.0+     | 0.2- |
| 1990 11 20                  | 809       | 0.0      | 0.4-      | 1998 01 02  | 704         | 0.6+     | 0.3+ |
|                             |           |          |           | 1998 01 24  | 704         | 1.1-     | 0.9+ |

**1991 EY<sub>1</sub> = 1991 DJ<sub>2</sub> = 1998 BA<sub>25</sub>**Id. S. Nakano (d, *MPC* 20606; unpublished)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i>                    |           | (2000.0) |           | <b>P</b>    |             | <b>Q</b> |      |
|-----------------------------|-----------|----------|-----------|-------------|-------------|----------|------|
| <i>n</i>                    | 296.88959 | $\omega$ | 244.70760 | -0.91664746 | +0.39540250 |          |      |
| <i>a</i>                    | 2.3110902 | $\Omega$ | 318.51468 | -0.32761629 | -0.82701425 |          |      |
| <i>e</i>                    | 0.1389721 | <i>i</i> | 5.06057   | -0.22896508 | -0.39963020 |          |      |
| <i>P</i>                    | 3.51      | <i>H</i> | 14.0      | <i>G</i>    | 0.15        | <i>U</i> | 5    |
| Residuals in seconds of arc |           |          |           |             |             |          |      |
| 1991 02 22                  | 511       | (3.4-    | 0.7-)     | 1998 01 25  | 566         | 0.2-     | 0.4- |
| 1991 03 07                  | 809       | 1.7-     | 0.5+      | 1998 01 25  | 566         | 0.0      | 0.2+ |
| 1991 03 07                  | 809       | 0.4-     | 0.4+      | 1998 01 28  | 411         | 0.9+     | 0.5- |
| 1991 03 07                  | 809       | 0.8+     | 0.2+      | 1998 01 28  | 411         | 0.3+     | 0.2+ |
| 1991 03 09                  | 809       | 0.2+     | 0.5-      | 1998 01 29  | 411         | 0.7-     | 0.1- |
| 1991 03 09                  | 809       | 0.4+     | 0.4-      | 1998 01 29  | 411         | 0.7-     | 0.0  |
| 1991 03 09                  | 809       | 0.6+     | 0.5-      | 1998 02 02  | 411         | 0.0      | 0.5+ |
| 1998 01 25                  | 566       | 0.1-     | 0.1-      | 1998 02 02  | 411         | 0.0      | 0.4+ |

**1991 EB<sub>5</sub> = 1991 DS<sub>2</sub> = 1989 VO<sub>3</sub> = 1989 XO<sub>1</sub>**Id. G. V. Williams (d, *MPC* 24716), A. Gnädig

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i>                    |           | (2000.0) |           | <b>P</b>    |             | <b>Q</b> |      |
|-----------------------------|-----------|----------|-----------|-------------|-------------|----------|------|
| <i>n</i>                    | 197.00314 | $\omega$ | 129.65021 | +0.10529777 | +0.99240072 |          |      |
| <i>a</i>                    | 2.3739822 | $\Omega$ | 146.23186 | -0.94386658 | +0.11989418 |          |      |
| <i>e</i>                    | 0.1034396 | <i>i</i> | 6.57704   | -0.31309465 | -0.02768020 |          |      |
| <i>P</i>                    | 3.66      | <i>H</i> | 13.0      | <i>G</i>    | 0.15        | <i>U</i> | 5    |
| Residuals in seconds of arc |           |          |           |             |             |          |      |
| 1989 11 03                  | 809       | 1.4+     | 1.1-      | 1989 12 03  | 809         | 0.4+     | 1.6+ |
| 1989 11 03                  | 809       | 0.5+     | 1.5-      | 1989 12 03  | 809         | 0.1-     | 0.3+ |
|                             |           |          |           | 1991 03 13  | 809         | 1.1+     | 0.2- |
|                             |           |          |           | 1991 03 13  | 809         | 1.9+     | 0.3- |

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1989 11 03 | 809 | 1.0+ | 0.7- | 1989 12 03 | 809 | 1.2- | 0.1- | 1991 03 15 | 809 | 0.1- | 0.2- |
| 1989 12 02 | 809 | 0.1+ | 0.4+ | 1991 02 20 | 898 | 0.0  | 1.1- | 1991 03 15 | 809 | 0.0  | 0.3+ |
| 1989 12 02 | 809 | 0.7- | 1.4+ | 1991 02 20 | 898 | 3.2- | 0.1+ | 1991 03 15 | 809 | 0.2+ | 0.6+ |
| 1989 12 02 | 809 | 1.3- | 0.1- | 1991 03 13 | 809 | 0.5+ | 0.3+ |            |     |      |      |

**1991 FY = 1987 BB<sub>3</sub> = 1998 DR<sub>20</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i>                    |            | (2000.0) |           | <b>P</b>    |             | <b>Q</b> |       |
|-----------------------------|------------|----------|-----------|-------------|-------------|----------|-------|
| <i>n</i>                    | 9.73531    | $\omega$ | 342.16895 | -0.50351852 | -0.85846701 |          |       |
| <i>a</i>                    | 0.27604913 | $\Omega$ | 137.91946 | +0.80935407 | -0.50815411 |          |       |
| <i>e</i>                    | 2.3360303  | <i>i</i> | 8.36411   | +0.30234928 | -0.06938146 |          |       |
| <i>P</i>                    | 0.0569839  | <i>H</i> | 13.5      | <i>G</i>    | 0.15        | <i>U</i> | 4     |
| Residuals in seconds of arc |            |          |           |             |             |          |       |
| 1987 01 30                  | 010        | 0.5+     | 0.1-      | 1991 03 15  | 046         | (1.3+    | 6.7-) |
| 1987 01 30                  | 010        | 0.7+     | 0.6-      | 1991 03 15  | 046         | (0.2-    | 5.7-) |
| 1987 01 30                  | 010        | 1.2-     | 0.6+      | 1991 03 17  | 887         | 0.6-     | 2.0+  |
| 1991 03 09                  | 887        | 0.3+     | 0.5-      | 1991 03 17  | 887         | 0.6+     | 0.4-  |
| 1991 03 14                  | 887        | 0.8+     | 1.0-      | 1998 02 24  | 552         | 0.1+     | 0.5+  |
| 1991 03 14                  | 887        | 1.3-     | 0.2-      | 1998 02 24  | 552         | 0.1-     | 0.1+  |

**1991 GV<sub>6</sub> = 1979 QW<sub>5</sub> = 1997 WM<sub>54</sub> = 1998 BF<sub>35</sub>**

Id. A. Doppler, G. V. Williams

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i>                    |            | (2000.0) |           | <b>P</b>    |             | <b>Q</b> |      |
|-----------------------------|------------|----------|-----------|-------------|-------------|----------|------|
| <i>n</i>                    | 114.02732  | $\omega$ | 98.73647  | +0.48779432 | +0.87279733 |          |      |
| <i>a</i>                    | 0.22870325 | $\Omega$ | 200.48535 | -0.81859225 | +0.45065399 |          |      |
| <i>e</i>                    | 2.6482226  | <i>i</i> | 2.74797   | -0.30325473 | +0.18744544 |          |      |
| <i>P</i>                    | 0.0971378  | <i>H</i> | 14.5      | <i>G</i>    | 0.15        | <i>U</i> | 2    |
| Residuals in seconds of arc |            |          |           |             |             |          |      |
| 1979 08 30                  | 809        | 0.2+     | 0.3+      | 1991 04 19  | 809         | 1.6+     | 0.4- |
| 1979 08 30                  | 809        | 0.4-     | 0.3+      | 1991 04 19  | 809         | 0.8+     | 0.7- |
| 1991 04 08                  | 809        | 0.3+     | 0.0       | 1991 04 19  | 675         | 2.2-     | 1.9- |
| 1991 04 08                  | 809        | 0.4-     | 2.3+      | 1991 04 19  | 675         | 2.9-     | 1.4- |
| 1991 04 08                  | 809        | 0.4-     | 1.9+      | 1997 11 29  | 704         | 1.1+     | 0.2- |
| 1991 04 10                  | 809        | 0.5+     | 0.8+      | 1997 11 29  | 704         | 1.3+     | 0.8+ |
| 1991 04 10                  | 809        | 1.1+     | 0.4+      | 1997 11 29  | 704         | 0.1+     | 0.5+ |
| 1991 04 10                  | 809        | 1.0+     | 0.1+      | 1997 11 29  | 704         | 0.9-     | 0.2+ |
| 1991 04 19                  | 809        | 1.0+     | 0.1-      | 1997 12 06  | 691         | 0.8-     | 0.0  |

**1991 GJ<sub>8</sub> = 1992 SK<sub>22</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i>                    |            | (2000.0) |           | <b>P</b>    |             | <b>Q</b> |      |
|-----------------------------|------------|----------|-----------|-------------|-------------|----------|------|
| <i>n</i>                    | 5.97063    | $\omega$ | 155.08493 | -0.99144000 | -0.12347015 |          |      |
| <i>a</i>                    | 0.28476004 | $\Omega$ | 17.97622  | +0.08429869 | -0.85362093 |          |      |
| <i>e</i>                    | 2.2881440  | <i>i</i> | 7.90559   | +0.09970188 | -0.50604983 |          |      |
| <i>P</i>                    | 0.0360386  | <i>H</i> | 15.5      | <i>G</i>    | 0.15        | <i>U</i> | 5    |
| Residuals in seconds of arc |            |          |           |             |             |          |      |
| 1991 04 08                  | 809        | 0.2+     | 0.7-      | 1991 04 15  | 675         | 0.4-     | 1.4- |
| 1991 04 08                  | 809        | 0.6+     | 0.9-      | 1991 04 15  | 675         | 0.0      | 0.6- |
| 1991 04 08                  | 809        | 0.0      | 0.8-      | 1991 04 19  | 809         | 0.4-     | 0.7+ |
| 1991 04 10                  | 809        | 0.2-     | 2.1+      | 1991 04 19  | 809         | 0.5+     | 0.5+ |
| 1991 04 10                  | 809        | 0.1-     | 2.1+      | 1991 04 19  | 809         | 0.2-     | 0.5- |
| 1991 04 10                  | 809        | 0.4-     | 0.1-      | 1992 09 22  | 809         | 2.1-     | 1.2- |
|                             |            |          |           | 1992 09 22  | 809         | 1.7-     | 1.4- |
|                             |            |          |           | 1992 09 23  | 809         | 1.3+     | 1.0+ |
|                             |            |          |           | 1992 09 23  | 809         | 1.1+     | 0.4+ |
|                             |            |          |           | 1992 09 23  | 809         | 0.9+     | 1.0+ |

**1991 RB<sub>1</sub> = 1987 WR<sub>1</sub> = 1998 DX<sub>28</sub>**

Id. G. V. Williams, T. B. Spahr

1998 MAR. 13

M.P.C. 31381

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 121.74955  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.20863341 | $\omega$ | 97.54789  | +0.98207842   | +0.15755537 |
| <i>a</i> | 2.8154435  | $\Omega$ | 253.42973 | -0.18491873   | +0.91156802 |
| <i>e</i> | 0.1685382  | <i>i</i> | 6.19509   | +0.03642867   | +0.37976316 |
| <i>P</i> | 4.72       | <i>H</i> | 13.5      | <i>G</i> 0.15 | <i>U</i> 4  |

Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| 1987 11 26 | 033 | 0.3-  | 0.3-  | 1991 09 11 | 402 | 1.5+ | 1.5+ | 1998 02 28 | 691 | 0.1- | 0.0  |
| 1987 11 26 | 033 | 0.1+  | 1.0-  | 1991 10 09 | 691 | 1.2- | 0.1- | 1998 02 28 | 691 | 0.0  | 0.1+ |
| 1991 09 07 | 399 | 0.1+  | 0.7-  | 1991 10 09 | 691 | 1.7- | 0.0  | 1998 02 28 | 691 | 0.0  | 0.2+ |
| 1991 09 07 | 399 | 0.9+  | 0.2+  | 1991 10 09 | 691 | 1.4- | 0.2+ | 1998 03 03 | 691 | 0.4- | 0.1- |
| 1991 09 10 | 402 | 0.1+  | 0.3-  | 1998 01 26 | 566 | 1.0+ | 0.5+ | 1998 03 03 | 691 | 0.4- | 0.1- |
| 1991 09 10 | 402 | (0.8+ | 2.5+) | 1998 01 26 | 566 | 0.9+ | 0.3+ | 1998 03 03 | 691 | 1.4- | 0.0  |
| 1991 09 11 | 402 | 1.2+  | 0.0   | 1998 01 26 | 566 | 0.7+ | 0.4+ |            |     |      |      |

1991 RE<sub>2</sub> = 1991 RH<sub>19</sub> = 1995 YB<sub>20</sub>Id. S. Nakano (d, *MPC* 19822), A. Doppler

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Doppler

| <i>M</i> | 249.36842  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.28726966 | $\omega$ | 149.72853 | +0.56647920   | -0.82015006 |
| <i>a</i> | 2.2747982  | $\Omega$ | 265.65268 | +0.73899902   | +0.54871971 |
| <i>e</i> | 0.1453973  | <i>i</i> | 4.62168   | +0.36466665   | +0.16205108 |
| <i>P</i> | 3.43       | <i>H</i> | 14.5      | <i>G</i> 0.15 | <i>U</i> 5  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1991 09 06 | 511 | 0.6- | 1.4- | 1991 09 17 | 675 | 0.3+ | 0.4+ | 1995 12 29 | 691 | 0.2- | 0.1- |
| 1991 09 07 | 511 | 1.0+ | 1.0+ | 1991 09 17 | 675 | 0.0  | 0.1+ | 1995 12 29 | 691 | 0.4- | 0.2- |
| 1991 09 08 | 511 | 0.3+ | 0.7+ | 1995 12 23 | 691 | 0.7+ | 0.4- | 1995 12 29 | 691 | 0.0  | 0.1- |
| 1991 09 14 | 675 | 0.7- | 0.7- | 1995 12 23 | 691 | 0.8- | 0.7+ |            |     |      |      |
| 1991 09 14 | 675 | 0.3- | 0.2- | 1995 12 23 | 691 | 0.5+ | 0.0  |            |     |      |      |

1991 RB<sub>9</sub> = 1998 BN<sub>15</sub>

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 63.60721   |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.20320224 | $\omega$ | 233.02250 | +0.62613558   | -0.77971348 |
| <i>a</i> | 2.8653899  | $\Omega$ | 178.21085 | +0.72576392   | +0.58231260 |
| <i>e</i> | 0.0620470  | <i>i</i> | 1.95236   | +0.28499294   | +0.23012807 |
| <i>P</i> | 4.85       | <i>H</i> | 13.5      | <i>G</i> 0.15 | <i>U</i> 4  |

Residuals in seconds of arc

|            |     |      |      |            |     |       |       |            |     |      |      |
|------------|-----|------|------|------------|-----|-------|-------|------------|-----|------|------|
| 1991 09 11 | 675 | 0.4+ | 0.2- | 1998 01 08 | 688 | 0.5+  | 0.3+  | 1998 02 20 | 910 | 0.3+ | 0.1- |
| 1991 09 11 | 675 | 0.5+ | 0.7- | 1998 01 24 | 566 | 1.4-  | 1.0-  | 1998 02 20 | 910 | 0.5+ | 0.0  |
| 1991 09 14 | 675 | 0.3+ | 1.0+ | 1998 01 24 | 566 | (2.4- | 2.0-) | 1998 02 22 | 566 | 0.2- | 0.2+ |
| 1991 09 14 | 675 | 0.1- | 0.5+ | 1998 01 24 | 566 | 0.5-  | 0.7-  | 1998 02 22 | 566 | 0.6+ | 0.2- |
| 1991 10 06 | 691 | 0.3- | 0.2- | 1998 01 28 | 566 | 0.3-  | 0.3+  | 1998 02 22 | 566 | 0.2- | 0.1+ |
| 1991 10 06 | 691 | 0.5- | 0.2- | 1998 01 28 | 566 | 0.3-  | 0.3+  | 1998 02 23 | 566 | 0.0  | 0.2+ |
| 1991 10 06 | 691 | 0.3- | 0.1- | 1998 01 28 | 566 | 0.1-  | 0.5+  | 1998 02 23 | 566 | 0.2+ | 0.1- |
| 1998 01 08 | 688 | 0.7+ | 0.3+ | 1998 02 20 | 910 | 0.2+  | 0.0   | 1998 02 23 | 566 | 0.3+ | 0.1+ |

1991 RB<sub>13</sub> = 1977 RQ<sub>2</sub> = 1998 BG<sub>37</sub>

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Gnädig

| <i>M</i> | 124.15873  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.21176807 | $\omega$ | 16.21073  | +0.99930103   | -0.00813163 |
| <i>a</i> | 2.7875910  | $\Omega$ | 344.12073 | -0.01170161   | +0.85896148 |
| <i>e</i> | 0.2301132  | <i>i</i> | 7.66352   | +0.03550398   | +0.51197563 |
| <i>P</i> | 4.65       | <i>H</i> | 13.5      | <i>G</i> 0.15 | <i>U</i> 4  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1977 09 09 | 095 | 0.1- | 0.2+ | 1991 09 17 | 675 | 0.1+ | 1.1+ | 1991 10 09 | 033 | 0.2- | 0.1- |
| 1991 09 10 | 675 | 1.3- | 1.9- | 1991 09 17 | 675 | 1.5+ | 1.1+ | 1998 01 28 | 691 | 0.3+ | 0.0  |
| 1991 09 10 | 675 | 0.5- | 0.7- | 1991 10 02 | 033 | 0.5- | 0.7- | 1998 01 28 | 691 | 0.6+ | 0.0  |
| 1991 09 11 | 095 | 1.7- | 1.7+ | 1991 10 02 | 033 | 0.5+ | 0.4+ | 1998 01 28 | 691 | 0.4+ | 0.1- |
| 1991 09 11 | 095 | 3.6+ | 2.5+ | 1991 10 03 | 033 | 0.5- | 0.6+ | 1998 02 03 | 691 | 0.4- | 0.2+ |

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1991 09 13 | 675 | 0.0  | 0.8- | 1991 10 04 | 303 | 0.0  | 0.0  | 1998 02 03 | 691 | 0.4- | 0.1+ |
| 1991 09 13 | 675 | 0.4- | 0.5- | 1991 10 05 | 303 | 0.8+ | 1.7- | 1998 02 03 | 691 | 0.3- | 0.0  |
| 1991 09 15 | 675 | 0.7- | 1.4- | 1991 10 08 | 033 | 0.1- | 0.8+ |            |     |      |      |
| 1991 09 15 | 675 | 0.4- | 0.8- | 1991 10 08 | 033 | 0.2+ | 0.3+ |            |     |      |      |

1991 TE<sub>4</sub> = 1998 EK<sub>2</sub>

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 164.02102  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.22746499 | $\omega$ | 352.86225 | +0.95786924   | -0.26755608 |
| <i>a</i> | 2.6578247  | $\Omega$ | 23.47978  | +0.27475799   | +0.74781061 |
| <i>e</i> | 0.2159864  | <i>i</i> | 15.19129  | +0.08363356   | +0.60761257 |
| <i>P</i> | 4.33       | <i>H</i> | 15.0      | <i>G</i> 0.15 | <i>U</i> 4  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1991 10 10 | 675 | 0.7+ | 0.0  | 1991 11 02 | 675 | 1.5+ | 0.1+ | 1998 03 02 | 910 | 0.1+ | 0.0  |
| 1991 10 10 | 675 | 0.5- | 1.4+ | 1991 11 04 | 675 | 0.5+ | 0.1- | 1998 03 03 | 910 | 0.2+ | 0.2- |
| 1991 10 13 | 675 | 0.4+ | 0.7- | 1991 11 04 | 675 | 2.8- | 0.2+ | 1998 03 03 | 910 | 0.0  | 0.0  |
| 1991 10 13 | 675 | 0.7- | 0.8- | 1998 03 02 | 910 | 0.0  | 0.0  | 1998 03 03 | 910 | 0.0  | 0.2+ |
| 1991 11 02 | 675 | 0.9+ | 0.0  | 1998 03 02 | 910 | 0.4- | 0.0  |            |     |      |      |

1991 YK<sub>1</sub> = 1998 CJ

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Marsden

| <i>M</i> | 13.73851   |          | (2000.0) | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|----------|---------------|-------------|
| <i>n</i> | 0.17330989 | $\omega$ | 8.81916  | -0.23464411   | -0.96098386 |
| <i>a</i> | 3.1860591  | $\Omega$ | 94.84932 | +0.88266310   | -0.27375039 |
| <i>e</i> | 0.1583611  | <i>i</i> | 8.45263  | +0.40724440   | +0.03963263 |
| <i>P</i> | 5.69       | <i>H</i> | 13.5     | <i>G</i> 0.15 | <i>U</i> 4  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1991 12 28 | 033 | 0.0  | 0.1- | 1998 02 04 | 046 | 0.2- | 0.1+ | 1998 02 08 | 046 | 0.2+ | 0.1- |
| 1992 01 02 | 033 | 0.0  | 0.1- | 1998 02 04 | 046 | 0.2- | 0.1+ | 1998 02 18 | 046 | 0.6+ | 0.5+ |
| 1992 01 03 | 033 | 0.0  | 0.3+ | 1998 02 04 | 046 | 0.1- | 0.2+ | 1998 02 18 | 046 | 0.2- | 0.0  |
| 1992 01 07 | 033 | 0.0  | 0.1- | 1998 02 05 | 046 | 0.0  | 0.0  | 1998 02 18 | 046 | 0.3+ | 0.1- |
| 1998 02 02 | 046 | 0.0  | 0.2+ | 1998 02 05 | 046 | 0.2+ | 0.0  | 1998 02 18 | 046 | 0.3- | 0.3- |
| 1998 02 02 | 046 | 0.1- | 0.0  | 1998 02 05 | 046 | 0.1- | 0.1- | 1998 02 18 | 046 | 0.3- | 0.3- |
| 1998 02 02 | 046 | 0.1- | 0.1+ | 1998 02 06 | 046 | 0.2+ | 0.0  | 1998 02 18 | 046 | 0.3- | 0.2- |
| 1998 02 02 | 046 | 0.1+ | 0.0  | 1998 02 06 | 046 | 0.1+ | 0.2- | 1998 03 05 | 046 | 0.1+ | 0.1+ |
| 1998 02 03 | 046 | 0.0  | 0.1+ | 1998 02 06 | 046 | 0.0  | 0.2+ | 1998 03 05 | 046 | 0.3+ | 0.0  |
| 1998 02 03 | 046 | 0.1- | 0.0  | 1998 02 08 | 046 | 0.0  | 0.4- | 1998 03 05 | 046 | 0.3- | 0.2+ |
| 1998 02 03 | 046 | 0.1- | 0.1+ | 1998 02 08 | 046 | 0.4+ | 0.2- |            |     |      |      |

1992 DE<sub>3</sub> = 1972 TK<sub>6</sub> = 1987 YE<sub>5</sub>

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Doppler

| <i>M</i> | 30.29813   |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.27515999 | $\omega$ | 8.77089   | +0.97521721   | +0.21736870 |
| <i>a</i> | 2.3410599  | $\Omega$ | 338.53916 | -0.20921848   | +0.84535561 |
| <i>e</i> | 0.1762567  | <i>i</i> | 6.47494   | -0.07196538   | +0.48798026 |
| <i>P</i> | 3.58       | <i>H</i> | 16.0      | <i>G</i> 0.15 | <i>U</i> 4  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1972 10 06 | 095 | 0.2- | 0.4- | 1992 02 25 | 691 | 0.5+ | 0.4- | 1992 03 05 | 691 | 1.7- | 0.5- |
| 1987 12 24 | 010 | 1.1- | 0.3- | 1992 02 25 | 691 | 0.4+ | 0.1+ | 1992 03 06 | 691 | 0.3- | 0.2+ |
| 1987 12 24 | 010 | 0.9+ | 0.6+ | 1992 03 05 | 691 | 1.1+ | 0.4+ | 1992 03 06 | 691 | 0.1- | 0.2- |
| 1992 02 25 | 691 | 0.5+ | 0.0  | 1992 03 05 | 691 | 1.6- | 0.1+ | 1992 03 06 | 691 | 0.3- | 0.5+ |

1992 DD<sub>4</sub> = 1997 GY<sub>5</sub>

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Doppler

| <i>M</i> | 168.22816  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.22148337 | $\omega$ | 298.44945 | -0.08608889   | -0.99586234 |
| <i>a</i> | 2.7054653  | $\Omega$ | 156.43557 | +0.93764664   | -0.09086056 |
| <i>e</i> | 0.0688839  | <i>i</i> | 4.17446   | +0.33676028   | -0.00159632 |
| <i>P</i> | 4.45       | <i>H</i> | 15.5      | <i>G</i> 0.15 | <i>U</i> 6  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1992 02 29 | 691 | 0.1+ | 0.4- | 1992 03 09 | 809 | 1.5+ | 0.1+ | 1997 04 02 | 704 | 0.1- | 1.4+ |
| 1992 02 29 | 691 | 0.1- | 0.2- | 1992 03 11 | 691 | 0.9- | 0.3- | 1997 04 06 | 704 | 0.5+ | 1.2- |
| 1992 02 29 | 691 | 0.3- | 0.4- | 1992 03 11 | 691 | 0.4- | 0.2- | 1997 04 06 | 704 | 0.3- | 0.0  |
| 1992 03 06 | 809 | 0.3- | 1.4+ | 1992 03 11 | 691 | 0.3- | 0.3- |            |     |      |      |
| 1992 03 08 | 809 | 0.5+ | 0.3+ | 1997 04 02 | 704 | 0.1- | 0.2- |            |     |      |      |

**1992 EW<sub>2</sub> = 1996 HM<sub>19</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 148.89013  | (2000.0) | <i>P</i>  | Doppler       | <i>Q</i>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.26915154 | $\omega$ | 200.23792 | -0.51002910   | +0.85989558 |
| <i>a</i> | 2.3757723  | $\Omega$ | 39.10453  | -0.78447925   | -0.45490042 |
| <i>e</i> | 0.1568208  | <i>i</i> | 1.92717   | -0.35279261   | -0.23161435 |
| <i>P</i> | 3.66       | <i>H</i> | 17.5      | <i>G</i> 0.15 | <i>U</i> 6  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1992 02 29 | 809 | 0.6- | 0.3+ | 1992 03 09 | 809 | 0.6+ | 0.7+ | 1996 04 18 | 809 | 0.4+ | 0.5+ |
| 1992 03 06 | 809 | 0.3+ | 0.6+ | 1992 03 11 | 691 | 0.8- | 0.2- | 1996 04 18 | 809 | 0.0  | 0.2- |
| 1992 03 06 | 691 | 0.3- | 0.6- | 1992 03 11 | 691 | 0.4- | 0.2- | 1996 04 20 | 809 | 0.1+ | 0.5- |
| 1992 03 06 | 691 | 0.2+ | 0.9- | 1992 03 11 | 691 | 0.4- | 0.1- | 1996 04 20 | 809 | 0.2- | 0.2- |
| 1992 03 08 | 809 | 1.3+ | 0.5+ | 1996 04 18 | 809 | 0.6+ | 1.2+ | 1996 04 20 | 809 | 0.8- | 0.7- |

**1992 EB<sub>5</sub> = 1987 HL**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 339.86524  | (2000.0) | <i>P</i>  | Williams      | <i>Q</i>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.17087302 | $\omega$ | 28.40749  | -0.98273179   | +0.03041995 |
| <i>a</i> | 3.2162790  | $\Omega$ | 151.50629 | -0.04183407   | -0.99738010 |
| <i>e</i> | 0.0412829  | <i>i</i> | 22.49405  | +0.18024466   | -0.06563202 |
| <i>P</i> | 5.77       | <i>H</i> | 11.5      | <i>G</i> 0.15 | <i>U</i> 2  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1987 04 25 | 675 | 0.2- | 0.1+ | 1992 03 01 | 809 | 0.6- | 0.7+ | 1998 02 27 | 566 | 0.9+ | 0.3- |
| 1987 04 25 | 675 | 0.2+ | 0.0  | 1992 03 04 | 809 | 0.4+ | 0.8+ | 1998 02 27 | 566 | 0.7+ | 0.2- |
| 1992 02 04 | 675 | 0.2- | 1.0+ | 1992 03 06 | 809 | 0.1+ | 0.9+ | 1998 02 28 | 732 | 0.9- | 1.2- |
| 1992 02 04 | 675 | 0.0  | 0.8- | 1992 04 04 | 809 | 0.1- | 0.2- | 1998 02 28 | 732 | 0.9+ | 0.7- |
| 1992 02 27 | 675 | 0.3+ | 0.2- | 1998 02 26 | 699 | 0.0  | 0.8+ | 1998 03 01 | 732 | 1.4- | 1.6+ |
| 1992 02 27 | 675 | 0.3+ | 0.5- | 1998 02 26 | 699 | 0.3+ | 0.1+ | 1998 03 01 | 732 | 1.4- | 0.7+ |
| 1992 02 28 | 675 | 0.2- | 0.6- | 1998 02 26 | 699 | 0.2+ | 0.4- |            |     |      |      |
| 1992 02 28 | 675 | 0.0  | 1.1- | 1998 02 27 | 566 | 0.7+ | 0.4- |            |     |      |      |

**1992 ML = 1972 RC<sub>1</sub> = 1979 SB<sub>8</sub> = 1996 RK**Id. G. V. Williams (*MPC* 27913; unpublished), P. Sicoli (*ibid.*)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 166.69793  | (2000.0) | <i>P</i>  | Williams      | <i>Q</i>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.28934777 | $\omega$ | 345.37276 | +0.75652454   | +0.65381467 |
| <i>a</i> | 2.2638933  | $\Omega$ | 333.78106 | -0.59676509   | +0.68141663 |
| <i>e</i> | 0.1527241  | <i>i</i> | 1.82053   | -0.26747348   | +0.32893426 |
| <i>P</i> | 3.41       | <i>H</i> | 14.0      | <i>G</i> 0.15 | <i>U</i> 1  |

Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| 1972 09 10 | 095 | 0.8+  | 1.8-  | 1996 09 08 | 587 | 0.1- | 0.2- | 1998 02 24 | 691 | 0.0  | 0.0  |
| 1979 09 23 | 095 | 0.1+  | 0.4-  | 1996 09 08 | 587 | 0.4- | 0.2- | 1998 02 24 | 691 | 0.0  | 0.0  |
| 1992 06 06 | 675 | 0.1+  | 0.2+  | 1996 09 10 | 587 | 0.6- | 0.3- | 1998 02 24 | 691 | 0.3- | 0.1- |
| 1992 06 06 | 675 | 0.4-  | 0.1-  | 1996 09 10 | 587 | 0.3- | 0.1+ | 1998 03 01 | 691 | 0.8- | 0.3- |
| 1992 06 25 | 675 | 0.2-  | 0.3-  | 1996 09 12 | 587 | 0.1- | 0.4- | 1998 03 01 | 691 | 0.9- | 0.3- |
| 1992 06 25 | 675 | (4.2- | 2.5+) | 1996 09 12 | 587 | 0.2- | 0.3- | 1998 03 01 | 691 | 0.6- | 0.3- |
| 1992 06 27 | 675 | 0.2+  | 1.5-  | 1996 09 15 | 587 | 0.1- | 0.8- | 1998 03 01 | 691 | 0.4- | 0.4- |
| 1992 06 27 | 675 | 0.3-  | 0.1-  | 1996 09 15 | 587 | 0.2- | 0.6- | 1998 03 01 | 691 | 0.1- | 1.0- |
| 1996 09 07 | 587 | 1.6+  | 1.3+  | 1998 01 29 | 566 | 0.5+ | 0.4- | 1998 03 01 | 691 | 0.4- | 0.6- |
| 1996 09 07 | 587 | (2.5+ | 1.6+) | 1998 01 29 | 566 | 0.4+ | 0.4- |            |     |      |      |
| 1996 09 07 | 587 | 0.9+  | 0.5+  | 1998 01 29 | 566 | 1.0+ | 0.4- |            |     |      |      |

**1992 PT<sub>1</sub> = 1996 XZ<sub>35</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 252.99524  | (2000.0) | <i>P</i>  | Doppler       | <i>Q</i>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.29678388 | $\omega$ | 120.52222 | -0.04660498   | +0.99679586 |
| <i>a</i> | 2.2259181  | $\Omega$ | 146.61612 | -0.95219872   | -0.02466258 |
| <i>e</i> | 0.2479577  | <i>i</i> | 6.78493   | -0.30190327   | -0.07609054 |
| <i>P</i> | 3.32       | <i>H</i> | 16.5      | <i>G</i> 0.15 | <i>U</i> 4  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1992 07 26 | 809 | 0.0  | 0.6+ | 1992 08 08 | 010 | 1.3+ | 0.5+ | 1996 12 12 | 691 | 0.2+ | 0.4- |
| 1992 07 26 | 809 | 0.6+ | 0.7+ | 1992 08 08 | 010 | 0.8- | 0.3- | 1996 12 12 | 691 | 0.3+ | 0.3+ |
| 1992 07 26 | 809 | 0.7- | 0.5+ | 1992 08 08 | 010 | 0.0  | 1.9- | 1996 12 12 | 691 | 0.2+ | 0.2+ |
| 1992 07 30 | 809 | 0.3- | 1.2- | 1992 08 09 | 010 | 0.3- | 1.4+ | 1996 12 14 | 691 | 0.3- | 0.1- |
| 1992 07 30 | 809 | 0.3+ | 1.0- | 1992 08 09 | 010 | 0.6+ | 1.0+ | 1996 12 14 | 691 | 0.4- | 0.0  |
| 1992 07 30 | 809 | 0.1+ | 0.2- | 1992 08 09 | 010 | 0.5- | 0.0  |            |     |      |      |

**1992 RS<sub>7</sub> = 1992 SA<sub>23</sub> = 1998 BV<sub>16</sub>**Id. S. Nakano (d. *MPC* 22572), G. V. Williams, A. Gnädig

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 78.34373   | (2000.0) | <i>P</i>  | Doppler       | <i>Q</i>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.23557600 | $\omega$ | 247.25230 | +0.92467235   | -0.37665314 |
| <i>a</i> | 2.5964623  | $\Omega$ | 134.82166 | +0.37180206   | +0.86155487 |
| <i>e</i> | 0.3119468  | <i>i</i> | 4.51191   | +0.08212359   | +0.34037571 |
| <i>P</i> | 4.18       | <i>H</i> | 16.0      | <i>G</i> 0.15 | <i>U</i> 5  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1992 09 02 | 809 | 0.2- | 0.0  | 1992 09 22 | 809 | 0.3- | 0.1- | 1998 01 22 | 691 | 0.2+ | 1.2- |
| 1992 09 02 | 809 | 0.4+ | 1.0- | 1992 09 23 | 809 | 0.2- | 0.2+ | 1998 01 28 | 691 | 0.6- | 0.6+ |
| 1992 09 02 | 809 | 0.3+ | 0.6- | 1992 09 23 | 809 | 0.2- | 0.3- | 1998 01 28 | 691 | 0.7- | 0.8+ |
| 1992 09 03 | 809 | 0.2+ | 2.2- | 1992 09 23 | 809 | 0.0  | 0.5+ | 1998 01 28 | 691 | 0.6- | 0.7+ |
| 1992 09 22 | 809 | 0.7+ | 1.4+ | 1998 01 22 | 691 | 0.9+ | 1.6- |            |     |      |      |
| 1992 09 22 | 809 | 0.0  | 1.2+ | 1998 01 22 | 691 | 0.5+ | 0.8- |            |     |      |      |

**1992 TM<sub>1</sub>**

Id. J. Roe (1998 observations)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 311.69473  | (2000.0) | <i>P</i>  | Williams      | <i>Q</i>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.23283873 | $\omega$ | 244.12664 | -0.87450678   | -0.43636362 |
| <i>a</i> | 2.6167721  | $\Omega$ | 269.36958 | +0.48500614   | -0.78440612 |
| <i>e</i> | 0.0998760  | <i>i</i> | 12.22383  | +0.00263426   | -0.44078774 |
| <i>P</i> | 4.23       | <i>H</i> | 12.0      | <i>G</i> 0.15 | <i>U</i> 5  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1992 10 03 | 675 | 0.0  | 0.1- | 1992 10 25 | 675 | 0.5- | 0.3+ | 1998 02 16 | 732 | 0.0  | 0.2- |
| 1992 10 03 | 675 | 0.3- | 0.0  | 1992 10 25 | 675 | 0.1- | 0.5- | 1998 02 17 | 732 | 0.4- | 0.5+ |
| 1992 10 20 | 675 | 0.2+ | 0.1+ | 1998 02 16 | 732 | 0.4- | 0.7+ | 1998 02 17 | 732 | 0.0  | 0.7- |
| 1992 10 20 | 675 | 0.6+ | 0.2+ | 1998 02 16 | 732 | 0.6+ | 0.1- | 1998 02 17 | 732 | 0.2+ | 0.1- |

**1992 UK<sub>2</sub> = 1998 DO<sub>9</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 75.25992   | (2000.0) | <i>P</i> | Williams      | <i>Q</i>    |
|----------|------------|----------|----------|---------------|-------------|
| <i>n</i> | 0.23696875 | $\omega$ | 20.44551 | +0.60856092   | -0.78014070 |
| <i>a</i> | 2.5862788  | $\Omega$ | 32.56935 | +0.68545491   | +0.42475976 |
| <i>e</i> | 0.2135571  | <i>i</i> | 15.62944 | +0.39975639   | +0.45930343 |
| <i>P</i> | 4.16       | <i>H</i> | 13.5     | <i>G</i> 0.15 | <i>U</i> 4  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1992 10 19 | 400 | 0.7+ | 1.0+ | 1992 11 15 | 400 | 0.1+ | 0.5- | 1998 02 22 | 566 | 0.2+ | 0.2+ |
| 1992 10 19 | 400 | 0.3+ | 0.4+ | 1992 11 15 | 400 | 2.0+ | 0.7- | 1998 02 23 | 566 | 0.2+ | 0.2- |
| 1992 10 26 | 400 | 0.4- | 0.6- | 1992 11 19 | 675 | 0.0  | 0.3- | 1998 02 23 | 566 | 0.4- | 0.1- |
| 1992 10 26 | 400 | 1.2+ | 0.4- | 1992 11 19 | 675 | 0.2- | 0.7- | 1998 02 23 | 566 | 0.2- | 0.5- |
| 1992 10 27 | 372 | 1.2- | 0.7- | 1992 11 24 | 675 | 0.4- | 0.1+ | 1998 02 24 | 566 | 0.9- | 0.2- |
| 1992 10 27 | 372 | 0.6- | 1.2- | 1992 11 24 | 675 | 0.8- | 1.7+ | 1998 02 24 | 566 | 0.2+ | 0.2- |

|            |     |      |      |            |     |      |     |            |     |      |      |
|------------|-----|------|------|------------|-----|------|-----|------------|-----|------|------|
| 1992 11 01 | 372 | 0.8− | 0.3+ | 1998 02 22 | 566 | 0.1− | 0.0 | 1998 02 24 | 566 | 0.7+ | 1.1+ |
| 1992 11 01 | 372 | 0.1+ | 1.6+ | 1998 02 22 | 566 | 0.2+ | 0.0 |            |     |      |      |

**1992 UQ<sub>2</sub> = 1998 DM**

Id. G. V. Williams, M. W. Buie

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            |          |           | Williams    |      |             |   |
|----------|------------|----------|-----------|-------------|------|-------------|---|
| <i>M</i> | 128.99168  |          | (2000.0)  | <b>P</b>    |      | <b>Q</b>    |   |
| <i>n</i> | 0.25491244 | <i>ω</i> | 322.23920 | +0.95461541 |      | −0.06460802 |   |
| <i>a</i> | 2.4634402  | <i>Ω</i> | 44.34610  | +0.24294765 |      | +0.73361895 |   |
| <i>e</i> | 0.2175886  | <i>i</i> | 24.57953  | −0.17229586 |      | +0.67648285 |   |
| <i>P</i> | 3.87       | <i>H</i> | 12.5      | <i>G</i>    | 0.15 | <i>U</i>    | 4 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1992 10 04 | 675 | 0.4− | 0.4+ | 1992 10 25 | 675 | 1.6− | 1.3− | 1998 01 08 | 688 | 0.0  | 0.5+ |
| 1992 10 04 | 675 | 0.1− | 0.2− | 1992 11 26 | 675 | 0.7+ | 0.1− | 1998 02 18 | 587 | 0.5− | 0.6− |
| 1992 10 20 | 675 | 0.6+ | 0.6− | 1992 11 26 | 675 | 0.8+ | 0.1+ | 1998 02 18 | 587 | 0.4− | 0.3+ |
| 1992 10 20 | 675 | 1.2+ | 0.3− | 1992 11 28 | 675 | 0.7+ | 0.3+ | 1998 02 18 | 587 | 0.0  | 0.6+ |
| 1992 10 24 | 675 | 2.1− | 2.1+ | 1992 11 28 | 675 | 0.7+ | 0.2+ | 1998 02 19 | 587 | 0.5+ | 1.7− |
| 1992 10 25 | 675 | 0.1− | 0.2− | 1998 01 08 | 688 | 0.4+ | 0.5+ | 1998 02 19 | 587 | 0.5+ | 0.9+ |

**1993 BR<sub>2</sub> = 1991 TV<sub>7</sub>**Id. S. Nakano (*MPC* 21803), K. Ichikawa

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            |          |           | Marsden     |      |             |   |
|----------|------------|----------|-----------|-------------|------|-------------|---|
| <i>M</i> | 7.34573    |          | (2000.0)  | <b>P</b>    |      | <b>Q</b>    |   |
| <i>n</i> | 0.20318024 | <i>ω</i> | 125.08213 | −0.50456747 |      | −0.86334544 |   |
| <i>a</i> | 2.8655967  | <i>Ω</i> | 355.20544 | +0.76326159 |      | −0.44236313 |   |
| <i>e</i> | 0.1979196  | <i>i</i> | 4.67041   | +0.40353861 |      | −0.24279521 |   |
| <i>P</i> | 4.85       | <i>H</i> | 13.5      | <i>G</i>    | 0.15 | <i>U</i>    | 4 |

Residuals in seconds of arc

|            |     |             |      |              |     |             |      |            |     |      |      |
|------------|-----|-------------|------|--------------|-----|-------------|------|------------|-----|------|------|
| 1991 10 07 | 033 | 0.0         | 0.7− | 1993 01 23   | 400 | 0.0         | 0.7+ | 1998 02 18 | 552 | 0.3− | 0.7+ |
| 1991 10 07 | 033 | 0.3−        | 0.6+ | 1993 01 24   | 400 | (0.9+ 2.8+) |      | 1998 02 20 | 552 | 0.1− | 0.1− |
| 1991 10 08 | 033 | 0.4+        | 0.1+ | 1993 01 24   | 400 | 0.5− 0.0    |      | 1998 02 20 | 552 | 0.1+ | 0.2− |
| 1993 01 20 | 896 | 0.8+        | 1.0+ | Y 1993 01 29 | 896 | 1.5− 1.2−   |      | 1998 02 21 | 552 | 0.2+ | 0.3− |
| 1993 01 20 | 896 | 1.0+        | 0.4− | Y 1993 01 29 | 896 | (2.8+ 1.2−) |      | 1998 02 21 | 552 | 0.3+ | 0.3− |
| 1993 01 21 | 896 | 0.7+        | 0.1+ | Y 1993 02 10 | 896 | 0.5− 0.3−   |      | 1998 02 21 | 552 | 0.3+ | 0.3− |
| 1993 01 21 | 896 | (2.6+ 1.9+) | Y    | 1993 02 10   | 896 | 0.1− 0.2−   |      |            |     |      |      |
| 1993 01 23 | 400 | (2.2+ 2.8+) |      | 1998 02 18   | 552 | 0.4− 0.7+   |      |            |     |      |      |

**1993 FR<sub>11</sub>**

Id. E. Bowell (1989, 1994 observations)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            |          |           | Williams    |      |             |   |
|----------|------------|----------|-----------|-------------|------|-------------|---|
| <i>M</i> | 318.26312  |          | (2000.0)  | <b>P</b>    |      | <b>Q</b>    |   |
| <i>n</i> | 0.23998495 | <i>ω</i> | 129.22497 | +0.52150253 |      | +0.85260619 |   |
| <i>a</i> | 2.5645630  | <i>Ω</i> | 172.00020 | −0.83769712 |      | +0.51899099 |   |
| <i>e</i> | 0.1639174  | <i>i</i> | 13.77301  | −0.16216858 |      | +0.06091830 |   |
| <i>P</i> | 4.11       | <i>H</i> | 13.0      | <i>G</i>    | 0.15 | <i>U</i>    | 4 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1989 03 30 | 675 | 0.1+ | 0.5+ | 1993 03 23 | 809 | 0.5+ | 0.1− | 1994 09 30 | 675 | 0.3+ | 0.2− |
| 1993 03 17 | 809 | 0.0  | 1.5− | 1993 04 16 | 413 | 0.8− | 0.7+ |            |     |      |      |
| 1993 03 18 | 809 | 0.1+ | 0.0  | 1994 09 30 | 675 | 0.3− | 0.3− |            |     |      |      |

**1993 FD<sub>22</sub> = 1991 XO**Id. K. Ichikawa (*MPC* 24231)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            |          |           | Marsden     |      |             |   |
|----------|------------|----------|-----------|-------------|------|-------------|---|
| <i>M</i> | 25.10094   |          | (2000.0)  | <b>P</b>    |      | <b>Q</b>    |   |
| <i>n</i> | 0.18208367 | <i>ω</i> | 243.73369 | −0.08696835 |      | −0.99616124 |   |
| <i>a</i> | 3.0828712  | <i>Ω</i> | 211.26046 | +0.92071843 |      | −0.07655454 |   |
| <i>e</i> | 0.2500560  | <i>i</i> | 1.10021   | +0.38041305 |      | −0.04245208 |   |
| <i>P</i> | 5.41       | <i>H</i> | 14.0      | <i>G</i>    | 0.15 | <i>U</i>    | 1 |

Residuals in seconds of arc

|            |     |      |      |            |     |             |      |            |     |             |      |
|------------|-----|------|------|------------|-----|-------------|------|------------|-----|-------------|------|
| 1991 12 04 | 399 | 0.5+ | 0.6− | 1993 03 22 | 809 | 0.6+        | 0.5+ | 1998 02 06 | 809 | 0.8+        | 0.1+ |
| 1991 12 04 | 399 | 1.8− | 0.2+ | 1993 03 26 | 809 | 0.2+        | 0.2− | 1998 02 07 | 809 | 0.4−        | 0.1+ |
| 1991 12 05 | 399 | 0.7+ | 0.1+ | 1993 04 16 | 413 | (4.4− 2.8+) |      | 1998 02 07 | 809 | 0.7−        | 0.1− |
| 1991 12 05 | 399 | 0.9− | 0.1+ | 1996 09 21 | 327 | 0.3−        | 1.0+ | 1998 02 07 | 809 | 0.7−        | 0.6+ |
| 1991 12 07 | 691 | 0.1+ | 0.2+ | 1996 09 21 | 327 | 0.6−        | 0.7+ | 1998 02 23 | 566 | (2.8− 0.6+) |      |
| 1991 12 07 | 691 | 0.7+ | 0.2− | 1996 09 21 | 327 | 0.0         | 0.5+ | 1998 02 23 | 566 | (2.6− 0.6+) |      |
| 1991 12 07 | 691 | 0.8+ | 0.3− | 1998 02 06 | 809 | 0.7+        | 0.1+ | 1998 02 23 | 566 | (3.0− 0.5+) |      |
| 1993 03 21 | 809 | 0.3− | 1.0+ | 1998 02 06 | 809 | 0.5+        | 0.0  |            |     |             |      |

**1993 FR<sub>26</sub> = 1953 TW = 1977 DX<sub>10</sub> = 1979 QX<sub>8</sub> = 1979 SV<sub>5</sub>**= 1982 DL<sub>2</sub> = 1984 RM = 1998 DL<sub>11</sub>

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            |          |           | Williams    |      |             |   |
|----------|------------|----------|-----------|-------------|------|-------------|---|
| <i>M</i> | 217.21717  |          | (2000.0)  | <b>P</b>    |      | <b>Q</b>    |   |
| <i>n</i> | 0.18810326 | <i>ω</i> | 316.70303 | +0.60928202 |      | +0.79252187 |   |
| <i>a</i> | 3.0167443  | <i>Ω</i> | 350.72868 | −0.67601146 |      | +0.50189857 |   |
| <i>e</i> | 0.0815305  | <i>i</i> | 9.34577   | −0.41446824 |      | +0.34642014 |   |
| <i>P</i> | 5.24       | <i>H</i> | 12.0      | <i>G</i>    | 0.15 | <i>U</i>    | 2 |

Residuals in seconds of arc

|            |     |             |      |            |     |      |      |            |     |      |      |
|------------|-----|-------------|------|------------|-----|------|------|------------|-----|------|------|
| 1953 10 07 | 760 | 1.4−        | 0.5+ | 1993 03 22 | 809 | 0.1+ | 0.2+ | 1998 03 02 | 327 | 0.0  | 0.2+ |
| 1953 10 07 | 760 | 1.6−        | 0.9+ | 1993 03 26 | 809 | 0.7− | 0.4+ | 1998 03 02 | 327 | 0.0  | 0.3+ |
| 1977 02 19 | 381 | 1.1+        | 0.2+ | 1998 02 22 | 566 | 0.3− | 0.6+ | 1998 03 02 | 327 | 0.1− | 0.3+ |
| 1977 02 19 | 381 | 0.4+        | 1.3− | 1998 02 22 | 566 | 0.0  | 0.6+ | 1998 03 05 | 327 | 0.0  | 0.3+ |
| 1979 08 20 | 095 | 0.1+        | 0.6− | 1998 02 22 | 566 | 0.1+ | 0.6+ | 1998 03 05 | 327 | 0.2− | 0.3+ |
| 1979 09 23 | 095 | 0.8−        | 0.3− | 1998 02 23 | 327 | 0.1− | 0.5+ | 1998 03 05 | 327 | 0.2− | 0.3+ |
| 1982 02 21 | 046 | (2.6+ 5.4−) |      | 1998 02 23 | 327 | 0.1+ | 0.6+ | 1998 03 08 | 327 | 0.1+ | 0.4+ |
| 1982 02 21 | 046 | 2.0+        | 2.1− | 1998 02 23 | 327 | 0.3+ | 0.5+ | 1998 03 08 | 327 | 0.1− | 0.6+ |
| 1984 09 01 | 808 | 0.6+        | 1.2+ | 1998 02 25 | 566 | 0.3+ | 0.0  | 1998 03 08 | 327 | 0.2− | 0.6+ |
| 1984 09 01 | 808 | 0.5+        | 2.5+ | 1998 02 25 | 566 | 0.1− | 0.1+ |            |     |      |      |
| 1993 03 21 | 809 | 0.1+        | 0.1+ | 1998 02 25 | 566 | 0.1+ | 0.2+ |            |     |      |      |

**1993 GG<sub>1</sub> = 1998 DM<sub>20</sub>**

Id. T. Kobayashi, S. Nakano

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            |          |           | Williams    |      |             |   |
|----------|------------|----------|-----------|-------------|------|-------------|---|
| <i>M</i> | 288.35954  |          | (2000.0)  | <b>P</b>    |      | <b>Q</b>    |   |
| <i>n</i> | 0.17746329 | <i>ω</i> | 154.34406 | −0.72152237 |      | +0.68462253 |   |
| <i>a</i> | 3.1361515  | <i>Ω</i> | 69.26971  | −0.65278164 |      | −0.62281442 |   |
| <i>e</i> | 0.1004228  | <i>i</i> | 6.34923   | −0.23082808 |      | −0.37867424 |   |
| <i>P</i> | 5.55       | <i>H</i> | 12.5      | <i>G</i>    | 0.15 | <i>U</i>    | 6 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1993 04 15 | 675 | 0.3− | 0.4− | 1998 03 01 | 897 | 1.3+ | 0.2+ | 1998 03 02 | 327 | 0.2− | 0.1+ |
| 1993 04 15 | 675 | 0.0  | 0.2− | 1998 03 01 | 557 | 0.2− | 0.4+ | 1998 03 02 | 327 | 0.1+ | 0.0  |
| 1993 04 16 | 675 | 0.3+ | 0.9− | 1998 03 01 | 897 | 0.6− | 0.7+ | 1998 03 02 | 327 | 0.2− | 0.0  |
| 1993 04 16 | 675 | 0.1− | 0.4+ | 1998 03 01 | 557 | 0.1− | 0.1+ | 1998 03 02 | 327 | 0.3− | 0.1− |
| 1993 04 19 | 675 | 0.3+ | 0.3+ | 1998 03 01 | 557 | 0.2+ | 0.3+ | 1998 03 04 | 557 | 0.1+ | 0.2− |
| 1993 04 19 | 675 | 0.2− | 0.7+ | 1998 03 01 | 557 | 0.2− | 0.2+ | 1998 03 04 | 557 | 0.0  | 0.2− |
| 1998 02 23 | 411 | 0.2− | 0.5− | 1998 03 01 | 046 | 0.1− | 0.2− | 1998 03 04 | 557 | 0.1− | 0.3− |
| 1998 02 23 | 411 | 0.7− | 0.3− | 1998 03 01 | 327 | 0.1+ | 0.0  | 1998 03 04 | 557 | 0.6− | 0.2− |
| 1998 02 23 | 411 | 0.1− | 0.4+ | 1998 03 01 | 327 | 0.2+ | 0.2− | 1998 03 05 | 327 | 0.4− | 0.3− |
| 1998 03 01 | 411 | 1.8+ | 0.5− | 1998 03 01 | 327 | 0.1+ | 0.1− | 1998 03 05 | 327 | 0.4− | 0.2− |
| 1998 03 01 | 411 | 0.1+ | 0.0  | 1998 03 01 | 046 | 0.1− | 0.1+ | 1998 03 05 | 327 | 0.3− | 0.1− |
| 1998 03 01 | 411 | 0.0  | 0.3+ | 1998 03 02 | 561 | 0.6+ | 0.4+ | 1998 03 06 | 557 | 0.4− | 0.2− |
| 1998 03 01 | 897 | 0.5− | 0.2+ | 1998 03 02 | 561 | 0.2+ | 0.3+ | 1998 03 06 | 557 | 0.4− | 0.3− |
| 1998 03 01 | 897 | 1.1+ | 0.4+ | 1998 03 02 | 561 | 0.4+ | 0.3+ | 1998 03 06 | 557 | 0.2− | 0.4− |
| 1998 03 01 | 046 | 0.2− | 0.3− | 1998 03 02 | 327 | 0.2− | 0.0  | 1998 03 06 | 557 | 0.4− | 0.2− |
| 1998 03 01 | 046 | 0.5+ | 0.4+ | 1998 03 02 | 327 | 0.1+ | 0.2+ |            |     |      |      |

**1993 MR = 1997 GH<sub>38</sub>**

Id. G. V. Williams, A. Gnädig

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Gnädig

| <i>M</i> | 359.17342  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.22549816 | $\omega$ | 76.31679  | +0.14530259   | +0.98857854 |
| <i>a</i> | 2.6732570  | $\Omega$ | 202.15769 | −0.94379426   | +0.12636337 |
| <i>e</i> | 0.2534513  | <i>i</i> | 6.08735   | −0.29688308   | +0.08212659 |
| <i>P</i> | 4.37       | <i>H</i> | 16.0      | <i>G</i> 0.15 | <i>U</i> 5  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1993 06 26 | 595 | 0.1+ | 0.1+ | 1993 06 29 | 595 | 1.5+ | 0.7+ | 1993 07 12 | 595 | 0.0  | 0.5+ |
| 1993 06 26 | 595 | 1.7− | 0.5+ | 1993 06 29 | 595 | 2.9+ | 0.3+ | 1997 04 15 | 816 | 0.2− | 0.7+ |
| 1993 06 26 | 595 | 0.1+ | 0.2− | 1993 07 07 | 595 | 0.4− | 0.1− | 1997 04 15 | 816 | 0.4+ | 0.5+ |
| 1993 06 28 | 589 | 1.0− | 0.5− | 1993 07 07 | 595 | 0.0  | 0.2− | 1997 04 15 | 816 | 0.1+ | 0.2+ |
| 1993 06 28 | 589 | 0.5− | 0.4− | 1993 07 07 | 595 | 0.0  | 0.2− | 1997 04 15 | 816 | 0.2+ | 0.3+ |
| 1993 06 28 | 595 | 0.3− | 0.3+ | 1993 07 08 | 595 | 0.6+ | 1.1+ | 1997 04 16 | 816 | 0.8− | 3.3− |
| 1993 06 28 | 589 | 0.6− | 0.6− | 1993 07 09 | 595 | 1.0− | 1.5− | 1997 04 16 | 816 | 1.2− | 1.2+ |
| 1993 06 28 | 589 | 0.1− | 0.0  | 1993 07 12 | 595 | 0.4+ | 0.2+ | 1997 04 16 | 816 | 1.5+ | 0.4+ |

**1993 QB<sub>3</sub> = 1998 CX<sub>3</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Marsden

| <i>M</i> | 66.36118   |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.29580581 | $\omega$ | 250.29317 | +0.76687758   | −0.61337606 |
| <i>a</i> | 2.2308220  | $\Omega$ | 146.72509 | +0.63716162   | +0.76292252 |
| <i>e</i> | 0.2991365  | <i>i</i> | 20.13449  | −0.07696653   | +0.20425241 |
| <i>P</i> | 3.33       | <i>H</i> | 14.0      | <i>G</i> 0.15 | <i>U</i> 5  |

Residuals in seconds of arc

|            |     |       |       |            |     |       |       |            |     |      |      |
|------------|-----|-------|-------|------------|-----|-------|-------|------------|-----|------|------|
| 1993 08 11 | 894 | 0.9+  | 1.5+  | 1993 09 13 | 675 | (4.3− | 1.7+) | 1998 02 06 | 809 | 0.4− | 0.9+ |
| 1993 08 11 | 894 | (4.8+ | 0.8−) | 1993 09 15 | 675 | 0.6+  | 0.3−  | 1998 02 06 | 809 | 1.6− | 0.5+ |
| 1993 08 20 | 675 | (3.0+ | 0.3−) | 1993 09 15 | 675 | 2.3−  | 0.2−  | 1998 02 07 | 809 | 0.9+ | 1.2− |
| 1993 08 20 | 675 | 0.8−  | 2.2−  | 1993 09 15 | 675 | 0.3+  | 0.2−  | 1998 02 07 | 809 | 0.6+ | 0.4− |
| 1993 08 23 | 675 | (4.3− | 2.2−) | 1993 09 15 | 675 | (1.9+ | 2.4+) | 1998 02 07 | 809 | 1.0+ | 1.9− |
| 1993 08 23 | 675 | (1.3− | 3.8−) | 1993 09 16 | 675 | 1.1+  | 0.9−  |            |     |      |      |
| 1993 09 13 | 675 | 0.1+  | 2.0+  | 1998 02 06 | 809 | 0.4−  | 1.7+  |            |     |      |      |

**1993 QE<sub>3</sub> = 1998 DO<sub>26</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 135.50931  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.31386514 | $\omega$ | 197.28647 | +0.92180938   | +0.38599467 |
| <i>a</i> | 2.1444076  | $\Omega$ | 139.94919 | −0.34877329   | +0.86606141 |
| <i>e</i> | 0.2380180  | <i>i</i> | 3.18181   | −0.16918823   | +0.31771961 |
| <i>P</i> | 3.14       | <i>H</i> | 17.0      | <i>G</i> 0.15 | <i>U</i> 5  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1993 08 13 | 675 | 1.0− | 0.8− | 1993 08 20 | 809 | 0.6− | 0.9− | 1998 02 24 | 691 | 0.0  | 0.2+ |
| 1993 08 13 | 675 | 0.4− | 1.3− | 1993 08 20 | 809 | 0.7− | 0.6− | 1998 02 24 | 691 | 0.1+ | 0.2+ |
| 1993 08 18 | 010 | 1.3+ | 1.2+ | 1993 08 24 | 809 | 0.4− | 0.5+ | 1998 02 24 | 691 | 0.4+ | 0.2− |
| 1993 08 19 | 010 | 1.3+ | 1.8+ | 1993 08 24 | 809 | 1.0− | 0.0  | 1998 03 02 | 691 | 0.2− | 0.1+ |
| 1993 08 19 | 010 | 1.6+ | 0.9+ | 1993 08 24 | 809 | 0.6− | 0.3− | 1998 03 02 | 691 | 0.0  | 0.1− |
| 1993 08 19 | 010 | 1.4+ | 0.6+ | 1993 09 21 | 675 | 1.1+ | 0.2− | 1998 03 02 | 691 | 0.3− | 0.1− |
| 1993 08 20 | 809 | 0.9− | 0.9− | 1993 09 21 | 675 | 0.9− | 0.1− |            |     |      |      |

**1993 TS<sub>11</sub> = 1998 BA<sub>19</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 62.49525   |          | (2000.0) | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|----------|---------------|-------------|
| <i>n</i> | 0.28447326 | $\omega$ | 31.88320 | +0.76617407   | −0.64245114 |
| <i>a</i> | 2.2896815  | $\Omega$ | 8.14421  | +0.56460132   | +0.66158635 |
| <i>e</i> | 0.1110995  | <i>i</i> | 6.19652  | +0.30692448   | +0.38672993 |
| <i>P</i> | 3.46       | <i>H</i> | 14.0     | <i>G</i> 0.15 | <i>U</i> 5  |

Residuals in seconds of arc

|            |     |       |       |            |     |       |       |            |     |      |      |
|------------|-----|-------|-------|------------|-----|-------|-------|------------|-----|------|------|
| 1993 10 11 | 400 | 1.8+  | 0.4+  | 1993 10 15 | 691 | 0.4−  | 0.3+  | 1998 02 04 | 587 | 0.6+ | 0.4− |
| 1993 10 11 | 400 | (3.3+ | 0.8−) | 1993 10 15 | 691 | 0.2+  | 0.5+  | 1998 02 04 | 587 | 0.3+ | 0.0  |
| 1993 10 12 | 400 | (2.5+ | 0.0)  | 1993 10 19 | 400 | (2.9+ | 0.7+) | 1998 02 14 | 587 | 0.1+ | 0.0  |
| 1993 10 12 | 400 | (0.5+ | 2.5−) | 1993 10 19 | 400 | (2.6+ | 1.3−) | 1998 02 14 | 587 | 0.2− | 0.1+ |

|            |     |       |       |            |     |       |       |            |     |      |      |
|------------|-----|-------|-------|------------|-----|-------|-------|------------|-----|------|------|
| 1993 10 13 | 675 | 0.7−  | 1.5−  | 1997 12 26 | 566 | 0.1+  | 0.2−  | 1998 02 14 | 587 | 0.0  | 0.1+ |
| 1993 10 13 | 675 | (0.9+ | 3.0−) | 1997 12 26 | 566 | 0.1+  | 0.1+  | 1998 02 26 | 098 | 0.5+ | 0.5− |
| 1993 10 15 | 691 | 0.5−  | 0.2+  | 1997 12 26 | 566 | 0.1+  | 0.2+  | 1998 02 26 | 098 | 0.2− | 0.7− |
| 1993 10 15 | 691 | 0.4−  | 0.2+  | 1998 01 27 | 587 | (2.3+ | 1.0+) | 1998 02 27 | 098 | 0.0  | 0.3+ |
| 1993 10 15 | 691 | 0.2−  | 0.3+  | 1998 01 27 | 587 | 0.5−  | 0.2+  | 1998 02 27 | 098 | 1.0− | 0.2− |
| 1993 10 15 | 675 | 0.6+  | 0.7−  | 1998 01 28 | 587 | 0.1+  | 0.3+  |            |     |      |      |
| 1993 10 15 | 691 | 0.3−  | 0.2+  | 1998 01 28 | 587 | 0.1+  | 0.3+  |            |     |      |      |

**1993 UQ<sub>5</sub> = 1998 BG<sub>44</sub>**

Id. G. Forti

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 57.08602   |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.28182018 | $\omega$ | 335.71787 | +0.70089970   | −0.70465127 |
| <i>a</i> | 2.3040293  | $\Omega$ | 69.56660  | +0.67217534   | +0.60074344 |
| <i>e</i> | 0.1167147  | <i>i</i> | 6.77093   | +0.23857896   | +0.37758962 |
| <i>P</i> | 3.50       | <i>H</i> | 15.0      | <i>G</i> 0.15 | <i>U</i> 4  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1993 10 10 | 809 | 2.0+ | 0.2+ | 1997 12 26 | 566 | 0.6+ | 0.9− | 1998 01 26 | 098 | 0.6+ | 0.3+ |
| 1993 10 10 | 809 | 1.1− | 0.5+ | 1997 12 26 | 566 | 0.0  | 0.2− | 1998 02 02 | 098 | 1.6− | 0.7− |
| 1993 10 10 | 809 | 0.6− | 0.4− | 1997 12 26 | 566 | 0.5+ | 0.3− | 1998 02 02 | 098 | 1.5− | 1.7− |
| 1993 10 20 | 809 | 0.2+ | 1.0+ | 1998 01 25 | 098 | 0.6− | 1.5+ | 1998 02 26 | 098 | 1.3+ | 0.9+ |
| 1993 10 20 | 809 | 0.9+ | 0.9+ | 1998 01 25 | 098 | 1.3+ | 0.2+ | 1998 02 26 | 098 | 1.0− | 0.1+ |
| 1993 10 20 | 809 | 0.1+ | 0.7+ | 1998 01 26 | 566 | 0.1− | 0.3+ | 1998 02 27 | 098 | 1.5+ | 0.9+ |
| 1993 10 21 | 809 | 0.3− | 0.6− | 1998 01 26 | 566 | 0.2− | 0.1+ | 1998 02 27 | 098 | 0.7− | 0.9− |
| 1993 10 21 | 809 | 0.8− | 1.1− | 1998 01 26 | 566 | 0.3+ | 0.3+ |            |     |      |      |
| 1993 10 21 | 809 | 0.5− | 0.9− | 1998 01 26 | 098 | 0.2− | 0.1+ |            |     |      |      |

**1993 WB**

Id. A. Vagnozzi (1998 observations)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 19.92182   |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.27684761 | $\omega$ | 123.13722 | −0.19134427   | −0.98145627 |
| <i>a</i> | 2.3315364  | $\Omega$ | 337.88552 | +0.89010188   | −0.16859679 |
| <i>e</i> | 0.1829157  | <i>i</i> | 1.74193   | +0.41364962   | −0.09120693 |
| <i>P</i> | 3.56       | <i>H</i> | 14.5      | <i>G</i> 0.15 | <i>U</i> 5  |

Residuals in seconds of arc

|            |     |      |      |            |     |       |       |            |     |       |       |
|------------|-----|------|------|------------|-----|-------|-------|------------|-----|-------|-------|
| 1993 11 11 | 399 | 0.1− | 1.0+ | 1993 11 22 | 596 | 0.4+  | 1.9−  | 1993 12 12 | 596 | 1.2−  | 1.5+  |
| 1993 11 11 | 399 | 1.3− | 0.2+ | 1993 11 22 | 596 | 1.3+  | 0.1+  | 1998 02 06 | 809 | 0.1−  | 1.0+  |
| 1993 11 16 | 399 | 1.0− | 0.1− | 1993 11 22 | 596 | 0.5+  | 0.8−  | 1998 02 06 | 809 | 0.2−  | 1.1+  |
| 1993 11 16 | 399 | 1.6− | 1.1+ | 1993 11 22 | 596 | 1.2+  | 0.0   | 1998 02 06 | 809 | 0.8−  | 0.9+  |
| 1993 11 16 | 596 | 1.1− | 0.2− | 1993 11 23 | 596 | (0.8+ | 2.2−) | 1998 02 06 | 596 | 1.0+  | 0.4−  |
| 1993 11 16 | 596 | 0.2− | 0.1+ | 1993 11 23 | 596 | 0.1+  | 1.6−  | 1998 02 06 | 596 | 1.4−  | 0.7−  |
| 1993 11 16 | 596 | 0.3− | 0.0  | 1993 11 24 | 596 | 0.8+  | 0.4+  | 1998 02 07 | 809 | (0.1− | 2.8+) |
| 1993 11 17 | 596 | 0.2+ | 1.8+ | 1993 11 24 | 596 | 0.7+  | 1.1−  | 1998 02 07 | 809 | (0.9− | 2.6+) |
| 1993 11 17 | 596 | 0.5+ | 0.3+ | 1993 11 24 | 596 | 1.0+  | 1.4−  | 1998 02 07 | 809 | (0.2+ | 2.7+) |
| 1993 11 17 | 596 | 0.5+ | 1.2− | 1993 12 03 | 596 | (0.1+ | 2.1−) | 1998 02 08 | 596 | 1.5+  | 0.7−  |
| 1993 11 19 | 595 | 0.3− | 0.8+ | 1993 12 03 | 596 | 0.1+  | 1.2−  | 1998 02 08 | 596 | 0.6+  | 0.3−  |
| 1993 11 19 | 595 | 0.4− | 0.9+ | 1993 12 03 | 596 | 1.1−  | 0.9+  | 1998 02 08 | 596 | 0.8+  | 0.1−  |
| 1993 11 20 | 596 | 0.4+ | 0.8+ | 1993 12 04 | 596 | 1.3−  | 1.0+  | 1998 03 03 | 596 | 0.5−  | 0.5−  |
| 1993 11 20 | 596 | 1.2− | 0.4+ | 1993 12 04 | 596 | 0.1−  | 0.7−  | 1998 03 03 | 596 | 0.9−  | 0.3−  |
| 1993 11 20 | 596 | 0.8+ | 0.4− | 1993 12 04 | 596 | 1.0+  | 0.5−  | 1998 03 03 | 596 | (0.8− | 2.5−) |
| 1993 11 20 | 596 | 1.2+ | 0.0  | 1993 12 12 | 596 | 0.4+  | 0.2−  |            |     |       |       |

**1993 YK = 1994 AF<sub>1</sub>**Id. G. V. Williams (d, *MPC* 23110), T. Kobayashi (1998 observations)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Nakano

| <i>M</i> | 7.33305    |          | (2000.0) | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|----------|---------------|-------------|
| <i>n</i> | 0.25443958 | $\omega$ | 15.59938 | −0.26653521   | −0.95323335 |
| <i>a</i> | 2.4664914  | $\Omega$ | 90.02200 | +0.86835093   | −0.30164937 |
| <i>e</i> | 0.2043019  | <i>i</i> | 8.19231  | +0.41824113   | +0.01881035 |
| <i>P</i> | 3.87       | <i>H</i> | 14.2     | <i>G</i> 0.15 | <i>U</i> 4  |

## Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1993 12 17 | 411 | 0.1+ | 0.3- | 1994 01 07 | 411 | 0.8- | 1.8- | 1994 01 19 | 411 | 0.4- | 0.1+ |
| 1993 12 17 | 411 | 0.2- | 0.3- | 1994 01 07 | 411 | 0.8+ | 0.3+ | 1994 01 19 | 411 | 0.2- | 0.2+ |
| 1993 12 18 | 411 | 0.1+ | 0.1- | 1994 01 07 | 411 | 0.6+ | 0.0  | 1994 01 19 | 411 | 0.4- | 0.8+ |
| 1993 12 18 | 411 | 0.1- | 0.0  | 1994 01 09 | 675 | 1.1- | 1.9- | 1994 02 01 | 411 | 0.3- | 1.8+ |
| 1993 12 18 | 411 | 0.2- | 0.3- | 1994 01 09 | 675 | 0.4+ | 0.0  | 1994 02 01 | 411 | 0.3- | 1.5+ |
| 1993 12 23 | 411 | 0.6+ | 1.0+ | 1994 01 09 | 411 | 0.6+ | 0.4- | 1994 02 01 | 411 | 0.5- | 1.0- |
| 1993 12 23 | 411 | 0.4- | 0.5+ | 1994 01 09 | 411 | 0.8+ | 0.2- | 1998 03 01 | 411 | 0.3- | 0.4- |
| 1993 12 23 | 411 | 0.3+ | 0.5+ | 1994 01 09 | 411 | 0.6+ | 1.1+ | 1998 03 01 | 411 | 0.2- | 0.1+ |
| 1994 01 04 | 411 | 0.1- | 0.6+ | 1994 01 14 | 411 | 0.2+ | 0.3+ | 1998 03 02 | 411 | 0.0  | 0.4- |
| 1994 01 04 | 411 | 0.5- | 0.9- | 1994 01 14 | 411 | 0.1- | 0.0  | 1998 03 02 | 411 | 0.4+ | 0.0  |
| 1994 01 04 | 411 | 0.1- | 0.0  | 1994 01 14 | 411 | 0.2+ | 0.5- |            |     |      |      |

1993 YN<sub>2</sub>

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            |                    | Williams      |             |  |  |
|----------|------------|--------------------|---------------|-------------|--|--|
| <i>M</i> | 23.30807   | (2000.0)           | <b>P</b>      | <b>Q</b>    |  |  |
| <i>n</i> | 0.26837654 | $\omega$ 203.12972 | -0.13016492   | -0.99035158 |  |  |
| <i>a</i> | 2.3803438  | $\Omega$ 254.37606 | +0.91721699   | -0.10206377 |  |  |
| <i>e</i> | 0.1731590  | <i>i</i> 2.82999   | +0.37652368   | -0.09373755 |  |  |
| <i>P</i> | 3.67       | <i>H</i> 15.5      | <i>G</i> 0.15 | <i>U</i> 3  |  |  |

## Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| 1993 12 18 | 587 | 0.5+  | 0.3+  | 1994 02 09 | 587 | 1.0+ | 0.0  | 1998 02 27 | 587 | 0.4+ | 0.1+ |
| 1993 12 19 | 587 | 0.8+  | 0.6+  | 1994 02 09 | 587 | 0.1+ | 0.7+ | 1998 02 27 | 587 | 0.2- | 0.3- |
| 1993 12 22 | 587 | (3.4+ | 3.0+) | 1994 03 04 | 587 | 0.4- | 0.2+ | 1998 02 27 | 587 | 0.0  | 0.3+ |
| 1993 12 22 | 587 | 0.8-  | 0.3-  | 1998 01 26 | 566 | 0.4+ | 0.3+ | 1998 03 01 | 587 | 0.1- | 0.2+ |
| 1994 01 13 | 587 | 0.3+  | 0.2+  | 1998 01 26 | 566 | 0.1+ | 0.5+ | 1998 03 01 | 587 | 0.2+ | 0.2+ |
| 1994 01 13 | 587 | 1.3-  | 0.1-  | 1998 01 26 | 566 | 0.0  | 0.4+ | 1998 03 02 | 587 | 0.2- | 0.1+ |
| 1994 01 29 | 587 | 0.3-  | 0.9-  | 1998 02 27 | 566 | 0.1- | 0.5- | 1998 03 02 | 587 | 0.2- | 0.4+ |
| 1994 01 29 | 587 | (1.0+ | 3.0-) | 1998 02 27 | 566 | 0.1+ | 0.6- | 1998 03 02 | 587 | 0.5- | 0.2- |
| 1994 01 29 | 587 | 0.2+  | 1.4-  | 1998 02 27 | 566 | 0.5+ | 0.3- |            |     |      |      |
| 1994 01 29 | 587 | (1.4- | 2.3-) | 1998 02 27 | 587 | 0.1- | 0.1- |            |     |      |      |

1994 AS<sub>2</sub> = 1998 BC<sub>45</sub>

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            |                    | Williams      |             |  |  |
|----------|------------|--------------------|---------------|-------------|--|--|
| <i>M</i> | 78.31813   | (2000.0)           | <b>P</b>      | <b>Q</b>    |  |  |
| <i>n</i> | 0.26024234 | $\omega$ 35.60008  | +0.86050840   | -0.50942851 |  |  |
| <i>a</i> | 2.4296894  | $\Omega$ 355.02322 | +0.45957771   | +0.77865860 |  |  |
| <i>e</i> | 0.2123132  | <i>i</i> 1.85627   | +0.21980360   | +0.36629685 |  |  |
| <i>P</i> | 3.79       | <i>H</i> 14.5      | <i>G</i> 0.15 | <i>U</i> 5  |  |  |

## Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1994 01 14 | 411 | 0.4+ | 0.3+ | 1994 01 19 | 691 | 0.6- | 0.2+ | 1994 02 07 | 411 | 0.6- | 0.3- |
| 1994 01 14 | 411 | 0.6+ | 0.4+ | 1994 01 19 | 691 | 0.6- | 0.4+ | 1998 01 22 | 691 | 0.2- | 0.4- |
| 1994 01 14 | 411 | 0.3+ | 1.0- | 1994 01 19 | 411 | 0.9+ | 0.5+ | 1998 01 22 | 691 | 0.4- | 0.3- |
| 1994 01 15 | 411 | 0.8+ | 0.0  | 1994 01 19 | 411 | 0.4+ | 0.3- | 1998 01 22 | 691 | 0.5- | 0.3- |
| 1994 01 15 | 411 | 1.2- | 0.2- | 1994 01 19 | 411 | 0.2+ | 0.3+ | 1998 01 28 | 566 | 0.4+ | 0.4+ |
| 1994 01 15 | 411 | 0.2+ | 0.4+ | 1994 01 23 | 411 | 0.1+ | 0.5- | 1998 01 28 | 566 | 0.6+ | 0.5+ |
| 1994 01 18 | 411 | 0.8- | 0.1- | 1994 01 23 | 411 | 1.1+ | 0.2- | 1998 01 28 | 566 | 0.2+ | 0.4+ |
| 1994 01 18 | 411 | 1.4- | 1.4- | 1994 01 23 | 411 | 0.2+ | 0.3- | 1998 02 24 | 566 | 0.2- | 0.2+ |
| 1994 01 18 | 411 | 1.6+ | 1.0+ | 1994 02 07 | 411 | 0.4- | 0.6- | 1998 02 24 | 566 | 0.0  | 0.2- |
| 1994 01 19 | 691 | 1.9- | 0.4+ | 1994 02 07 | 411 | 0.8+ | 1.1+ | 1998 02 24 | 566 | 0.1- | 0.3- |

1994 AD<sub>3</sub>

Id. M. Cavagna (1995 observations)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            |                    | Williams      |             |  |  |
|----------|------------|--------------------|---------------|-------------|--|--|
| <i>M</i> | 49.67913   | (2000.0)           | <b>P</b>      | <b>Q</b>    |  |  |
| <i>n</i> | 0.27205517 | $\omega$ 312.83816 | +0.42373276   | -0.90367961 |  |  |
| <i>a</i> | 2.3588377  | $\Omega$ 111.99583 | +0.84926155   | +0.37265759 |  |  |
| <i>e</i> | 0.2197301  | <i>i</i> 3.81891   | +0.31496884   | +0.21092528 |  |  |
| <i>P</i> | 3.62       | <i>H</i> 15.5      | <i>G</i> 0.15 | <i>U</i> 3  |  |  |

## Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1994 01 13 | 587 | 0.9- | 0.2+ | 1994 01 29 | 587 | 0.4- | 0.2- | 1995 05 21 | 587 | 0.5- | 0.6- |
| 1994 01 13 | 587 | 0.4+ | 0.1- | 1994 02 05 | 658 | 0.3+ | 0.0  | 1995 05 21 | 587 | 0.3- | 1.2- |

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1994 01 14 | 587 | 0.8+ | 0.6+ | 1994 02 05 | 658 | 0.1+ | 0.2+ | 1995 05 21 | 587 | 0.2- | 0.4- |
| 1994 01 15 | 587 | 0.3+ | 1.6- | 1994 02 05 | 658 | 0.2+ | 0.1+ | 1995 05 29 | 587 | 0.4- | 0.6+ |
| 1994 01 16 | 587 | 1.0- | 0.9- | 1994 02 05 | 658 | 0.3- | 0.9+ | 1995 05 29 | 587 | 0.8+ | 0.1- |
| 1994 01 16 | 587 | 0.1- | 1.0+ | 1994 02 08 | 658 | 0.1- | 0.1+ | 1998 02 19 | 587 | 0.4+ | 0.5+ |
| 1994 01 16 | 587 | 1.8- | 0.7- | 1994 02 08 | 658 | 0.5+ | 0.1+ | 1998 02 19 | 587 | 0.2+ | 0.4+ |
| 1994 01 18 | 587 | 0.1+ | 1.0- | 1994 02 08 | 658 | 0.4- | 0.2+ | 1998 02 19 | 587 | 0.1- | 0.0  |
| 1994 01 18 | 587 | 0.4- | 0.4- | 1994 02 09 | 587 | 1.2- | 0.4- | 1998 02 25 | 587 | 0.2- | 0.3+ |
| 1994 01 18 | 589 | 0.4+ | 1.0+ | 1994 02 09 | 587 | 0.1+ | 0.3- | 1998 02 25 | 587 | 0.3+ | 0.4+ |
| 1994 01 18 | 589 | 0.4+ | 0.4+ | 1994 03 03 | 587 | 0.2- | 0.3+ |            |     |      |      |
| 1994 01 29 | 587 | 1.0+ | 0.3- | 1994 03 03 | 587 | 0.4+ | 1.2- |            |     |      |      |

1994 CG<sub>2</sub> = 1991 RG<sub>36</sub> = 1998 BF<sub>47</sub>

Id. G. V. Williams, T. B. Spahr, E. Bowell

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            |                    | Williams      |             | Nakano |  |
|----------|------------|--------------------|---------------|-------------|--------|--|
| <i>M</i> | 232.86647  | (2000.0)           | <b>P</b>      | <b>Q</b>    |        |  |
| <i>n</i> | 0.23308870 | $\omega$ 268.94137 | -0.00925282   | +0.99995421 |        |  |
| <i>a</i> | 2.6149009  | $\Omega$ 0.54668   | -0.78508726   | -0.00575192 |        |  |
| <i>e</i> | 0.1204975  | <i>i</i> 14.83079  | -0.61931606   | -0.00764818 |        |  |
| <i>P</i> | 4.23       | <i>H</i> 13.4      | <i>G</i> 0.15 | <i>U</i> 3  |        |  |

## Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| 1991 09 14 | 675 | 0.2-  | 0.0   | 1994 02 13 | 411 | 0.2+ | 0.3+ | 1998 01 26 | 566 | 0.3+ | 0.2- |
| 1991 09 14 | 675 | 0.1-  | 0.4+  | 1994 02 13 | 411 | 1.5+ | 0.3- | 1998 01 26 | 566 | 0.6+ | 0.4- |
| 1994 02 08 | 809 | 1.3+  | 1.3-  | 1994 02 15 | 691 | 1.0- | 0.3+ | 1998 02 19 | 699 | 1.1- | 1.1+ |
| 1994 02 08 | 809 | 1.0-  | 0.9-  | 1994 02 15 | 691 | 1.0- | 0.4+ | 1998 02 19 | 699 | 0.8- | 0.8+ |
| 1994 02 08 | 809 | 0.1+  | 1.5-  | 1994 02 15 | 691 | 1.1- | 0.4+ | 1998 02 19 | 699 | 0.3+ | 0.4- |
| 1994 02 10 | 809 | 1.8+  | 1.1-  | 1994 02 17 | 411 | 0.2+ | 0.6+ | 1998 02 27 | 566 | 0.1- | 0.1+ |
| 1994 02 10 | 809 | 0.6+  | 0.8-  | 1994 02 17 | 411 | 0.4+ | 0.6+ | 1998 02 27 | 566 | 0.2+ | 0.1+ |
| 1994 02 10 | 809 | 0.5+  | 1.0-  | 1994 02 17 | 411 | 0.3+ | 0.7- | 1998 02 27 | 566 | 0.1- | 0.1+ |
| 1994 02 12 | 411 | 0.3-  | 0.8+  | 1994 03 04 | 411 | 0.1- | 0.3- | 1998 03 01 | 411 | 0.3+ | 0.0  |
| 1994 02 12 | 411 | 0.2-  | 0.6+  | 1994 03 04 | 411 | 0.7- | 0.4- | 1998 03 01 | 411 | 0.4+ | 0.0  |
| 1994 02 13 | 809 | 0.3-  | 2.0+  | 1994 03 04 | 411 | 0.6- | 0.4- | 1998 03 02 | 411 | 0.5- | 0.5- |
| 1994 02 13 | 809 | 1.8-  | 1.5+  | 1994 03 15 | 411 | 0.1+ | 0.9+ | 1998 03 02 | 411 | 0.3- | 0.3- |
| 1994 02 13 | 809 | (2.5- | 2.1+) | 1994 03 15 | 411 | 0.5+ | 0.2+ |            |     |      |      |
| 1994 02 13 | 411 | 1.0+  | 0.3+  | 1998 01 26 | 566 | 0.9+ | 0.4- |            |     |      |      |

1994 CD<sub>9</sub> = 1989 TE<sub>11</sub> = 1989 UG<sub>8</sub> = 1998 EQ<sub>3</sub>

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            |                   | Williams      |             |  |  |
|----------|------------|-------------------|---------------|-------------|--|--|
| <i>M</i> | 71.87656   | (2000.0)          | <b>P</b>      | <b>Q</b>    |  |  |
| <i>n</i> | 0.27693111 | $\omega$ 59.67160 | +0.41698605   | -0.90787865 |  |  |
| <i>a</i> | 2.3310677  | $\Omega$ 6.17891  | +0.63223998   | +0.25546267 |  |  |
| <i>e</i> | 0.2422507  | <i>i</i> 23.74903 | +0.65298947   | +0.33240816 |  |  |
| <i>P</i> | 3.56       | <i>H</i> 14.0     | <i>G</i> 0.15 | <i>U</i> 4  |  |  |

## Residuals in seconds of arc

|            |           |       |      |            |     |      |      |            |     |      |      |
|------------|-----------|-------|------|------------|-----|------|------|------------|-----|------|------|
| 1989 10 05 | 327       | 1.5-  | 1.3+ | 1994 02 10 | 675 | 0.1+ | 1.1- | 1998 03 03 | 910 | 0.1+ | 0.2- |
| 1989 10 05 | 327       | 1.3+  | 0.0  | 1994 02 13 | 675 | 0.0  | 0.0  | 1998 03 03 | 910 | 0.1- | 0.0  |
| 1989 10 21 | 095       | 0.5+  | 1.6- | 1994 02 13 | 675 | 0.2- | 0.0  | 1998 03 03 | 910 | 0.4- | 0.0  |
| 1989 10 25 | 095 (5.3- | 6.6+) |      | 1994 02 15 | 675 | 0.1- | 1.0+ | 1998 03 03 | 910 | 0.0  | 0.0  |
| 1989 10 29 | 095 (0.5- | 5.8+) |      | 1994 02 15 | 675 | 0.4- | 0.6+ | 1998 03 04 | 910 | 0.2- | 0.0  |
| 1994 02 10 | 675       | 0.7+  | 0.4- | 1998 03 02 | 910 | 0.1+ | 0.1- |            |     |      |      |

1994 CF<sub>14</sub> = 1975 TE<sub>2</sub> = 1998 DY<sub>14</sub>

Id. G. V. Williams, T. B. Spahr

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| $M$ | 169.24513  |          | (2000.0)  | <b>P</b>    | <b>Q</b>    |
|-----|------------|----------|-----------|-------------|-------------|
| $n$ | 0.23863601 | $\omega$ | 317.49592 | +0.86285304 | +0.50386561 |
| $a$ | 2.5742185  | $\Omega$ | 12.43163  | -0.39917559 | +0.72789110 |
| $e$ | 0.1256510  | $i$      | 10.72214  | -0.31007012 | +0.46507419 |
| $P$ | 4.13       | $H$      | 13.5      | $G$ 0.15    | $U$ 4       |

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1994 02 08 | 809 | 0.8− | 0.5− | 1994 03 09 | 010 | 0.0  | 0.4+ | 1998 02 27 | 566 | 0.2+ | 0.3− |
| 1994 02 10 | 809 | 0.6− | 0.1+ | 1994 03 09 | 010 | 0.1− | 0.4+ | 1998 02 27 | 566 | 0.3− | 0.1− |
| 1994 02 10 | 809 | 1.1− | 1.2− | 1994 03 10 | 010 | 0.0  | 0.3+ | 1998 02 27 | 566 | 0.0  | 0.1+ |
| 1994 02 10 | 809 | 1.4− | 0.9− | 1994 03 10 | 010 | 0.3− | 0.2+ |            |     |      |      |
| 1994 02 13 | 809 | 2.4+ | 0.3+ | 1994 03 10 | 010 | 0.3+ | 0.1− |            |     |      |      |

**1994 ED = 1996 TV<sub>67</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| $M$ | 248.02734  |          | (2000.0)  | $\mathbf{P}$ | $\mathbf{Q}$ |
|-----|------------|----------|-----------|--------------|--------------|
| $n$ | 0.21779733 | $\omega$ | 109.93043 | −0.66448848  | +0.74698576  |
| $a$ | 2.7359050  | $\Omega$ | 118.40732 | −0.69449590  | −0.60659786  |
| $e$ | 0.0446879  | $i$      | 1.40831   | −0.27591757  | −0.27212370  |
| $P$ | 4.53       | $H$      | 13.5      | $G$ 0.15     | $U$ 5        |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1994 03 04 | 411 | 0.4+ | 0.2− | 1994 03 10 | 411 | 0.4− | 0.7− | 1996 10 11 | 566 | 0.0  | 0.1+ |
| 1994 03 04 | 411 | 0.2+ | 0.2− | 1994 03 10 | 411 | 0.5+ | 0.3+ | 1996 10 11 | 566 | 0.3− | 0.5+ |
| 1994 03 04 | 411 | 0.1− | 0.4− | 1994 03 10 | 411 | 1.5+ | 0.3− | 1996 10 11 | 566 | 0.3+ | 0.2− |
| 1994 03 06 | 411 | 0.9− | 0.1+ | 1994 03 15 | 411 | 0.3− | 0.5− | 1996 10 14 | 327 | 0.0  | 0.0  |
| 1994 03 06 | 411 | 0.1+ | 0.4+ | 1994 03 15 | 411 | 0.2− | 0.8+ | 1996 10 14 | 327 | 0.1− | 0.2− |
| 1994 03 06 | 411 | 0.7− | 1.1+ | 1994 03 15 | 411 | 0.1− | 0.3− | 1996 10 14 | 327 | 0.2+ | 0.1− |

**1994 PT<sub>32</sub> = 1997 EN<sub>59</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|     |            |          |           |             |             |
|-----|------------|----------|-----------|-------------|-------------|
| $M$ | 180.12807  |          | (2000.0)  | <b>P</b>    | <b>Q</b>    |
| $n$ | 0.19244692 | $\omega$ | 222.06525 | +0.72926321 | −0.68422252 |
| $a$ | 2.9711785  | $\Omega$ | 181.13119 | +0.66808785 | +0.71325474 |
| $e$ | 0.1082724  | $i$      | 11.20419  | +0.14776261 | +0.15201061 |
| $P$ | 5.12       | $H$      | 14.5      | $G$ 0.15    | $U$ 4       |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1994 08 12 | 809 | 1.5+ | 0.2− | 1994 09 05 | 809 | 0.3+ | 1.5+ | 1997 03 04 | 691 | 0.4+ | 0.0  |
| 1994 08 12 | 809 | 0.4+ | 0.6− | 1994 09 05 | 809 | 0.2+ | 0.5+ | 1997 03 04 | 691 | 0.4+ | 0.3+ |
| 1994 08 12 | 809 | 1.1− | 1.3− | 1994 09 05 | 809 | 0.9− | 0.3+ | 1997 03 07 | 691 | 0.2− | 0.6− |
| 1994 08 13 | 809 | 0.1− | 1.5+ | 1994 09 06 | 809 | 0.3+ | 0.5− | 1997 03 07 | 691 | 0.1− | 0.2+ |
| 1994 08 13 | 809 | 0.5− | 0.1+ | 1994 09 06 | 809 | 0.2+ | 0.8− | 1997 03 07 | 691 | 0.4− | 0.1+ |
| 1994 08 13 | 809 | 0.1− | 0.4+ | 1994 09 06 | 809 | 0.3− | 0.9− |            |     |      |      |

**1995 BN<sub>3</sub> = 1996 KH<sub>5</sub> = 1997 SG<sub>35</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| $M$ | 21.49069   |          | (2000.0)  | <b>P</b>    | <b>Q</b>    |
|-----|------------|----------|-----------|-------------|-------------|
| $n$ | 0.23184610 | $\omega$ | 273.25984 | +0.99735832 | +0.03306923 |
| $a$ | 2.6242358  | $\Omega$ | 84.85194  | −0.00426878 | +0.91550518 |
| $e$ | 0.1354700  | $i$      | 3.72321   | −0.07251318 | +0.40094475 |
| $P$ | 4.25       | $H$      | 14.0      | $G$ 0.15    | $U$ 3       |

Residuals in seconds of arc

|            |     |       |       |            |     |       |       |            |     |      |      |
|------------|-----|-------|-------|------------|-----|-------|-------|------------|-----|------|------|
| 1995 01 30 | 411 | (1.0+ | 3.0+) | 1995 03 01 | 411 | 0.4−  | 0.3+  | 1997 09 30 | 566 | 0.3− | 0.9− |
| 1995 01 30 | 411 | 0.5+  | 1.3+  | 1996 05 13 | 691 | 0.3−  | 0.6+  | 1997 09 30 | 566 | 0.5− | 1.0+ |
| 1995 02 01 | 411 | 0.3+  | 0.7+  | 1996 05 13 | 691 | 0.2−  | 0.6+  | 1997 10 01 | 422 | 0.2− | 0.2− |
| 1995 02 01 | 411 | 0.8+  | 1.4+  | 1996 05 13 | 691 | 0.5−  | 0.6+  | 1997 10 01 | 422 | 0.0  | 0.1− |
| 1995 02 06 | 411 | 0.2−  | 0.7−  | 1996 05 22 | 809 | (0.2− | 3.9+) | 1997 10 01 | 422 | 0.0  | 0.2− |
| 1995 02 06 | 411 | 0.8−  | 0.4+  | 1996 05 22 | 809 | (0.9− | 3.9+) | 1997 10 30 | 704 | 0.3− | 0.2+ |
| 1995 02 10 | 411 | 1.2−  | 0.1+  | 1996 05 22 | 809 | (0.6− | 3.4+) | 1997 10 30 | 704 | 1.1− | 1.4+ |
| 1995 02 10 | 411 | 0.9−  | 0.8+  | 1996 05 24 | 809 | 1.5+  | 0.1−  | 1997 10 30 | 704 | 0.9− | 1.9+ |
| 1995 02 19 | 411 | 0.7+  | 0.3+  | 1996 05 24 | 809 | 1.2+  | 0.1+  | 1997 11 30 | 566 | 1.0+ | 0.3− |
| 1995 02 19 | 411 | 0.2+  | 1.0−  | 1996 05 24 | 809 | 0.8−  | 0.4+  | 1997 11 30 | 566 | 0.6+ | 0.0  |
| 1995 03 01 | 411 | 1.7+  | 1.4−  | 1997 09 30 | 566 | 0.3+  | 0.1+  | 1997 11 30 | 566 | 0.5+ | 0.2+ |

**1995 GB = 1997 YQ<sub>20</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|     |            |          |           |             |             |
|-----|------------|----------|-----------|-------------|-------------|
| $M$ | 238.27581  |          | (2000.0)  | <b>P</b>    | <b>Q</b>    |
| $n$ | 0.26894729 | $\omega$ | 120.10331 | −0.48210503 | +0.87502147 |
| $a$ | 2.3769750  | $\Omega$ | 121.01054 | −0.82035511 | −0.43333840 |
| $e$ | 0.1712770  | $i$      | 2.92454   | −0.30755851 | −0.21576669 |
| $P$ | 3.66       | $H$      | 14.0      | $G$ 0.15    | $U$ 4       |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1995 04 01 | 411 | 0.5− | 1.3− | 1995 04 12 | 411 | 0.0  | 0.3− | 1995 05 18 | 411 | 1.1− | 0.4+ |
| 1995 04 01 | 411 | 0.6− | 0.9− | 1995 04 19 | 411 | 0.3+ | 0.1+ | 1997 12 27 | 566 | 0.3+ | 0.2− |
| 1995 04 02 | 411 | 0.8− | 0.1+ | 1995 04 19 | 411 | 0.9+ | 0.6+ | 1997 12 27 | 566 | 0.0  | 0.3− |
| 1995 04 02 | 411 | 0.9+ | 0.1− | 1995 04 23 | 691 | 0.7− | 0.3+ | 1997 12 27 | 566 | 0.1− | 0.7− |
| 1995 04 04 | 411 | 1.4+ | 0.3+ | 1995 04 23 | 691 | 0.4− | 0.6+ | 1998 01 02 | 704 | 0.2+ | 0.2+ |
| 1995 04 04 | 411 | 0.2+ | 0.1+ | 1995 04 23 | 691 | 0.8− | 0.7+ | 1998 01 02 | 704 | 0.3− | 0.0  |
| 1995 04 07 | 411 | 0.2+ | 0.3− | 1995 04 26 | 411 | 1.0+ | 0.4− | 1998 01 02 | 704 | 0.8+ | 0.0  |
| 1995 04 07 | 411 | 0.1+ | 0.3− | 1995 04 26 | 411 | 0.4+ | 0.2+ | 1998 01 02 | 704 | 0.1− | 0.1+ |
| 1995 04 12 | 411 | 0.9− | 0.4+ | 1995 05 18 | 411 | 0.3+ | 0.1− | 1998 01 02 | 704 | 0.9− | 1.0+ |
| 1995 04 12 | 411 | 0.6− | 0.6+ | 1995 05 18 | 411 | 0.5+ | 0.7− |            |     |      |      |

**1995 HK = 1998 CN<sub>3</sub>**

Id. B. G. Marsden

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|     |            |          |           |             |             |
|-----|------------|----------|-----------|-------------|-------------|
| $M$ | 294.84733  |          | (2000.0)  | <b>P</b>    | <b>Q</b>    |
| $n$ | 0.29892068 | $\omega$ | 76.95602  | −0.87170704 | +0.48888458 |
| $a$ | 2.2152976  | $\Omega$ | 132.30006 | −0.46529466 | −0.80436918 |
| $e$ | 0.0939425  | $i$      | 2.59188   | −0.15371311 | −0.33761234 |
| $P$ | 3.30       | $H$      | 14.5      | $G$ 0.15    | $U$ 5       |

Residuals in seconds of arc

|            |     |       |       |            |     |       |       |            |     |      |      |
|------------|-----|-------|-------|------------|-----|-------|-------|------------|-----|------|------|
| 1995 04 20 | 400 | 1.5+  | 0.4−  | 1995 05 01 | 691 | 0.9−  | 0.4+  | 1998 02 06 | 809 | 0.0  | 0.7+ |
| 1995 04 20 | 400 | (1.1+ | 3.6−) | 1995 05 01 | 691 | 0.8−  | 0.4+  | 1998 02 06 | 809 | 0.3− | 0.2+ |
| 1995 04 24 | 400 | 2.0+  | 0.3+  | 1995 05 07 | 397 | (3.0− | 3.1+) | 1998 02 07 | 809 | 0.3+ | 0.5+ |
| 1995 04 24 | 400 | 1.1+  | 0.2−  | 1995 05 07 | 397 | 0.3−  | 1.3−  | 1998 02 07 | 809 | 0.5− | 0.2+ |
| 1995 04 26 | 691 | 0.8−  | 0.3+  | 1995 05 08 | 397 | 0.4+  | 0.2−  | 1998 02 07 | 809 | 0.5− | 0.8+ |
| 1995 04 26 | 691 | 0.6−  | 0.4+  | 1995 05 08 | 397 | 0.1−  | 0.0   | 1998 02 24 | 566 | 0.1− | 0.9− |
| 1995 04 26 | 691 | 0.7−  | 0.4+  | 1995 05 28 | 400 | 0.5+  | 0.0   | 1998 02 24 | 566 | 0.0  | 1.0− |
| 1995 05 01 | 691 | 1.2−  | 0.3+  | 1998 02 06 | 809 | 0.9+  | 0.3+  | 1998 02 24 | 566 | 0.0  | 1.1− |

**1995 OH<sub>10</sub> = 1982 PB<sub>1</sub> = 1998 EG<sub>6</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|     |            |          |           |             |             |
|-----|------------|----------|-----------|-------------|-------------|
| $M$ | 180.80392  |          | (2000.0)  | <b>P</b>    | <b>Q</b>    |
| $n$ | 0.22572335 | $\omega$ | 42.34871  | +0.89755529 | +0.43842205 |
| $a$ | 2.6714787  | $\Omega$ | 291.59276 | −0.41678422 | +0.80913710 |
| $e$ | 0.2221741  | $i$      | 2.87868   | −0.14382423 | +0.39125856 |
| $P$ | 4.37       | $H$      | 14.5      | $G$ 0.15    | $U$ 4       |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1982 08 15 | 095 | 0.0  | 0.0  | 1995 07 26 | 033 | 0.3+ | 0.1− | 1998 03 05 | 910 | 0.1+ | 0.7+ |
| 1995 07 21 | 033 | 0.9+ | 0.9+ | 1998 03 01 | 910 | 0.3+ | 0.1− | 1998 03 05 | 910 | 0.3− | 0.4+ |
| 1995 07 22 | 033 | 0.9− | 0.6− | 1998 03 01 | 910 | 0.1+ | 0.4− | 1998 03 06 | 910 | 0.1− | 0.0  |
| 1995 07 23 | 033 | 0.3− | 0.2− | 1998 03 01 | 910 | 0.0  | 0.5− |            |     |      |      |

**1995 SX<sub>2</sub> = 1998 DG<sub>14</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|     |            |          |           |             |             |
|-----|------------|----------|-----------|-------------|-------------|
| $M$ | 236.65053  |          | (2000.0)  | <b>P</b>    | <b>Q</b>    |
| $n$ | 0.26100457 | $\omega$ | 280.68736 | +0.79526796 | +0.60486837 |
| $a$ | 2.4249566  | $\Omega$ | 42.11003  | −0.52957455 | +0.72602692 |
| $e$ | 0.1917918  | $i$      | 3.50766   | −0.29512653 | +0.32713784 |
| $P$ | 3.78       | $H$      | 15.0      | $G$ 0.15    | $U$ 4       |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1995 09 20 | 399 | 0.5− | 1.1+ | 1995 12 14 | 327 | 0.4− | 0.4− | 1998 02 27 | 910 | 0.3− | 0.2+ |
| 1995 09 20 | 399 | 0.3+ | 0.6− | 1995 12 14 | 327 | 0.9− | 0.0  | 1998 02 27 | 910 | 0.0  | 0.1+ |

## 1998 MAR. 13

|            |     |       |       |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| 1995 09 21 | 399 | 0.5−  | 0.5+  | 1995 12 15 | 327 | 0.0  | 0.1− | 1998 02 27 | 910 | 0.1− | 0.0  |
| 1995 09 21 | 399 | 0.9−  | 1.9−  | 1995 12 15 | 327 | 0.5+ | 0.1− | 1998 02 28 | 910 | 0.3+ | 0.1+ |
| 1995 09 23 | 809 | (8.3+ | 2.0−) | 1995 12 15 | 327 | 0.0  | 0.0  | 1998 02 28 | 910 | 0.1+ | 0.1− |
| 1995 09 30 | 399 | 1.9+  | 1.2+  | 1995 12 16 | 327 | 0.8+ | 0.8+ | 1998 02 28 | 910 | 0.2+ | 0.2+ |
| 1995 09 30 | 399 | 0.3−  | 0.1−  | 1995 12 16 | 327 | 0.6− | 0.1+ |            |     |      |      |
| 1995 12 14 | 327 | 0.4+  | 0.2+  | 1995 12 16 | 327 | 0.1+ | 0.2− |            |     |      |      |

1995 SD<sub>24</sub> = 1998 DY<sub>13</sub>

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 209.14905  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.21562582 | $\omega$ | 161.35509 | +0.82237761   | +0.56840659 |
| <i>a</i> | 2.7542427  | $\Omega$ | 163.93295 | −0.53267803   | +0.78447331 |
| <i>e</i> | 0.1048352  | <i>i</i> | 5.11576   | −0.19987294   | +0.24802333 |
| <i>P</i> | 4.57       | <i>H</i> | 15.0      | <i>G</i> 0.15 | <i>U</i> 6  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1995 09 19 | 691 | 0.0  | 0.3+ | 1995 09 25 | 691 | 0.2− | 0.3+ | 1998 02 27 | 910 | 0.4+ | 0.4+ |
| 1995 09 19 | 691 | 0.0  | 0.4+ | 1995 09 30 | 691 | 0.0  | 0.5− | 1998 02 27 | 910 | 0.0  | 0.3+ |
| 1995 09 19 | 691 | 0.1− | 0.3+ | 1995 09 30 | 691 | 0.0  | 0.5− | 1998 02 27 | 910 | 0.2− | 0.2+ |
| 1995 09 25 | 691 | 0.4+ | 0.5+ | 1995 09 30 | 691 | 0.0  | 0.3− | 1998 02 27 | 910 | 0.1+ | 0.2− |
| 1995 09 25 | 691 | 0.2− | 0.3+ | 1998 02 27 | 910 | 0.1+ | 0.3+ | 1998 02 28 | 910 | 0.1− | 0.1− |

1995 SO<sub>26</sub> = 1998 ET<sub>2</sub>

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 62.74832   |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.19005367 | $\omega$ | 277.56571 | −0.41381607   | −0.90894432 |
| <i>a</i> | 2.9960695  | $\Omega$ | 197.15393 | +0.88830343   | −0.39096228 |
| <i>e</i> | 0.0584637  | <i>i</i> | 9.90992   | +0.19918149   | −0.14480578 |
| <i>P</i> | 5.19       | <i>H</i> | 14.5      | <i>G</i> 0.15 | <i>U</i> 4  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1995 09 19 | 691 | 0.2− | 0.1− | 1995 09 24 | 691 | 0.0  | 0.1− | 1998 03 02 | 910 | 0.1+ | 0.1+ |
| 1995 09 19 | 691 | 0.1+ | 0.0  | 1995 09 27 | 691 | 0.2− | 0.2− | 1998 03 02 | 910 | 0.1+ | 0.0  |
| 1995 09 19 | 691 | 0.0  | 0.2+ | 1995 09 27 | 691 | 0.5+ | 0.1+ | 1998 03 03 | 910 | 0.1− | 0.0  |
| 1995 09 24 | 691 | 0.1+ | 0.1+ | 1995 09 27 | 691 | 0.4− | 0.2+ | 1998 03 03 | 910 | 0.1− | 0.1+ |
| 1995 09 24 | 691 | 0.1+ | 0.0  | 1998 03 02 | 910 | 0.1+ | 0.1− | 1998 03 03 | 910 | 0.1− | 0.1− |

1995 ST<sub>48</sub> = 1995 UU<sub>18</sub> = 1998 CQ<sub>3</sub>Id. S. Nakano (d, *MPC* 31161), B. G. Marsden

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 304.33226  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.19183720 | $\omega$ | 115.73595 | −0.82969005   | +0.55662002 |
| <i>a</i> | 2.9774707  | $\Omega$ | 98.11349  | −0.52624954   | −0.75464535 |
| <i>e</i> | 0.1586250  | <i>i</i> | 2.44837   | −0.18621451   | −0.34739683 |
| <i>P</i> | 5.14       | <i>H</i> | 14.5      | <i>G</i> 0.15 | <i>U</i> 5  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1995 09 26 | 691 | 0.0  | 0.3− | 1995 10 19 | 691 | 0.6− | 0.2+ | 1998 02 06 | 809 | 0.8− | 1.0+ |
| 1995 09 26 | 691 | 0.1+ | 0.4− | 1995 10 19 | 691 | 0.0  | 0.0  | 1998 02 07 | 809 | 0.9+ | 1.3− |
| 1995 09 26 | 691 | 0.2+ | 0.3− | 1995 10 24 | 691 | 0.4+ | 1.2+ | 1998 02 07 | 809 | 1.0+ | 0.1− |
| 1995 10 01 | 691 | 0.1− | 0.3− | 1995 10 24 | 691 | 0.3+ | 0.0  | 1998 02 07 | 809 | 0.5+ | 1.0− |
| 1995 10 01 | 691 | 0.0  | 0.0  | 1995 10 24 | 691 | 0.2+ | 0.0  | 1998 02 23 | 691 | 0.2− | 0.3+ |
| 1995 10 01 | 691 | 0.0  | 0.1− | 1998 02 06 | 809 | 0.9− | 0.4+ | 1998 02 23 | 691 | 0.2− | 0.3+ |
| 1995 10 19 | 691 | 0.5− | 0.1+ | 1998 02 06 | 809 | 0.1− | 0.3+ | 1998 02 23 | 691 | 0.2− | 0.1+ |

1995 WE = 1964 VB<sub>2</sub>

Id. E. Bowell (1988, 1991 observations), G. V. Williams

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 170.23675  |          | (2000.0) | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|----------|---------------|-------------|
| <i>n</i> | 0.28543092 | $\omega$ | 52.00935 | −0.51089805   | −0.85246222 |
| <i>a</i> | 2.2845572  | $\Omega$ | 69.06181 | +0.74680798   | −0.50400587 |
| <i>e</i> | 0.1554993  | <i>i</i> | 6.81736  | +0.42574760   | −0.13887497 |
| <i>P</i> | 3.45       | <i>H</i> | 13.5     | <i>G</i> 0.15 | <i>U</i> 3  |

## M.P.C. 31387

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |       |       |
|------------|-----|------|------|------------|-----|------|------|------------|-----|-------|-------|
| 1964 11 10 | 330 | 0.7+ | 4.1− | 1995 11 16 | 400 | 0.7+ | 0.1− | 1995 11 29 | 411 | 0.0   | 0.6+  |
| 1988 11 06 | 675 | 0.5− | 1.0+ | 1995 11 16 | 411 | 0.2+ | 0.4+ | 1995 12 08 | 411 | 0.2+  | 0.3−  |
| 1988 11 06 | 675 | 0.1+ | 0.2+ | 1995 11 16 | 411 | 0.1− | 0.3+ | 1995 12 08 | 411 | 0.2+  | 0.2−  |
| 1991 09 15 | 675 | 0.0  | 0.2− | 1995 11 17 | 411 | 0.2− | 0.4+ | 1995 12 19 | 566 | (3.8− | 5.4−) |
| 1991 09 15 | 675 | 0.4+ | 0.7− | 1995 11 17 | 411 | 0.6+ | 0.1+ | 1995 12 19 | 566 | (3.8− | 5.5−) |
| 1995 11 15 | 400 | 1.6− | 0.2− | 1995 11 24 | 411 | 0.3− | 0.5+ | 1995 12 19 | 566 | (3.9− | 5.5−) |
| 1995 11 15 | 400 | 0.3+ | 1.3− | 1995 11 24 | 411 | 0.6− | 1.0+ |            |     |       |       |
| 1995 11 16 | 400 | 0.5− | 1.3+ | 1995 11 29 | 411 | 0.1+ | 0.3+ |            |     |       |       |

1996 AU<sub>13</sub> = 1981 UT<sub>3</sub> = 1983 CS<sub>8</sub>

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Gnädig

| <i>M</i> | 296.71204  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.22660970 | $\omega$ | 329.40774 | +0.99577620   | +0.08369592 |
| <i>a</i> | 2.6645082  | $\Omega$ | 25.87217  | −0.05641197   | +0.88208825 |
| <i>e</i> | 0.1144632  | <i>i</i> | 4.96232   | −0.07243922   | +0.46358959 |
| <i>P</i> | 4.35       | <i>H</i> | 16.0      | <i>G</i> 0.15 | <i>U</i> 5  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1981 10 30 | 381 | 1.5+ | 0.4+ | 1996 01 15 | 691 | 0.2− | 0.4− | 1996 01 24 | 691 | 0.3− | 0.1− |
| 1981 10 30 | 381 | 1.5− | 0.4− | 1996 01 15 | 691 | 0.3− | 0.3− | 1996 01 27 | 691 | 0.2+ | 0.5+ |
| 1983 02 10 | 095 | 0.2− | 0.3− | 1996 01 24 | 691 | 0.3− | 0.2+ | 1996 01 27 | 691 | 0.6+ | 0.1− |
| 1996 01 15 | 691 | 0.3+ | 0.1− | 1996 01 24 | 691 | 0.1− | 0.1+ | 1996 01 27 | 691 | 0.3+ | 0.4+ |

1996 CT<sub>8</sub> = 1997 LU<sub>3</sub>

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Gnädig

| <i>M</i> | 223.45278  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.22825625 | $\omega$ | 291.99580 | +0.33416834   | −0.92555010 |
| <i>a</i> | 2.6516789  | $\Omega$ | 137.14031 | +0.93211164   | +0.29654992 |
| <i>e</i> | 0.1060722  | <i>i</i> | 15.17122  | +0.13964027   | +0.23540425 |
| <i>P</i> | 4.32       | <i>H</i> | 14.0      | <i>G</i> 0.15 | <i>U</i>    |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1996 02 14 | 098 | 0.1+ | 0.0  | 1996 02 18 | 691 | 0.8− | 0.6+ | 1997 06 05 | 691 | 0.1− | 0.0  |
| 1996 02 14 | 098 | 0.5+ | 1.5− | 1996 02 18 | 691 | 0.9− | 0.6+ | 1997 06 05 | 691 | 0.2+ | 0.0  |
| 1996 02 15 | 098 | 0.3+ | 0.7+ | 1996 02 24 | 098 | 0.3− | 0.4− | 1997 06 10 | 691 | 0.6− | 1.0− |
| 1996 02 15 | 098 | 0.1+ | 0.4− | 1996 02 24 | 098 | 1.1+ | 0.6− | 1997 06 10 | 691 | 0.0  | 0.5+ |
| 1996 02 18 | 691 | 0.1+ | 0.8+ | 1997 06 05 | 691 | 0.0  | 0.1+ | 1997 06 10 | 691 | 0.5+ | 0.4+ |

1996 ED<sub>9</sub> = 1997 JV<sub>2</sub>

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Gnädig

| <i>M</i> | 271.95553  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.17714871 | $\omega$ | 203.84802 | +0.99514977   | −0.01886590 |
| <i>a</i> | 3.1398631  | $\Omega$ | 156.60838 | +0.03619768   | +0.98280549 |
| <i>e</i> | 0.0398892  | <i>i</i> | 14.07425  | −0.09146947   | +0.18367756 |
| <i>P</i> | 5.56       | <i>H</i> | 13.5      | <i>G</i> 0.15 | <i>U</i> 5  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1996 03 12 | 691 | 0.5+ | 0.1− | 1996 03 17 | 691 | 0.4− | 0.0  | 1997 05 04 | 721 | 0.0  | 0.8− |
| 1996 03 12 | 691 | 0.1− | 0.1+ | 1996 03 23 | 691 | 0.1− | 0.3+ | 1997 05 06 | 721 | 0.2− | 0.3+ |
| 1996 03 12 | 691 | 0.1− | 0.0  | 1996 03 23 | 691 | 0.2+ | 0.0  | 1997 05 06 | 721 | 1.2+ | 0.5+ |
| 1996 03 17 | 691 | 0.1+ | 0.1− | 1996 03 23 | 691 | 0.1+ | 0.1− |            |     |      |      |
| 1996 03 17 | 691 | 0.2− | 0.1− | 1997 05 04 | 721 | 0.9− | 0.0  |            |     |      |      |

1996 EO<sub>12</sub> = 1991 RP<sub>29</sub>

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Gnädig

| <i>M</i> | 316.07724  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.30001970 | $\omega$ | 78.59427  | +0.92385578   | −0.36683387 |
| <i>a</i> | 2.2098843  | $\Omega$ | 302.83945 | +0.28045869   | +0.84297211 |
| <i>e</i> | 0.2504388  | <i>i</i> | 7.46747   | +0.26044849   | +0.39348562 |
| <i>P</i> | 3.29       | <i>H</i> | 15.5      | <i>G</i> 0.15 | <i>U</i> 4  |

## M.P.C. 31388

1998 MAR. 13

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1991 09 12 | 675 | 0.2+ | 0.4- | 1996 03 13 | 691 | 0.2- | 0.1- | 1996 03 27 | 691 | 0.2+ | 0.1- |
| 1991 09 12 | 675 | 0.0  | 0.5+ | 1996 03 13 | 691 | 0.2- | 0.4- | 1996 03 27 | 691 | 0.3+ | 0.1+ |
| 1991 09 16 | 675 | 0.4+ | 0.4- | 1996 03 19 | 691 | 0.0  | 0.1+ | 1996 03 27 | 691 | 0.2- | 0.2- |
| 1991 09 16 | 675 | 0.5- | 0.4+ | 1996 03 19 | 691 | 0.3- | 0.4+ |            |     |      |      |
| 1996 03 13 | 691 | 0.2+ | 0.1+ | 1996 03 19 | 691 | 0.2+ | 0.1+ |            |     |      |      |

## 1996 PQ

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 50.29026   |          | (2000.0)  | <b>P</b>    | <b>Q</b>    |
|----------|------------|----------|-----------|-------------|-------------|
| <i>n</i> | 0.27716185 | $\omega$ | 273.19989 | +0.48006844 | -0.87472146 |
| <i>a</i> | 2.3297737  | $\Omega$ | 147.83951 | +0.84618678 | +0.44182399 |
| <i>e</i> | 0.1065980  | <i>i</i> | 7.15589   | +0.23130549 | +0.19913294 |
| <i>P</i> | 3.56       | <i>H</i> | 14.5      | <i>G</i>    | 0.15        |
|          |            |          |           | <i>U</i>    | 4           |

Residuals in seconds of arc

|            |     |       |       |            |     |       |       |            |     |      |      |
|------------|-----|-------|-------|------------|-----|-------|-------|------------|-----|------|------|
| 1996 07 14 | 809 | 0.8+  | 0.2-  | 1996 08 09 | 566 | 1.2-  | 0.7-  | 1996 09 13 | 566 | 0.7+ | 0.2- |
| 1996 07 14 | 809 | 0.4+  | 0.4+  | 1996 08 09 | 566 | 1.0-  | 0.5-  | 1996 09 14 | 566 | 0.5+ | 0.2+ |
| 1996 07 14 | 809 | 0.0   | 0.6+  | 1996 08 11 | 566 | 0.3-  | 0.8-  | 1996 09 14 | 566 | 0.3+ | 0.2+ |
| 1996 07 16 | 809 | (2.7+ | 0.6-) | 1996 08 11 | 566 | 0.8-  | 0.7-  | 1996 09 14 | 566 | 0.4+ | 0.1- |
| 1996 07 16 | 809 | 1.4+  | 0.3+  | 1996 08 11 | 566 | 0.7-  | 0.6-  | 1998 02 18 | 552 | 0.4- | 0.3+ |
| 1996 07 16 | 809 | 1.0+  | 0.6-  | 1996 08 15 | 566 | 0.3-  | 0.5-  | 1998 02 18 | 552 | 0.0  | 0.3+ |
| 1996 08 08 | 809 | 0.0   | 0.4+  | 1996 08 15 | 566 | 0.4-  | 0.6-  | 1998 02 27 | 552 | 0.8+ | 0.9- |
| 1996 08 08 | 809 | 0.5-  | 0.2+  | 1996 08 15 | 566 | 0.0   | 0.4-  | 1998 02 27 | 552 | 1.0+ | 0.4- |
| 1996 08 08 | 809 | 0.0   | 0.2+  | 1996 09 08 | 809 | (2.1+ | 2.6+) | 1998 03 01 | 691 | 0.7- | 0.5- |
| 1996 08 09 | 809 | (1.0+ | 2.7+) | 1996 09 08 | 809 | (1.7+ | 2.4+) | 1998 03 01 | 691 | 0.6- | 0.7- |
| 1996 08 09 | 809 | 0.6+  | 1.8+  | 1996 09 08 | 809 | (2.0+ | 2.6+) | 1998 03 01 | 691 | 0.5- | 0.5- |
| 1996 08 09 | 809 | (0.4+ | 2.2+) | 1996 09 13 | 566 | 0.2+  | 0.1-  |            |     |      |      |
| 1996 08 09 | 566 | 0.7-  | 0.7-  | 1996 09 13 | 566 | 0.4+  | 0.0   |            |     |      |      |

1996 PB<sub>5</sub> = 1986 RH<sub>14</sub> = 1986 TN<sub>12</sub> = 1998 DV<sub>32</sub>

Id. G. V. Williams, E. Bowell

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 94.83151   |          | (2000.0)  | <b>P</b>    | <b>Q</b>    |
|----------|------------|----------|-----------|-------------|-------------|
| <i>n</i> | 0.29051212 | $\omega$ | 85.33146  | +0.85536690 | -0.51587291 |
| <i>a</i> | 2.2578403  | $\Omega$ | 305.71690 | +0.44928040 | +0.78408301 |
| <i>e</i> | 0.1708520  | <i>i</i> | 3.32881   | +0.25786543 | +0.34509272 |
| <i>P</i> | 3.39       | <i>H</i> | 15.0      | <i>G</i>    | 0.15        |
|          |            |          |           | <i>U</i>    | 3           |

Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| 1986 09 11 | 095 | 0.9+  | 1.6-  | 1996 07 21 | 809 | 1.2- | 0.6- | 1996 09 14 | 566 | 0.4+ | 0.3+ |
| 1986 10 05 | 095 | 0.6-  | 0.9+  | 1996 08 15 | 566 | 0.7+ | 0.7- | 1996 09 14 | 566 | 0.4- | 0.5+ |
| 1996 07 14 | 809 | (2.7+ | 5.2+) | 1996 08 15 | 566 | 0.6+ | 0.7- | 1996 09 14 | 566 | 0.3+ | 0.4+ |
| 1996 07 14 | 809 | (2.9+ | 4.7+) | 1996 08 15 | 566 | 0.8+ | 0.8- | 1998 02 22 | 566 | 0.1+ | 0.1- |
| 1996 07 14 | 809 | (2.5+ | 3.8+) | 1996 08 17 | 566 | 0.3+ | 0.0  | 1998 02 22 | 566 | 0.2+ | 0.2+ |
| 1996 07 15 | 809 | 0.6-  | 1.0+  | 1996 08 17 | 566 | 0.3+ | 0.3+ | 1998 02 22 | 566 | 0.1- | 0.2+ |
| 1996 07 15 | 809 | 0.6+  | 0.8+  | 1996 08 17 | 566 | 0.0  | 0.1+ | 1998 02 26 | 699 | 0.2- | 0.2- |
| 1996 07 15 | 809 | 1.2+  | 0.0   | 1996 09 14 | 566 | 0.4- | 0.2+ | 1998 02 26 | 699 | 0.3- | 0.9- |
| 1996 07 21 | 809 | 0.9-  | 0.2+  | 1996 09 14 | 566 | 0.0  | 0.1- | 1998 02 26 | 699 | 0.3- | 0.4- |
| 1996 07 21 | 809 | 1.5-  | 0.6-  | 1996 09 14 | 566 | 0.5- | 0.5- |            |     |      |      |

1996 PA<sub>7</sub>

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 112.72738  |          | (2000.0)  | <b>P</b>    | <b>Q</b>    |
|----------|------------|----------|-----------|-------------|-------------|
| <i>n</i> | 0.27803574 | $\omega$ | 303.44466 | +0.79065409 | -0.43800665 |
| <i>a</i> | 2.3248894  | $\Omega$ | 85.97031  | +0.59814835 | +0.70175281 |
| <i>e</i> | 0.3518606  | <i>i</i> | 25.39551  | -0.13070833 | +0.56186580 |
| <i>P</i> | 3.54       | <i>H</i> | 14.0      | <i>G</i>    | 0.15        |
|          |            |          |           | <i>U</i>    | 3           |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1996 08 12 | 413 | 0.8+ | 0.3+ | 1996 10 18 | 424 | 0.3- | 0.6+ | 1997 01 30 | 670 | 0.3- | 0.2- |
| 1996 08 12 | 413 | 0.7- | 0.5+ | 1996 10 18 | 424 | 0.5- | 0.3+ | 1997 01 30 | 670 | 0.5+ | 0.0  |
| 1996 08 15 | 424 | 0.6- | 0.1+ | 1996 11 08 | 424 | 0.2+ | 0.1+ | 1997 01 31 | 670 | 0.1+ | 0.2+ |
| 1996 08 15 | 424 | 0.2+ | 0.4- | 1996 11 08 | 424 | 0.4+ | 0.4- | 1997 01 31 | 670 | 0.6- | 0.4- |
| 1996 08 16 | 424 | 0.7- | 0.9- | 1996 12 03 | 413 | 0.2- | 0.3+ | 1997 01 31 | 670 | 0.1+ | 0.8+ |

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1996 08 16 | 424 | 1.7- | 0.9- | 1996 12 03 | 413 | 0.9- | 0.4- | 1998 02 28 | 561 | 0.5+ | 0.5+ |
| 1996 09 16 | 424 | 0.2- | 0.3+ | 1996 12 07 | 424 | 0.1- | 0.9+ | 1998 02 28 | 561 | 0.6+ | 0.3+ |
| 1996 09 16 | 424 | 0.4- | 0.5+ | 1996 12 07 | 424 | 0.7- | 0.5+ | 1998 02 28 | 561 | 0.9+ | 0.6+ |
| 1996 09 16 | 424 | 0.1- | 0.3+ | 1996 12 07 | 424 | 0.2- | 0.8+ | 1998 03 02 | 561 | 0.4- | 0.2+ |
| 1996 09 16 | 424 | 0.1+ | 0.1- | 1996 12 10 | 801 | 0.1+ | 0.4- | 1998 03 02 | 561 | 0.2- | 0.1- |
| 1996 10 12 | 424 | 0.8+ | 0.1+ | 1996 12 10 | 801 | 0.2+ | 1.0- | 1998 03 02 | 561 | 0.2- | 0.1+ |
| 1996 10 12 | 424 | 0.7+ | 0.2+ | 1997 01 30 | 670 | 0.5+ | 0.5- |            |     |      |      |
| 1996 10 12 | 424 | 1.7+ | 0.0  | 1997 01 30 | 670 | 0.2+ | 0.2- |            |     |      |      |

1996 RW = 1998 CP<sub>4</sub>

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Marsden

| <i>M</i> | 33.56360   |          | (2000.0)  | <b>P</b>    | <b>Q</b>    |
|----------|------------|----------|-----------|-------------|-------------|
| <i>n</i> | 0.23601691 | $\omega$ | 182.43684 | +0.11793159 | -0.99236185 |
| <i>a</i> | 2.5932276  | $\Omega$ | 260.79204 | +0.91169865 | +0.12264798 |
| <i>e</i> | 0.2024874  | <i>i</i> | 2.10138   | +0.39357047 | +0.01324492 |
| <i>P</i> | 4.18       | <i>H</i> | 15.0      | <i>G</i>    | 0.15        |
|          |            |          |           | <i>U</i>    | 5           |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1996 09 10 | 566 | 0.2+ | 0.3- | 1996 09 13 | 566 | 0.0  | 0.1- | 1998 02 06 | 809 | 0.5+ | 0.8- |
| 1996 09 10 | 566 | 0.1+ | 0.2- | 1996 09 13 | 566 | 0.4- | 0.3+ | 1998 02 06 | 809 | 0.1+ | 1.0- |
| 1996 09 10 | 566 | 0.6+ | 0.3- | 1996 09 13 | 566 | 0.6- | 0.1- | 1998 02 06 | 809 | 0.0  | 1.1- |
| 1996 09 11 | 566 | 0.1+ | 0.0  | 1996 09 18 | 566 | 0.4+ | 0.0  | 1998 02 07 | 809 | 0.2+ | 1.0+ |
| 1996 09 11 | 566 | 0.0  | 0.0  | 1996 09 18 | 566 | 0.2- | 0.0  | 1998 02 07 | 809 | 0.0  | 0.7+ |
| 1996 09 11 | 566 | 0.1+ | 0.2- | 1996 09 18 | 566 | 0.2- | 0.8+ | 1998 02 07 | 809 | 1.0- | 1.2+ |

1996 RK<sub>11</sub> = 1998 EL<sub>7</sub>

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 78.37411   |          | (2000.0) | <b>P</b>    | <b>Q</b>    |
|----------|------------|----------|----------|-------------|-------------|
| <i>n</i> | 0.25955900 | $\omega$ | 12.20063 | +0.74113481 | -0.67118965 |
| <i>a</i> | 2.4339519  | $\Omega$ | 29.97523 | +0.61341377 | +0.66794922 |
| <i>e</i> | 0.1711067  | <i>i</i> | 1.71521  | +0.27284197 | +0.32147828 |
| <i>P</i> | 3.80       | <i>H</i> | 16.5     | <i>G</i>    | 0.15        |
|          |            |          |          | <i>U</i>    | 4           |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1996 09 08 | 691 | 0.4- | 0.1+ | 1996 09 11 | 691 | 0.2+ | 0.2+ | 1998 03 01 | 691 | 0.4+ | 0.0  |
| 1996 09 08 | 691 | 0.3- | 0.0  | 1996 09 17 | 691 | 0.4+ | 0.0  | 1998 03 01 | 691 | 0.4+ | 0.3- |
| 1996 09 08 | 691 | 0.4- | 0.0  | 1996 09 17 | 691 | 0.3+ | 0.2- | 1998 03 05 | 691 | 0.3- | 0.1+ |
| 1996 09 11 | 691 | 0.1+ | 0.1+ | 1996 09 17 | 691 | 0.0  | 0.0  | 1998 03 05 | 691 | 0.2- | 0.0  |
| 1996 09 11 | 691 | 0.0  | 0.1+ | 1998 03 01 | 691 | 0.3+ | 0.1+ | 1998 03 05 | 691 | 0.5- | 0.2+ |

1996 RZ<sub>20</sub> = 1998 DE<sub>24</sub>

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Marsden

| <i>M</i> | 137.80225  |          | (2000.0)  | <b>P</b>    | <b>Q</b>    |
|----------|------------|----------|-----------|-------------|-------------|
| <i>n</i> | 0.29353747 | $\omega$ | 1.65219   | +0.98732840 | +0.15666260 |
| <i>a</i> | 2.2422998  | $\Omega$ | 349.23484 | -0.14710421 | +0.84377621 |
| <i>e</i> | 0.0690859  | <i>i</i> | 7.78084   | -0.05952298 | +0.51332109 |
| <i>P</i> | 3.36       | <i>H</i> | 16.0      | <i>G</i>    | 0.15        |
|          |            |          |           | <i>U</i>    | 5           |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1996 09 05 | 691 | 0.3- | 0.1+ | 1996 09 13 | 566 | 0.7+ | 0.3- | 1998 02 26 | 552 | 0.9- | 0.8- |
| 1996 09 05 | 691 | 0.2- | 0.1+ | 1996 09 20 | 691 | 0.5- | 0.1+ | 1998 03 01 | 552 | 0.7+ | 0.8+ |
| 1996 09 05 | 691 | 0.3- | 0.3+ | 1996 09 20 | 691 | 0.7- | 0.2+ | 1998 03 01 | 552 | 0.7+ | 0.8+ |
| 1996 09 13 | 566 | 1.0+ | 0.1- | 1996 09 20 | 691 | 0.7- | 0.1- |            |     |      |      |
| 1996 09 13 | 566 | 1.0+ | 0.2- | 1998 02 26 | 552 | 0.5- | 0.7- |            |     |      |      |

1996 SG<sub>8</sub> = 1998 DR<sub>26</sub>

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 159.48946  |          | (2000.0)  | <b>P</b>    | <b>Q</b>    |
|----------|------------|----------|-----------|-------------|-------------|
| <i>n</i> | 0.28265494 | $\omega$ | 295.29785 | +0.80295362 | +0.59602983 |
| <i>a</i> | 2.2994907  | $\Omega$ | 28.11652  | -0.54397074 | +0.73535121 |
| <i>e</i> | 0.2520415  | <i>i</i> | 0.45362   | -0.24364178 | +0.32250121 |
| <i>P</i> | 3.49       | <i>H</i> | 16.5      | <i>G</i>    | 0.15        |
|          |            |          |           | <i>U</i>    | 5           |

## Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1996 09 21 | 327 | 0.1− | 0.1− | 1996 10 05 | 327 | 0.2+ | 0.4+ | 1996 11 08 | 691 | 0.6− | 0.6+ |
| 1996 09 21 | 327 | 0.4+ | 0.0  | 1996 10 05 | 327 | 0.3− | 0.3− | 1998 02 24 | 691 | 0.3− | 0.7+ |
| 1996 09 21 | 327 | 0.5+ | 0.6− | 1996 10 14 | 327 | 0.3+ | 0.0  | 1998 02 24 | 691 | 0.5− | 0.2− |
| 1996 09 22 | 327 | 0.1− | 0.1− | 1996 10 14 | 327 | 0.2− | 0.3− | 1998 02 24 | 691 | 0.1− | 0.0  |
| 1996 09 22 | 327 | 0.3− | 0.5− | 1996 10 14 | 327 | 0.5+ | 0.2− | 1998 03 02 | 691 | 0.1+ | 0.5− |
| 1996 09 22 | 327 | 0.2− | 0.1− | 1996 11 08 | 691 | 0.2− | 0.3+ | 1998 03 02 | 691 | 0.2+ | 0.4− |
| 1996 10 05 | 327 | 0.3+ | 0.3+ | 1996 11 08 | 691 | 0.2− | 0.4+ | 1998 03 02 | 691 | 0.4+ | 0.3− |

**1996 TR = 1998 EU<sub>6</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 118.26314  |          | (2000.0)  | <b>P</b>    | <b>Q</b>    |          |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.27220023 | $\omega$ | 205.85575 | +0.93312006 | −0.35941789 |          |   |
| <i>a</i> | 2.3579996  | $\Omega$ | 175.17385 | +0.34745182 | +0.89395560 |          |   |
| <i>e</i> | 0.1280962  | <i>i</i> | 7.02037   | +0.09254291 | +0.26769790 |          |   |
| <i>P</i> | 3.62       | <i>H</i> | 15.5      | <i>G</i>    | 0.15        | <i>U</i> | 4 |

## Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1996 10 04 | 595 | 0.7+ | 0.1+ | 1996 11 01 | 595 | 0.5− | 0.1+ | 1998 03 01 | 910 | 0.2− | 0.3+ |
| 1996 10 04 | 595 | 0.3+ | 0.2+ | 1996 11 02 | 595 | 0.1− | 0.8+ | 1998 03 01 | 910 | 0.6+ | 0.3+ |
| 1996 10 04 | 595 | 0.2− | 0.2− | 1996 11 02 | 595 | 0.3− | 1.2+ | 1998 03 01 | 910 | 0.3+ | 0.3+ |
| 1996 10 04 | 595 | 0.2− | 0.1+ | 1996 12 03 | 595 | 0.5+ | 1.0+ | 1998 03 05 | 910 | 0.1− | 0.0  |
| 1996 10 09 | 595 | 0.2− | 0.4− | 1996 12 03 | 595 | 0.2+ | 1.8− | 1998 03 06 | 910 | 0.1− | 0.0  |
| 1996 10 09 | 595 | 0.2+ | 0.1− | 1996 12 04 | 595 | 0.0  | 0.8− | 1998 03 06 | 910 | 0.4− | 0.3− |
| 1996 11 01 | 595 | 0.5− | 0.0  | 1996 12 04 | 595 | 0.2+ | 0.3− |            |     |      |      |

**1996 TF<sub>5</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Marsden

| <i>M</i> | 101.51604  |          | (2000.0)  | <b>P</b>    | <b>Q</b>    |          |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.28530291 | $\omega$ | 211.33461 | +0.68791449 | −0.72554639 |          |   |
| <i>a</i> | 2.2852405  | $\Omega$ | 195.22800 | +0.67987936 | +0.65328075 |          |   |
| <i>e</i> | 0.1414610  | <i>i</i> | 4.11984   | +0.25404274 | +0.21634857 |          |   |
| <i>P</i> | 3.45       | <i>H</i> | 16.0      | <i>G</i>    | 0.15        | <i>U</i> | 4 |

## Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1996 10 08 | 684 | 0.5+ | 0.2− | 1996 10 16 | 684 | 0.0  | 0.3− | 1996 12 06 | 327 | 0.2+ | 0.8+ |
| 1996 10 08 | 684 | 0.7+ | 0.2− | 1996 11 01 | 684 | 0.1+ | 0.3− | 1996 12 06 | 327 | 0.7− | 0.8+ |
| 1996 10 08 | 684 | 0.6+ | 0.3− | 1996 11 01 | 684 | 0.2+ | 0.2− | 1996 12 06 | 327 | 0.3+ | 0.8+ |
| 1996 10 09 | 684 | 0.3− | 0.5+ | 1996 11 01 | 684 | 0.1+ | 0.1− | 1996 12 12 | 327 | 0.5− | 0.7− |
| 1996 10 09 | 684 | 0.2− | 0.3+ | 1996 11 10 | 684 | 0.1+ | 0.0  | 1996 12 12 | 327 | 0.6− | 0.0  |
| 1996 10 11 | 566 | 0.3− | 0.2− | 1996 11 10 | 684 | 0.1+ | 0.0  | 1996 12 12 | 327 | 0.4+ | 0.8− |
| 1996 10 11 | 566 | 0.3− | 0.3− | 1996 11 11 | 684 | 0.2+ | 0.2− | 1998 03 03 | 684 | 0.9+ | 0.3− |
| 1996 10 11 | 566 | 0.8− | 0.2+ | 1996 11 11 | 684 | 0.1+ | 0.3− | 1998 03 03 | 684 | 0.1+ | 0.5+ |
| 1996 10 13 | 684 | 0.3− | 0.2+ | 1996 11 11 | 684 | 0.4+ | 0.1− | 1998 03 04 | 684 | 0.2− | 0.3− |
| 1996 10 13 | 684 | 0.4− | 0.2+ | 1996 12 01 | 684 | 0.3+ | 0.1+ | 1998 03 04 | 684 | 0.9− | 0.2− |
| 1996 10 16 | 684 | 0.2− | 0.1− | 1996 12 01 | 684 | 0.3+ | 0.1+ |            |     |      |      |

**1996 TH<sub>5</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Marsden

| <i>M</i> | 68.10744   |          | (2000.0) | <b>P</b>    | <b>Q</b>    |          |   |
|----------|------------|----------|----------|-------------|-------------|----------|---|
| <i>n</i> | 0.26428644 | $\omega$ | 52.51549 | +0.35048783 | −0.93647058 |          |   |
| <i>a</i> | 2.4048397  | $\Omega$ | 16.98241 | +0.84408414 | +0.30961914 |          |   |
| <i>e</i> | 0.1818996  | <i>i</i> | 2.64105  | +0.40580814 | +0.16479939 |          |   |
| <i>P</i> | 3.73       | <i>H</i> | 16.0     | <i>G</i>    | 0.15        | <i>U</i> | 4 |

## Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| 1996 09 19 | 691 | 0.3+  | 0.2−  | 1996 10 10 | 684 | 0.4− | 0.3+ | 1996 10 18 | 566 | 0.5+ | 0.2− |
| 1996 09 19 | 691 | 0.3+  | 0.1+  | 1996 10 10 | 684 | 0.2− | 0.0  | 1996 10 18 | 566 | 0.2+ | 0.2− |
| 1996 10 06 | 809 | (3.4− | 4.9−) | 1996 10 11 | 684 | 0.1− | 0.2+ | 1996 11 05 | 684 | 0.1+ | 0.5+ |
| 1996 10 06 | 809 | (3.6− | 5.5−) | 1996 10 11 | 684 | 0.1+ | 0.2+ | 1996 11 07 | 684 | 0.3+ | 0.1− |
| 1996 10 06 | 809 | (4.0− | 5.4−) | 1996 10 11 | 684 | 0.2− | 0.2+ | 1996 11 07 | 684 | 0.4+ | 0.2+ |
| 1996 10 07 | 809 | (0.7− | 3.1−) | 1996 10 12 | 684 | 0.2− | 0.1− | 1996 11 28 | 684 | 0.1+ | 0.0  |
| 1996 10 07 | 809 | (0.2− | 2.3−) | 1996 10 12 | 684 | 0.1− | 0.1− | 1996 11 28 | 684 | 0.5− | 0.2− |
| 1996 10 07 | 809 | 0.4−  | 1.5−  | 1996 10 15 | 684 | 0.1+ | 0.0  | 1996 11 28 | 684 | 0.1− | 0.0  |
| 1996 10 09 | 684 | 0.2+  | 0.3+  | 1996 10 15 | 684 | 0.1+ | 0.1− | 1998 02 28 | 684 | 0.4− | 0.1− |

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1996 10 09 | 684 | 0.1− | 0.2+ | 1996 10 16 | 684 | 0.0  | 0.2+ | 1998 02 28 | 684 | 0.0  | 0.1− |
| 1996 10 09 | 684 | 0.0  | 0.2+ | 1996 10 16 | 684 | 0.1− | 0.2+ | 1998 03 01 | 684 | 0.4+ | 0.1− |
| 1996 10 10 | 684 | 0.5− | 0.2− | 1996 10 18 | 566 | 0.4+ | 0.4− | 1998 03 01 | 684 | 0.2− | 0.0  |

**1996 TO<sub>6</sub>**

Id. A. Nakamura (1998 observations)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Nakano

| <i>M</i> | 118.27237  |          | (2000.0)  | <b>P</b>    | <b>Q</b>    |          |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.27746781 | $\omega$ | 97.49588  | +0.95926503 | −0.19843394 |          |   |
| <i>a</i> | 2.3280608  | $\Omega$ | 274.10574 | +0.10366663 | +0.90937492 |          |   |
| <i>e</i> | 0.2272009  | <i>i</i> | 11.63059  | +0.26279998 | +0.36559707 |          |   |
| <i>P</i> | 3.55       | <i>H</i> | 16.0      | <i>G</i>    | 0.15        | <i>U</i> | 5 |

## Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1996 10 05 | 360 | 0.2− | 0.2+ | 1996 10 16 | 360 | 0.5+ | 0.5− | 1996 12 03 | 360 | 0.7− | 0.5+ |
| 1996 10 05 | 360 | 0.1− | 0.2+ | 1996 10 16 | 360 | 0.6+ | 0.6− | 1998 03 01 | 360 | 0.3+ | 0.4− |
| 1996 10 05 | 360 | 0.2− | 0.2+ | 1996 10 16 | 360 | 0.6+ | 0.4− | 1998 03 01 | 360 | 0.0  | 0.0  |
| 1996 10 09 | 360 | 0.2− | 0.2− | 1996 11 15 | 360 | 0.8+ | 0.5+ | 1998 03 01 | 360 | 0.3− | 0.2− |
| 1996 10 09 | 360 | 0.4− | 0.0  | 1996 11 16 | 360 | 0.3+ | 0.3+ | 1998 03 02 | 360 | 0.3− | 0.2− |
| 1996 10 09 | 360 | 0.2− | 0.0  | 1996 11 16 | 360 | 0.1+ | 0.0  | 1998 03 02 | 360 | 0.1+ | 0.0  |
| 1996 10 10 | 360 | 0.3− | 0.2− | 1996 11 16 | 360 | 0.4+ | 0.2+ | 1998 03 02 | 360 | 0.3− | 0.0  |
| 1996 10 10 | 360 | 0.2− | 0.3− | 1996 12 03 | 360 | 0.1− | 0.5+ |            |     |      |      |
| 1996 10 10 | 360 | 0.2− | 0.2− | 1996 12 03 | 360 | 0.2+ | 0.0  |            |     |      |      |

**1996 TJ<sub>7</sub>**

Id. A. Nakamura (1998 observations)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Nakano

| <i>M</i> | 83.08119   |          | (2000.0)  | <b>P</b>    | <b>Q</b>    |          |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.21691748 | $\omega$ | 208.66939 | +0.69017136 | −0.72325653 |          |   |
| <i>a</i> | 2.7432981  | $\Omega$ | 197.72214 | +0.67792603 | +0.65769328 |          |   |
| <i>e</i> | 0.1609108  | <i>i</i> | 4.47258   | +0.25313986 | +0.21056957 |          |   |
| <i>P</i> | 4.54       | <i>H</i> | 15.5      | <i>G</i>    | 0.15        | <i>U</i> | 3 |

## Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1996 10 10 | 360 | 0.0  | 0.0  | 1996 10 19 | 360 | 0.1+ | 0.0  | 1996 12 06 | 360 | 0.2+ | 0.7− |
| 1996 10 10 | 360 | 0.1+ | 0.1− | 1996 10 19 | 360 | 0.4+ | 0.1− | 1996 12 06 | 360 | 0.0  | 0.6− |
| 1996 10 10 | 360 | 0.2+ | 0.1− | 1996 10 19 | 360 | 0.2− | 0.1+ | 1998 02 21 | 360 | 0.3+ | 0.6+ |
| 1996 10 11 | 360 | 0.1+ | 0.2− | 1996 11 06 | 360 | 0.2− | 1.1+ | 1998 02 21 | 360 | 0.3− | 0.1− |
| 1996 10 11 | 360 | 0.1− | 0.4− | 1996 11 06 | 360 | 0.6− | 0.5+ | 1998 02 21 | 360 | 0.0  | 0.5+ |
| 1996 10 11 | 360 | 0.1+ | 0.2− | 1996 11 06 | 360 | 0.4− | 0.1− | 1998 03 01 | 360 | 0.2+ | 0.5− |
| 1996 10 16 | 360 | 0.0  | 0.2+ | 1996 11 13 | 360 | 0.3+ | 0.3+ | 1998 03 01 | 360 | 0.1− | 0.0  |
| 1996 10 16 | 360 | 0.1− | 0.3+ | 1996 11 13 | 360 | 0.1+ | 0.1− | 1998 03 01 | 360 | 0.0  | 0.3− |
| 1996 10 16 | 360 | 0.1− | 0.3+ | 1996 11 13 | 360 | 0.1+ | 0.2− |            |     |      |      |

**1996 TY<sub>7</sub> = 1975 TV<sub>6</sub>**

Id. A. Nakamura (1998 observations), S. Nakano

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Nakano

| <i>M</i> | 93.01449   |          | (2000.0)  | <b>P</b>    | <b>Q</b>    |          |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.23534722 | $\omega$ | 357.62458 | +0.76084594 | −0.64373314 |          |   |
| <i>a</i> | 2.5981447  | $\Omega$ | 42.81842  | +0.59735492 | +0.64540338 |          |   |
| <i>e</i> | 0.2661256  | <i>i</i> | 6.92786   | +0.25353610 | +0.41117164 |          |   |
| <i>P</i> | 4.19       | <i>H</i> | 14.9      | <i>G</i>    | 0.15        | <i>U</i> | 2 |

## Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1975 10 10 | 033 | 0.0  | 0.1+ | 1996 10 23 | 900 | 0.5− | 0.4+ | 1996 12 08 | 900 | 0.7− | 0.7+ |
| 1996 10 11 | 367 | 0.1− | 0.2+ | 1996 10 23 | 900 | 0.6− | 1.4+ | 1996 12 14 | 367 | 0.3− | 0.3− |
| 1996 10 11 | 367 | 0.2− | 1.0+ | 1996 10 27 | 367 | 0.1− | 0.1− | 1996 12 14 | 367 | 0.6+ | 0.3+ |
| 1996 10 12 | 367 | 0.6+ | 0.4− | 1996 10 27 | 367 | 0.4− | 0.6+ | 1996 12 15 | 402 | 0.1− | 0.0  |
| 1996 10 12 | 367 | 0.5+ | 0.5− | 1996 10 29 | 367 | 0.5− | 0.2+ | 1996 12 15 | 402 | 0.1+ | 0.4+ |
| 1996 10 13 | 367 | 0.2+ | 0.3− | 1996 10 29 | 367 | 0.1− | 0.4− | 1997 01 04 | 367 | 0.1+ | 0.2− |
| 1996 10 13 | 367 | 0.0  | 0.0  | 1996 11 08 | 691 | 1.2− | 0.1− | 1997 01 04 | 367 | 0.7− | 0.8− |
| 1996 10 14 | 367 | 0.4+ | 0.4− | 1996 11 08 | 691 | 1.5− | 0.1+ | 1998 03 01 | 360 | 0.1+ | 0.2− |
| 1996 10 14 | 367 | 0.5+ | 0.2− | 1996 11 08 | 691 | 1.2− | 0.1− | 1998 03 01 | 360 | 0.1+ | 0.1+ |
| 1996 10 16 | 367 | 0.5+ | 0.3− | 1996 11 15 | 900 | 0.6+ | 0.3− | 1998 03 01 | 360 | 0.3− | 0.3+ |

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1996 10 16 | 367 | 0.7+ | 0.2- | 1996 11 15 | 900 | 0.2- | 0.6- | 1998 03 02 | 360 | 0.1+ | 0.1- |
| 1996 10 17 | 900 | 0.2+ | 0.4- | 1996 12 02 | 900 | 1.9+ | 0.6- | 1998 03 02 | 360 | 0.1- | 0.1- |
| 1996 10 17 | 900 | 0.3+ | 0.2- | 1996 12 02 | 900 | 1.8+ | 0.8+ | 1998 03 02 | 360 | 0.1+ | 0.0  |

**1996 TM<sub>9</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 158.79834  |          | (2000.0)  |  | <b>P</b>      |  | <b>Q</b>    |
|----------|------------|----------|-----------|--|---------------|--|-------------|
| <i>n</i> | 0.30384571 | $\omega$ | 355.11062 |  | +0.99705906   |  | +0.07663687 |
| <i>a</i> | 2.1912940  | $\Omega$ | 0.49416   |  | -0.06978063   |  | +0.90857200 |
| <i>e</i> | 0.0270709  | <i>i</i> | 0.88239   |  | -0.03168424   |  | +0.41063818 |
| <i>P</i> | 3.24       | <i>H</i> | 15.5      |  | <i>G</i> 0.15 |  | <i>U</i> 4  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1996 10 14 | 046 | 0.2- | 0.2+ | 1996 10 19 | 046 | 0.1+ | 0.1+ | 1996 11 06 | 691 | 1.2- | 0.0  |
| 1996 10 14 | 046 | 0.3- | 0.1- | 1996 10 19 | 046 | 0.0  | 0.0  | 1996 11 06 | 691 | 1.3- | 0.2- |
| 1996 10 14 | 046 | 0.3- | 0.2+ | 1996 10 19 | 046 | 0.3+ | 0.1- | 1996 11 15 | 046 | 0.7- | 0.0  |
| 1996 10 14 | 046 | 0.1- | 0.2- | 1996 10 23 | 046 | 0.9+ | 0.4+ | 1996 11 15 | 046 | 0.5- | 0.0  |
| 1996 10 14 | 046 | 0.3+ | 0.0  | 1996 10 23 | 046 | 0.4+ | 0.3+ | 1996 12 12 | 046 | 0.1+ | 0.0  |
| 1996 10 14 | 046 | 0.1- | 0.4+ | 1996 10 23 | 046 | 0.3+ | 0.4+ | 1996 12 12 | 046 | 0.1+ | 0.1+ |
| 1996 10 14 | 046 | 0.1- | 0.4+ | 1996 10 23 | 046 | 0.4+ | 0.0  | 1996 12 12 | 046 | 0.1+ | 0.2+ |
| 1996 10 14 | 046 | 0.0  | 0.1+ | 1996 11 03 | 046 | 0.5+ | 0.1+ | 1998 02 27 | 046 | 0.2- | 0.2- |
| 1996 10 16 | 046 | 0.4- | 0.3+ | 1996 11 03 | 046 | 0.6+ | 0.3+ | 1998 02 27 | 046 | 0.0  | 0.2- |
| 1996 10 16 | 046 | 0.8- | 0.3- | 1996 11 03 | 046 | 0.4+ | 0.1+ | 1998 02 27 | 046 | 0.1- | 0.1- |
| 1996 10 16 | 046 | 0.1- | 0.1+ | 1996 11 04 | 046 | 0.2+ | 0.7- | 1998 03 06 | 046 | 0.0  | 0.5+ |
| 1996 10 18 | 566 | 0.4+ | 0.4- | 1996 11 04 | 046 | 1.0+ | 0.4- | 1998 03 06 | 046 | 0.1+ | 0.1- |
| 1996 10 18 | 566 | 0.1- | 0.6- | 1996 11 04 | 046 | 1.3+ | 0.5- | 1998 03 06 | 046 | 0.2+ | 0.1+ |
| 1996 10 18 | 566 | 0.1+ | 0.1- | 1996 11 06 | 691 | 1.2- | 0.1+ |            |     |      |      |

**1996 TU<sub>11</sub>**

Id. P. G. Comba (1998 observations)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 104.06515  |          | (2000.0)  |  | <b>P</b>      |  | <b>Q</b>    |
|----------|------------|----------|-----------|--|---------------|--|-------------|
| <i>n</i> | 0.28769182 | $\omega$ | 342.40047 |  | +0.59362064   |  | -0.79398749 |
| <i>a</i> | 2.2725723  | $\Omega$ | 70.98817  |  | +0.75401864   |  | +0.49182499 |
| <i>e</i> | 0.0967925  | <i>i</i> | 7.97315   |  | +0.28119464   |  | +0.35734024 |
| <i>P</i> | 3.43       | <i>H</i> | 15.5      |  | <i>G</i> 0.15 |  | <i>U</i> 3  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1996 10 13 | 684 | 0.0  | 0.0  | 1996 11 04 | 684 | 0.1+ | 0.1+ | 1998 03 02 | 684 | 0.0  | 0.0  |
| 1996 10 13 | 684 | 0.0  | 0.1- | 1996 11 04 | 684 | 0.1- | 0.2+ | 1998 03 03 | 684 | 0.1- | 0.1+ |
| 1996 10 14 | 684 | 0.1- | 0.0  | 1996 11 04 | 684 | 0.1+ | 0.0  | 1998 03 03 | 684 | 0.1- | 0.1+ |
| 1996 10 14 | 684 | 0.0  | 0.1- | 1996 12 03 | 684 | 0.0  | 0.0  | 1998 03 03 | 684 | 0.0  | 0.1+ |
| 1996 10 14 | 684 | 0.0  | 0.0  | 1996 12 03 | 684 | 0.0  | 0.1- | 1998 03 04 | 684 | 0.3+ | 0.3- |
| 1996 10 15 | 684 | 0.0  | 0.1- | 1998 03 02 | 684 | 0.2- | 0.0  | 1998 03 04 | 684 | 0.0  | 0.1- |
| 1996 10 15 | 684 | 0.2+ | 0.1+ | 1998 03 02 | 684 | 0.0  | 0.0  |            |     |      |      |

**1996 TD<sub>21</sub> = 1991 EA<sub>8</sub> = 1992 SZ<sub>6</sub> = 1998 DD<sub>16</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 288.38182  |          | (2000.0)  |  | <b>P</b>      |  | <b>Q</b>    |
|----------|------------|----------|-----------|--|---------------|--|-------------|
| <i>n</i> | 0.27944836 | $\omega$ | 193.32797 |  | -0.71289529   |  | +0.70106693 |
| <i>a</i> | 2.3170479  | $\Omega$ | 31.20624  |  | -0.64037594   |  | -0.64098240 |
| <i>e</i> | 0.0991821  | <i>i</i> | 1.86871   |  | -0.28583029   |  | -0.31248475 |
| <i>P</i> | 3.53       | <i>H</i> | 15.5      |  | <i>G</i> 0.15 |  | <i>U</i> 2  |

Residuals in seconds of arc

|            |     |       |        |            |     |      |      |            |     |      |      |
|------------|-----|-------|--------|------------|-----|------|------|------------|-----|------|------|
| 1991 03 09 | 372 | 1.6-  | 3.3-   | 1996 10 05 | 691 | 0.5+ | 0.0  | 1996 10 08 | 691 | 0.6- | 0.4- |
| 1991 03 09 | 372 | (1.6- | 14.4-) | 1996 10 05 | 691 | 0.4+ | 0.1- | 1998 02 25 | 566 | 0.0  | 0.7+ |
| 1992 09 26 | 691 | 0.9+  | 0.0    | 1996 10 05 | 691 | 0.3+ | 0.0  | 1998 02 25 | 566 | 0.4+ | 1.0+ |
| 1992 09 26 | 691 | 0.0   | 0.1-   | 1996 10 06 | 691 | 0.3+ | 0.0  | 1998 02 25 | 566 | 0.0  | 0.9+ |
| 1992 09 26 | 691 | 0.1+  | 0.2+   | 1996 10 06 | 691 | 0.2+ | 0.2- | 1998 02 27 | 566 | 0.6+ | 0.3+ |
| 1992 09 27 | 691 | 0.1-  | 0.1+   | 1996 10 06 | 691 | 0.3+ | 0.2- | 1998 02 27 | 566 | 0.2+ | 0.2+ |
| 1992 09 27 | 691 | 0.5-  | 0.3-   | 1996 10 08 | 691 | 0.4- | 0.1- | 1998 02 27 | 566 | 0.1+ | 0.1- |
| 1992 09 27 | 691 | 0.3-  | 0.1+   | 1996 10 08 | 691 | 0.5- | 0.0  |            |     |      |      |

**1996 UR = 1987 SD<sub>6</sub>**

Id. T. Urata (1998 observations), S. Nakano

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 97.59896   |          | (2000.0)  |  | <b>P</b>      |  | <b>Q</b>    |
|----------|------------|----------|-----------|--|---------------|--|-------------|
| <i>n</i> | 0.22305793 | $\omega$ | 190.35470 |  | +0.90797743   |  | -0.41824046 |
| <i>a</i> | 2.6927184  | $\Omega$ | 194.45015 |  | +0.39138757   |  | +0.86828751 |
| <i>e</i> | 0.1609675  | <i>i</i> | 5.87276   |  | +0.14964212   |  | +0.26674279 |
| <i>P</i> | 4.42       | <i>H</i> | 13.3      |  | <i>G</i> 0.15 |  | <i>U</i> 2  |

Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |       |       |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|-------|-------|
| 1987 09 21 | 046 | 0.8+  | 1.1-  | 1996 10 30 | 385 | 0.4- | 0.0  | 1997 01 07 | 385 | 0.1+  | 0.4-  |
| 1987 09 21 | 046 | 0.2+  | 2.1-  | 1996 10 30 | 385 | 0.4- | 0.4+ | 1997 01 07 | 385 | 0.6-  | 0.9-  |
| 1996 10 16 | 905 | (3.0- | 1.0-) | 1996 11 09 | 385 | 0.5- | 0.5+ | 1997 01 23 | 327 | 0.3+  | 0.5-  |
| 1996 10 16 | 905 | 0.2+  | 0.2-  | 1996 11 09 | 385 | 0.6- | 0.5+ | 1997 01 23 | 327 | 0.3+  | 0.0   |
| 1996 10 19 | 385 | 0.3+  | 0.2-  | 1996 11 09 | 385 | 0.5- | 0.4+ | 1997 01 23 | 327 | 0.2+  | 0.6-  |
| 1996 10 19 | 385 | 0.2+  | 0.2-  | 1996 12 14 | 385 | 0.2- | 0.6+ | 1998 02 06 | 385 | 0.0   | 0.7-  |
| 1996 10 19 | 385 | 0.7+  | 0.3-  | 1996 12 14 | 385 | 0.2- | 0.3+ | 1998 02 06 | 385 | 0.2+  | 0.2-  |
| 1996 10 21 | 385 | 0.1+  | 0.6+  | 1996 12 14 | 385 | 0.4- | 0.3+ | 1998 03 03 | 385 | 0.7-  | 0.7-  |
| 1996 10 21 | 385 | 0.3-  | 0.7+  | 1997 01 06 | 385 | 0.8+ | 0.0  | 1998 03 03 | 385 | (2.4+ | 3.0-) |
| 1996 10 21 | 385 | 0.3+  | 0.4+  | 1997 01 06 | 385 | 0.1- | 0.5- |            |     |       |       |
| 1996 10 30 | 385 | 0.5-  | 0.5+  | 1997 01 07 | 385 | 1.0+ | 0.3- |            |     |       |       |

**1996 UA<sub>3</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 156.98772  |          | (2000.0)  |  | <b>P</b>      |  | <b>Q</b>    |
|----------|------------|----------|-----------|--|---------------|--|-------------|
| <i>n</i> | 0.27771566 | $\omega$ | 275.48079 |  | +0.94176160   |  | +0.30962527 |
| <i>a</i> | 2.3266754  | $\Omega$ | 66.53685  |  | -0.22287098   |  | +0.86687119 |
| <i>e</i> | 0.1434623  | <i>i</i> | 8.22390   |  | -0.25182060   |  | +0.39072564 |
| <i>P</i> | 3.55       | <i>H</i> | 16.0      |  | <i>G</i> 0.15 |  | <i>U</i> 4  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |       |       |
|------------|-----|------|------|------------|-----|------|------|------------|-----|-------|-------|
| 1996 10 24 | 118 | 0.4- | 1.0- | 1996 11 04 | 118 | 0.2- | 0.2+ | 1996 12 25 | 118 | (0.5- | 2.3+) |
| 1996 10 24 | 118 | 0.4- | 0.3- | 1996 11 04 | 118 | 0.2- | 0.1- | 1996 12 25 | 118 | (1.6- | 3.7+) |
| 1996 10 24 | 118 | 0.1- | 1.1- | 1996 11 05 | 046 | 0.5- | 0.2- | 1996 12 26 | 118 | (0.8- | 2.5+) |
| 1996 10 30 | 118 | 1.5+ | 0.1- | 1996 11 05 | 046 | 0.1- | 0.2+ | 1996 12 26 | 118 | 1.6-  | 1.2+  |
| 1996 10 30 | 118 | 1.2- | 0.0  | 1996 11 05 | 046 | 0.3- | 0.2+ | 1996 12 27 | 118 | 0.3-  | 0.6-  |
| 1996 10 30 | 118 | 0.4- | 0.3- | 1996 11 05 | 046 | 0.1- | 0.1- | 1996 12 27 | 118 | 1.2-  | 1.1-  |
| 1996 10 31 | 118 | 0.0  | 0.4- | 1996 11 08 | 118 | 0.1+ | 0.1- | 1996 12 27 | 118 | 0.0   | 0.1-  |
| 1996 10 31 | 118 | 0.6+ | 0.6- | 1996 11 08 | 118 | 0.3+ | 0.0  | 1996 12 29 | 118 | 0.1+  | 0.3+  |
| 1996 10 31 | 118 | 0.4+ | 0.5- | 1996 11 08 | 118 | 0.2+ | 0.2+ | 1996 12 29 | 118 | 0.7+  | 0.4-  |
| 1996 11 03 | 118 | 0.3+ | 0.2+ | 1996 11 09 | 118 | 0.3- | 0.2+ | 1998 02 21 | 118 | 0.1+  | 0.0   |
| 1996 11 03 | 118 | 0.4+ | 0.1+ | 1996 11 09 | 118 | 0.5- | 0.2+ | 1998 02 21 | 118 | 0.0   | 0.3-  |
| 1996 11 03 | 118 | 0.1+ | 0.2- | 1996 11 12 | 118 | 0.0  | 0.6+ | 1998 02 21 | 118 | 0.6+  | 0.3-  |
| 1996 11 03 | 046 | 0.1- | 0.2- | 1996 11 12 | 118 | 0.2- | 1.0+ | 1998 02 22 | 118 | 0.5+  | 0.1-  |
| 1996 11 03 | 046 | 0.2+ | 0.1+ | 1996 11 12 | 118 | 0.6+ | 0.8+ | 1998 02 22 | 118 | 0.7+  | 0.1-  |
| 1996 11 03 | 046 | 0.0  | 0.2- | 1996 11 19 | 118 | 0.5+ | 0.5+ | 1998 02 22 | 118 | 0.0   | 0.0   |
| 1996 11 03 | 046 | 0.1+ | 0.1- | 1996 12 01 | 118 | 1.0+ | 0.9+ | 1998 02 28 | 118 | 0.9-  | 0.1+  |
| 1996 11 03 | 046 | 0.1+ | 0.4+ | 1996 12 01 | 118 | 0.5+ | 0.2- | 1998 02 28 | 118 | 1.4-  | 0.1+  |

**1996 VQ<sub>1</sub> = 1991 RU<sub>35</sub>**

Id. V. Goretti (1998 observations), G. V. Williams

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 246.12806  |          | (2000.0)  |  | <b>P</b>      |  | <b>Q</b>    |
|----------|------------|----------|-----------|--|---------------|--|-------------|
| <i>n</i> | 0.22710380 | $\omega$ | 292.81580 |  | -0.39810206   |  | +0.90580116 |
| <i>a</i> | 2.6606420  | $\Omega$ | 312.88710 |  | -0.75224014   |  | -0.41284185 |
| <i>e</i> | 0.0673371  | <i>i</i> | 11.41799  |  | -0.52502335   |  | -0.09531976 |
| <i>P</i> | 4.34       | <i>H</i> | 13.5      |  | <i>G</i> 0.15 |  | <i>U</i> 4  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1991 09 14 | 675 | 0.0  | 0.6- | 1996 11 08 | 610 | 0.2- | 0.1- | 1996 11 18 | 825 | 0.1- | 0.1+ |
| 1991 09 14 | 675 | 0.6+ | 0.5- | 1996 11 13 | 825 | 0.3- | 0.6+ | 1996 11 18 | 825 | 1.7- | 1.3- |
| 1996 11 03 | 610 | 0.8+ | 1.4- | 1996 11 13 | 825 | 1.2+ | 1.0+ | 1998 02 05 | 610 | 0.5- | 0.0  |
| 1996 11 03 | 610 | 0.5+ | 1.0- | 1996 11 13 | 825 | 1.1+ | 0.4- | 1998 02 05 | 610 | 0.8- | 0.6- |
| 1996 11 03 | 610 | 0.3+ | 0.5- | 1996 11 13 | 825 | 0.2+ | 0.8+ | 1998 02 06 | 610 | 1.0- | 1.2- |
| 1996 11 04 | 610 | 0.3+ | 0.2+ | 1996 11 14 | 825 | 0.1- | 0.8- | 1998 02 18 | 610 | 0.5+ | 0.2+ |

## 1998 MAR. 13

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1996 11 04 | 610 | 0.1− | 0.3+ | 1996 11 14 | 825 | 0.2− | 0.5+ | 1998 02 18 | 610 | 0.4+ | 0.2+ |
| 1996 11 04 | 610 | 0.2− | 0.5+ | 1996 11 14 | 825 | 0.3− | 0.5+ | 1998 02 18 | 610 | 0.3+ | 0.2+ |
| 1996 11 08 | 610 | 0.0  | 0.0  | 1996 11 18 | 825 | 0.7+ | 1.6+ | 1998 02 18 | 610 | 0.5+ | 0.1+ |
| 1996 11 08 | 610 | 0.1− | 0.0  | 1996 11 18 | 825 | 2.0− | 0.0  |            |     |      |      |

**1996 VN<sub>3</sub> = 1984 SH<sub>7</sub> = 1998 DP<sub>27</sub>**

Id. G. V. Williams, S. Nakano

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| Williams |            |          |          | Williams    |      |             |   |
|----------|------------|----------|----------|-------------|------|-------------|---|
| <i>M</i> | 57.44050   | (2000.0) |          | <b>P</b>    |      | <b>Q</b>    |   |
| <i>n</i> | 0.17260129 | $\omega$ | 5.68380  | +0.19957218 |      | −0.97924339 |   |
| <i>a</i> | 3.1947731  | $\Omega$ | 72.80806 | +0.89755897 |      | +0.16819051 |   |
| <i>e</i> | 0.2216920  | <i>i</i> | 2.12376  | +0.39313971 |      | +0.11311205 |   |
| <i>P</i> | 5.71       | <i>H</i> | 13.5     | <i>G</i>    | 0.15 | <i>U</i>    | 3 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1984 09 23 | 071 | 1.8+ | 0.3− | 1996 11 15 | 411 | 0.2− | 0.6− | 1998 02 21 | 691 | 0.1+ | 0.4− |
| 1984 09 24 | 071 | 0.7− | 2.1− | 1996 11 30 | 411 | 0.3+ | 0.1+ | 1998 02 21 | 691 | 0.1− | 0.5− |
| 1996 11 06 | 411 | 1.4+ | 0.4− | 1996 11 30 | 411 | 0.5+ | 0.1+ | 1998 02 21 | 691 | 0.2− | 0.6− |
| 1996 11 06 | 411 | 0.4+ | 0.2− | 1996 12 08 | 411 | 1.1− | 0.4+ | 1998 03 03 | 691 | 0.4− | 0.7− |
| 1996 11 13 | 411 | 0.9+ | 0.4+ | 1996 12 08 | 411 | 0.1− | 0.3+ | 1998 03 03 | 691 | 0.3− | 0.5− |
| 1996 11 13 | 411 | 0.2− | 0.3− | 1997 01 16 | 691 | 0.4− | 0.1+ | 1998 03 03 | 691 | 0.4− | 0.4− |
| 1996 11 13 | 411 | 0.8− | 0.7− | 1997 01 16 | 691 | 0.7− | 0.5+ |            |     |      |      |
| 1996 11 15 | 411 | 0.2− | 0.0  | 1997 01 16 | 691 | 0.3− | 0.5+ |            |     |      |      |

**1996 VN<sub>4</sub> = 1994 LQ<sub>6</sub> = 1998 CO<sub>4</sub>**

Id. B. G. Marsden, S. Nakano, T. Urata, A. Gnädig

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| Marsden  |            |          |           | Marsden     |      |             |   |
|----------|------------|----------|-----------|-------------|------|-------------|---|
| <i>M</i> | 340.61403  | (2000.0) |           | <b>P</b>    |      | <b>Q</b>    |   |
| <i>n</i> | 0.19597973 | $\omega$ | 301.32827 | −0.93791020 |      | −0.34664055 |   |
| <i>a</i> | 2.9353638  | $\Omega$ | 218.39397 | +0.32486484 |      | −0.86481460 |   |
| <i>e</i> | 0.0404617  | <i>i</i> | 1.18431   | +0.12160300 |      | −0.36322999 |   |
| <i>P</i> | 5.03       | <i>H</i> | 13.0      | <i>G</i>    | 0.15 | <i>U</i>    | 4 |

Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |       |       |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|-------|-------|
| 1994 06 03 | 809 | 0.1+  | 1.0+  | 1996 11 15 | 369 | 0.2+ | 0.2− | 1996 12 29 | 369 | 0.1−  | 0.1+  |
| 1994 06 03 | 809 | 0.5+  | 1.4+  | 1996 11 15 | 369 | 0.0  | 0.6+ | 1996 12 29 | 369 | 0.5+  | 0.2−  |
| 1994 06 03 | 809 | 1.4+  | 0.2+  | 1996 11 15 | 369 | 0.3− | 0.4+ | 1996 12 29 | 369 | 0.4+  | 0.4−  |
| 1994 06 04 | 809 | (2.7− | 1.8+) | 1996 11 28 | 369 | 0.2− | 0.4− | 1996 12 29 | 369 | 1.0−  | 0.4−  |
| 1994 06 04 | 809 | 1.5−  | 1.1+  | 1996 11 28 | 369 | 0.1− | 0.8− | 1998 02 06 | 809 | (1.5+ | 2.4+) |
| 1994 06 04 | 809 | (0.2− | 3.0+) | 1996 11 28 | 369 | 0.1− | 0.3+ | 1998 02 06 | 809 | 0.0   | 1.5+  |
| 1996 11 06 | 369 | 0.2−  | 0.5+  | 1996 12 14 | 369 | 0.4+ | 0.1+ | 1998 02 06 | 809 | 1.0+  | 1.3+  |
| 1996 11 06 | 369 | 0.2+  | 0.2−  | 1996 12 14 | 369 | 0.3+ | 0.5+ | 1998 02 07 | 809 | 0.5−  | 0.9−  |
| 1996 11 06 | 369 | 0.6+  | 0.9+  | 1996 12 28 | 369 | 0.6+ | 0.7+ | 1998 02 07 | 809 | 0.1+  | 0.8−  |
| 1996 11 13 | 369 | 0.6−  | 0.6+  | 1996 12 28 | 369 | 0.1− | 0.7+ | 1998 02 07 | 809 | 0.3−  | 0.3−  |
| 1996 11 13 | 369 | 0.5−  | 0.2+  | 1996 12 29 | 369 | 0.2+ | 0.1− |            |     |       |       |
| 1996 11 13 | 369 | 0.6−  | 0.3+  | 1996 12 29 | 369 | 0.1− | 0.6+ |            |     |       |       |

**1996 VZ<sub>37</sub> = 1998 BR<sub>46</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| Williams |            |          |           | Williams    |      |             |   |
|----------|------------|----------|-----------|-------------|------|-------------|---|
| <i>M</i> | 54.51622   | (2000.0) |           | <b>P</b>    |      | <b>Q</b>    |   |
| <i>n</i> | 0.17039174 | $\omega$ | 328.17392 | +0.61215730 |      | −0.79052693 |   |
| <i>a</i> | 3.2223325  | $\Omega$ | 84.07408  | +0.72926675 |      | +0.55553209 |   |
| <i>e</i> | 0.1803552  | <i>i</i> | 1.04744   | +0.30566886 |      | +0.25778143 |   |
| <i>P</i> | 5.78       | <i>H</i> | 15.0      | <i>G</i>    | 0.15 | <i>U</i>    | 5 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1996 11 01 | 327 | 0.1+ | 0.1+ | 1996 11 09 | 327 | 0.7+ | 0.8+ | 1998 01 28 | 910 | 0.4+ | 0.1+ |
| 1996 11 01 | 327 | 0.4− | 0.4+ | 1996 11 09 | 327 | 0.0  | 0.1− | 1998 01 28 | 910 | 0.5+ | 0.1+ |
| 1996 11 01 | 327 | 0.3− | 0.6+ | 1996 11 09 | 327 | 0.2+ | 0.4+ | 1998 01 28 | 910 | 0.6+ | 0.1+ |
| 1996 11 02 | 327 | 0.1− | 0.2− | 1996 11 15 | 327 | 0.2+ | 0.7− | 1998 01 30 | 691 | 0.4− | 0.1+ |
| 1996 11 02 | 327 | 0.0  | 0.0  | 1996 11 15 | 327 | 0.0  | 0.2− | 1998 01 30 | 691 | 0.4− | 0.2− |
| 1996 11 02 | 327 | 0.1+ | 0.0  | 1996 11 15 | 327 | 0.1+ | 0.4− | 1998 01 30 | 691 | 0.7− | 0.1− |
| 1996 11 02 | 327 | 0.2− | 0.9− | 1996 11 15 | 327 | 0.2− | 0.0  |            |     |      |      |

**1996 VO<sub>38</sub> = 1998 BX<sub>45</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| Williams |            |          |           | Williams    |      |             |   |
|----------|------------|----------|-----------|-------------|------|-------------|---|
| <i>M</i> | 175.29937  | (2000.0) |           | <b>P</b>    |      | <b>Q</b>    |   |
| <i>n</i> | 0.20470925 | $\omega$ | 173.87146 | +0.62467667 |      | +0.78008133 |   |
| <i>a</i> | 2.8513098  | $\Omega$ | 134.78008 | −0.71854704 |      | +0.59196114 |   |
| <i>e</i> | 0.0609334  | <i>i</i> | 2.85753   | −0.30572735 |      | +0.20262065 |   |
| <i>P</i> | 4.81       | <i>H</i> | 13.5      | <i>G</i>    | 0.15 | <i>U</i>    | 5 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1996 11 07 | 399 | 0.6− | 0.2+ | 1998 01 25 | 566 | 0.6+ | 0.0  | 1998 02 27 | 910 | 0.0  | 1.0+ |
| 1996 11 07 | 399 | 1.4− | 0.2− | 1998 01 25 | 566 | 0.2+ | 0.2− | 1998 02 27 | 910 | 0.3− | 0.6− |
| 1996 11 12 | 399 | 1.0+ | 0.9+ | 1998 01 25 | 566 | 0.6+ | 0.1+ | 1998 02 27 | 910 | 0.4− | 0.6− |
| 1996 11 12 | 399 | 0.1+ | 1.6− | 1998 01 26 | 691 | 0.4− | 0.4+ | 1998 03 02 | 910 | 0.2− | 0.1− |
| 1996 11 15 | 399 | 0.4+ | 0.9+ | 1998 01 26 | 691 | 0.2− | 0.3+ | 1998 03 02 | 910 | 0.1+ | 0.2− |
| 1996 11 15 | 399 | 0.5+ | 0.2− | 1998 01 26 | 691 | 0.1− | 0.0  | 1998 03 02 | 910 | 0.2+ | 0.3− |

**1996 XY**

Id. E. Bowell (1989 observations)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| Williams |            |          |           | Williams    |      |             |   |
|----------|------------|----------|-----------|-------------|------|-------------|---|
| <i>M</i> | 277.79016  | (2000.0) |           | <b>P</b>    |      | <b>Q</b>    |   |
| <i>n</i> | 0.21295586 | $\omega$ | 158.64300 | −0.46311369 |      | +0.86689070 |   |
| <i>a</i> | 2.7772160  | $\Omega$ | 83.36125  | −0.83769432 |      | −0.36015588 |   |
| <i>e</i> | 0.0567650  | <i>i</i> | 10.70237  | −0.28947182 |      | −0.34465673 |   |
| <i>P</i> | 4.63       | <i>H</i> | 13.5      | <i>G</i>    | 0.15 | <i>U</i>    | 5 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1989 03 30 | 675 | 0.6+ | 2.0− | 1996 12 03 | 411 | 0.1+ | 0.2− | 1996 12 15 | 595 | 0.8− | 0.4+ |
| 1989 03 30 | 675 | 0.5+ | 0.3+ | 1996 12 03 | 411 | 0.7− | 0.3− | 1996 12 15 | 595 | 0.5− | 0.4+ |
| 1989 04 01 | 675 | 0.4− | 0.7+ | 1996 12 08 | 411 | 0.5+ | 0.5+ | 1996 12 20 | 411 | 0.1− | 0.8+ |
| 1989 04 01 | 675 | 0.7− | 1.0+ | 1996 12 08 | 411 | 1.0+ | 0.3+ | 1996 12 20 | 411 | 0.3+ | 0.2− |
| 1996 12 02 | 411 | 0.7− | 0.6+ | 1996 12 12 | 411 | 0.8+ | 0.3− | 1996 12 28 | 411 | 0.8− | 0.2− |
| 1996 12 02 | 411 | 0.0  | 1.0− | 1996 12 12 | 411 | 0.3+ | 0.1− | 1996 12 28 | 411 | 0.7+ | 0.6− |

**1996 XJ<sub>2</sub>**

Id. M. Tichý (1998 observations)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| Marsden  |            |          |          | Marsden     |      |             |   |
|----------|------------|----------|----------|-------------|------|-------------|---|
| <i>M</i> | 48.18495   | (2000.0) |          | <b>P</b>    |      | <b>Q</b>    |   |
| <i>n</i> | 0.17168620 | $\omega$ | 14.44133 | −0.11301962 |      | −0.92810188 |   |
| <i>a</i> | 3.2061152  | $\Omega$ | 82.99192 | +0.87247030 |      | −0.26354143 |   |
| <i>e</i> | 0.1317616  | <i>i</i> | 20.94237 | +0.47541786 |      | +0.26300726 |   |
| <i>P</i> | 5.74       | <i>H</i> | 14.5     | <i>G</i>    | 0.15 | <i>U</i>    | 3 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1996 11 30 | 046 | 0.4− | 0.4− | 1996 12 05 | 046 | 0.1+ | 0.0  | 1997 01 08 | 046 | 0.3− | 1.0+ |
| 1996 11 30 | 046 | 0.1+ | 0.1+ | 1996 12 05 | 046 | 0.3+ | 0.2+ | 1998 02 27 | 046 | 0.1− | 0.1+ |
| 1996 12 04 | 046 | 0.2+ | 0.1+ | 1996 12 10 | 046 | 0.1+ | 1.1− | 1998 02 27 | 046 | 0.5+ | 0.6+ |
| 1996 12 04 | 046 | 0.2+ | 0.4+ | 1996 12 10 | 046 | 0.1+ | 0.4− | 1998 02 27 | 046 | 0.2− | 0.7+ |
| 1996 12 04 | 046 | 0.4− | 0.6+ | 1996 12 11 | 046 | 0.4+ | 0.7− | 1998 03 06 | 046 | 0.0  | 0.4+ |
| 1996 12 04 | 046 | 0.7− | 0.9+ | 1996 12 11 | 046 | 0.0  | 0.4− | 1998 03 06 | 046 | 0.3+ | 0.2− |
| 1996 12 05 | 046 | 0.1+ | 0.3+ | 1996 12 11 | 046 | 0.2+ | 0.1− | 1998 03 06 | 046 | 0.3+ | 0.4− |
| 1996 12 05 | 046 | 0.0  | 0.4+ | 1996 12 29 | 046 | 0.2− | 0.6− | 1998 03 06 | 046 | 0.7− | 1.1− |
| 1996 12 05 | 046 | 0.2+ | 0.1+ | 1996 12 29 | 046 | 0.0  | 0.2− |            |     |      |      |

**1996 XJ<sub>11</sub> = 1998 ED<sub>7</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| Williams |            |          |           | Williams    |      |             |   |
|----------|------------|----------|-----------|-------------|------|-------------|---|
| <i>M</i> | 195.79940  | (2000.0) |           | <b>P</b>    |      | <b>Q</b>    |   |
| <i>n</i> | 0.26696936 | $\omega$ | 168.94632 | +0.65263691 |      | +0.75675858 |   |
| <i>a</i> | 2.3887009  | $\Omega$ | 141.77819 | −0.69965066 |      | +0.62076142 |   |
| <i>e</i> | 0.1614431  | <i>i</i> | 3.44410   | −0.29078172 |      | +0.20486999 |   |
| <i>P</i> | 3.69       | <i>H</i> | 16.5      | <i>G</i>    | 0.15 | <i>U</i>    | 5 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1996 12 02 | 691 | 0.4− | 0.0  | 1996 12 09 | 691 | 0.6− | 0.2− | 1998 03 01 | 691 | 0.6+ | 0.2− |
| 1996 12 02 | 691 | 0.0  | 0.3+ | 1996 12 12 | 691 | 0.8+ | 0.1− | 1998 03 01 | 691 | 0.4+ | 0.1− |

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|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1996 12 02 | 691 | 0.1+ | 0.2+ | 1996 12 12 | 691 | 0.8+ | 0.0  | 1998 03 05 | 691 | 0.5- | 0.1- |
| 1996 12 09 | 691 | 0.8- | 0.1- | 1996 12 12 | 691 | 0.6+ | 0.1- | 1998 03 05 | 691 | 0.3- | 0.0  |
| 1996 12 09 | 691 | 0.4- | 0.0  | 1998 03 01 | 691 | 0.4+ | 0.1+ | 1998 03 05 | 691 | 0.6- | 0.3+ |

**1996 XC<sub>18</sub>**

Id. T. Kobayashi (1998 observations)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Nakano

|     |            |          |           |             |             |
|-----|------------|----------|-----------|-------------|-------------|
| $M$ | 305.73618  |          | (2000.0)  | <b>P</b>    | <b>Q</b>    |
| $n$ | 0.25415889 | $\omega$ | 161.20248 | -0.78446086 | +0.60875194 |
| $a$ | 2.4683070  | $\Omega$ | 56.87515  | -0.58559876 | -0.66416280 |
| $e$ | 0.1003882  | $i$      | 8.13439   | -0.20419414 | -0.43394567 |
| $P$ | 3.88       | $H$      | 14.6      | $G$ 0.15    | $U$ 4       |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1996 12 07 | 691 | 0.0  | 0.0  | 1996 12 12 | 691 | 0.2+ | 0.1- | 1998 03 02 | 411 | 0.0  | 0.1+ |
| 1996 12 07 | 691 | 0.1+ | 0.0  | 1996 12 31 | 691 | 0.3+ | 0.2+ | 1998 03 03 | 411 | 0.5+ | 0.1- |
| 1996 12 07 | 691 | 0.2+ | 0.0  | 1996 12 31 | 691 | 0.1- | 0.2- | 1998 03 03 | 411 | 0.4+ | 0.1+ |
| 1996 12 12 | 691 | 0.5- | 0.2+ | 1996 12 31 | 691 | 0.1- | 0.0  |            |     |      |      |
| 1996 12 12 | 691 | 0.0  | 0.1- | 1998 03 02 | 411 | 0.9- | 0.1- |            |     |      |      |

**1996 XD<sub>20</sub>**

Id. P. G. Comba (1998 observations)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Marsden

| $M$ | 125.68443  |          | (2000.0)  | $\mathbf{P}$ | $\mathbf{Q}$ |
|-----|------------|----------|-----------|--------------|--------------|
| $n$ | 0.26069435 | $\omega$ | 300.21126 | +0.74416412  | -0.65852834  |
| $a$ | 2.4268800  | $\Omega$ | 101.22302 | +0.64541875  | +0.66556927  |
| $e$ | 0.1123078  | $i$      | 6.56078   | +0.17220452  | +0.35122353  |
| $P$ | 3.78       | $H$      | 15.5      | $G$ 0.15     | $U$ 4        |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1996 12 13 | 684 | 0.0  | 0.2- | 1996 12 18 | 684 | 0.2+ | 0.3- | 1997 02 08 | 684 | 0.1- | 0.1+ |
| 1996 12 13 | 684 | 0.0  | 0.3- | 1996 12 18 | 684 | 0.0  | 0.1+ | 1997 02 08 | 684 | 0.5- | 0.2+ |
| 1996 12 13 | 684 | 0.0  | 0.2- | 1996 12 18 | 684 | 0.0  | 0.1- | 1998 03 04 | 684 | 0.2+ | 0.2- |
| 1996 12 14 | 684 | 0.2- | 0.2- | 1997 01 04 | 684 | 0.3+ | 0.1- | 1998 03 04 | 684 | 0.2+ | 0.0  |
| 1996 12 14 | 684 | 0.1- | 0.2- | 1997 01 04 | 684 | 0.4+ | 0.0  | 1998 03 04 | 684 | 0.3+ | 0.2- |
| 1996 12 14 | 684 | 0.2- | 0.1- | 1997 01 04 | 684 | 0.1+ | 0.1+ | 1998 03 05 | 684 | 0.2- | 0.0  |
| 1996 12 15 | 684 | 0.2+ | 0.0  | 1997 01 28 | 684 | 0.1+ | 0.6+ | 1998 03 05 | 684 | 0.7- | 0.1+ |
| 1996 12 15 | 684 | 0.1- | 0.1+ | 1997 01 28 | 684 | 0.1+ | 0.1- |            |     |      |      |
| 1996 12 15 | 684 | 0.0  | 0.2+ | 1997 02 08 | 684 | 0.5- | 0.3+ |            |     |      |      |

**1996 XA<sub>27</sub> = 1981 AC<sub>3</sub> = 1998 DK<sub>4</sub>**

Id. G. V. Williams, T. B. Spahr

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

|     |            |          |           |             |             |
|-----|------------|----------|-----------|-------------|-------------|
| $M$ | 97.50181   |          | (2000.0)  | <b>P</b>    | <b>Q</b>    |
| $n$ | 0.17863159 | $\omega$ | 65.13449  | +0.93914955 | -0.27891289 |
| $a$ | 3.1224623  | $\Omega$ | 310.38795 | +0.13149801 | +0.83116791 |
| $e$ | 0.2334648  | $i$      | 15.26321  | +0.31734271 | +0.48100676 |
| $P$ | 5.52       | $H$      | 11.5      | $G$ 0.15    | $U$ 4       |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1981 01 08 | 381 | 0.3+ | 1.2+ | 1996 12 16 | 327 | 0.4+ | 0.2+ | 1996 12 22 | 327 | 0.2- | 0.0  |
| 1981 01 08 | 381 | 0.9- | 1.5- | 1996 12 16 | 327 | 0.3+ | 0.5+ | 1998 02 22 | 566 | 0.1+ | 0.0  |
| 1981 01 08 | 381 | 1.5+ | 0.7+ | 1996 12 16 | 327 | 0.3+ | 0.1+ | 1998 02 22 | 566 | 0.1+ | 0.1- |
| 1981 01 08 | 381 | 0.9- | 0.3- | 1996 12 20 | 327 | 0.5- | 0.2- | 1998 02 22 | 566 | 0.1+ | 0.2+ |
| 1996 12 12 | 327 | 1.5+ | 0.7- | 1996 12 20 | 327 | 0.3- | 0.2- | 1998 02 23 | 566 | 0.0  | 0.1- |
| 1996 12 12 | 327 | 0.3- | 0.4+ | 1996 12 20 | 327 | 0.1- | 0.1- | 1998 02 23 | 566 | 0.0  | 0.1- |
| 1996 12 12 | 327 | 0.7- | 0.1- | 1996 12 20 | 327 | 0.1+ | 0.2- | 1998 02 23 | 566 | 0.3- | 0.0  |
| 1996 12 12 | 327 | 0.4- | 0.3+ | 1996 12 22 | 327 | 0.3+ | 0.1- |            |     |      |      |
| 1996 12 16 | 327 | 0.3- | 0.2+ | 1996 12 22 | 327 | 0.1- | 0.1- |            |     |      |      |

**1997 AP<sub>17</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

|     |            |          |           |             |             |
|-----|------------|----------|-----------|-------------|-------------|
| $M$ | 256.15933  |          | (2000.0)  | <b>P</b>    | <b>Q</b>    |
| $n$ | 0.19047930 | $\omega$ | 193.63399 | +0.32130261 | +0.92861120 |
| $a$ | 2.9916046  | $\Omega$ | 95.35680  | -0.85041974 | +0.36916478 |
| $e$ | 0.0538144  | $i$      | 10.74336  | -0.41659441 | -0.03739804 |
| $P$ | 5.17       | $H$      | 13.5      | $G$ 0.15    | $U$ 4       |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |       |       |
|------------|-----|------|------|------------|-----|------|------|------------|-----|-------|-------|
| 1989 09 04 | 675 | 0.3+ | 1.0+ | 1997 01 07 | 596 | 0.3+ | 0.0  | 1997 01 27 | 596 | 0.4-  | 0.8+  |
| 1989 09 04 | 675 | 0.3- | 0.9- | 1997 01 07 | 596 | 0.6+ | 0.2+ | 1997 01 27 | 596 | (1.7- | 2.5-) |
| 1996 12 09 | 691 | 0.2- | 0.2+ | 1997 01 15 | 596 | 0.4- | 0.8- | 1997 02 06 | 596 | 1.5+  | 0.4+  |
| 1996 12 09 | 691 | 0.2- | 0.1+ | 1997 01 15 | 596 | 0.6+ | 0.2+ | 1997 02 06 | 596 | 0.7-  | 0.9-  |
| 1996 12 09 | 691 | 0.0  | 0.1+ | 1997 01 15 | 596 | 0.4+ | 0.3- | 1997 02 06 | 596 | 0.6+  | 0.1+  |
| 1996 12 14 | 691 | 0.7- | 0.4+ | 1997 01 16 | 599 | 0.2+ | 0.4- | 1998 03 01 | 596 | 0.0   | 0.0   |
| 1996 12 14 | 691 | 0.4- | 0.2+ | 1997 01 16 | 599 | 0.1- | 0.6- | 1998 03 01 | 596 | 0.1-  | 0.1+  |
| 1996 12 14 | 691 | 0.4- | 0.3+ | 1997 01 27 | 596 | 1.0- | 1.0- | 1998 03 01 | 596 | 0.1+  | 0.0   |
| 1997 01 07 | 596 | 1.6+ | 0.2- | 1997 01 27 | 596 | 1.4- | 1.3+ |            |     |       |       |

**1997 BH<sub>3</sub> = 1995 QM<sub>10</sub>**

Id. G. V. Williams, E. Bowell (1991 observations)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

|     |            |          |           |             |             |
|-----|------------|----------|-----------|-------------|-------------|
| $M$ | 78.65892   |          | (2000.0)  | <b>P</b>    | <b>Q</b>    |
| $n$ | 0.21097532 | $\omega$ | 297.74811 | -0.29930027 | -0.95383241 |
| $a$ | 2.7945697  | $\Omega$ | 169.57555 | +0.91679292 | -0.29473030 |
| $e$ | 0.1904856  | $i$      | 7.92964   | +0.26440518 | -0.05777362 |
| $P$ | 4.67       | $H$      | 14.5      | $G$ 0.15    | $U$ 2       |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1991 12 02 | 675 | 0.7- | 0.8+ | 1997 01 31 | 589 | 0.4- | 0.6+ | 1997 02 10 | 589 | 0.1- | 0.0  |
| 1991 12 02 | 675 | 0.6+ | 0.1- | 1997 01 31 | 589 | 0.1+ | 0.5+ | 1997 02 28 | 589 | 0.3- | 1.1- |
| 1995 08 19 | 809 | 3.0- | 0.1- | 1997 01 31 | 589 | 0.1+ | 0.5+ | 1997 02 28 | 589 | 0.9- | 0.7- |
| 1995 08 20 | 809 | 2.2- | 0.6- | 1997 02 01 | 589 | 0.3+ | 0.1- | 1997 02 28 | 589 | 0.4+ | 0.7- |
| 1995 08 22 | 809 | 1.2- | 0.0  | 1997 02 01 | 589 | 0.2+ | 0.0  | 1997 02 28 | 589 | 0.2- | 0.2- |
| 1995 08 25 | 809 | 0.0  | 0.3- | 1997 02 01 | 589 | 0.3+ | 0.2- | 1997 03 04 | 589 | 0.6+ | 0.2+ |
| 1995 09 01 | 809 | 0.4+ | 0.3+ | 1997 02 01 | 589 | 0.3- | 0.2+ | 1997 03 04 | 589 | 0.1- | 0.1- |
| 1995 09 17 | 809 | 0.7+ | 0.4- | 1997 02 03 | 589 | 0.1- | 0.4- | 1997 03 11 | 589 | 0.8+ | 0.3- |
| 1995 09 18 | 809 | 0.4+ | 0.6- | 1997 02 03 | 589 | 0.1- | 0.0  | 1997 03 11 | 589 | 1.0- | 0.2- |
| 1995 09 18 | 809 | 0.8+ | 0.2- | 1997 02 03 | 589 | 0.2+ | 0.0  | 1997 03 11 | 589 | 0.8- | 0.7- |
| 1995 09 20 | 809 | 1.0+ | 1.2+ | 1997 02 03 | 589 | 0.1+ | 0.1- | 1997 03 11 | 589 | 0.1- | 0.6+ |
| 1995 09 22 | 809 | 0.5+ | 0.6+ | 1997 02 08 | 589 | 0.0  | 0.3- | 1997 04 12 | 589 | 0.4+ | 0.6- |
| 1995 09 22 | 809 | 1.5+ | 0.7+ | 1997 02 08 | 589 | 0.2+ | 1.0- | 1997 04 12 | 589 | 0.8+ | 0.8+ |
| 1995 09 23 | 809 | 0.2+ | 0.5+ | 1997 02 08 | 589 | 0.1- | 0.3- | 1997 04 12 | 589 | 0.6+ | 0.8+ |
| 1995 09 29 | 809 | 0.5+ | 1.1- | 1997 02 08 | 589 | 0.5- | 0.3- | 1997 04 25 | 589 | 0.0  | 1.1+ |
| 1997 01 17 | 599 | 0.2+ | 0.2+ | 1997 02 09 | 589 | 0.1- | 0.1- | 1997 04 25 | 589 | 0.6+ | 1.1+ |
| 1997 01 17 | 599 | 0.0  | 0.1- | 1997 02 09 | 589 | 0.2+ | 0.4- | 1997 04 28 | 589 | 0.2- | 0.2+ |
| 1997 01 30 | 589 | 0.2+ | 0.9+ | 1997 02 09 | 589 | 0.0  | 0.5- | 1997 04 28 | 589 | 0.6- | 0.4+ |
| 1997 01 30 | 589 | 0.4+ | 0.9+ | 1997 02 09 | 589 | 0.0  | 0.3- | 1997 04 28 | 589 | 0.4- | 0.3+ |
| 1997 01 30 | 589 | 0.3+ | 0.7+ | 1997 02 10 | 589 | 0.2- | 0.1- |            |     |      |      |
| 1997 01 31 | 589 | 0.3- | 0.2- | 1997 02 10 | 589 | 0.1+ | 0.2- |            |     |      |      |

**1997 BE<sub>7</sub> = 1930 MT = 1989 GW<sub>6</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Doppler

|     |            |          |           |             |             |
|-----|------------|----------|-----------|-------------|-------------|
| $M$ | 130.17590  |          | (2000.0)  | <b>P</b>    | <b>Q</b>    |
| $n$ | 0.22957704 | $\omega$ | 201.72785 | +0.58464820 | -0.80977363 |
| $a$ | 2.6414988  | $\Omega$ | 212.55371 | +0.75723879 | +0.56659125 |
| $e$ | 0.2205954  | $i$      | 5.28135   | +0.29116300 | +0.15245008 |
| $P$ | 4.29       | $H$      | 14.0      | $G$         | 0.15        |
|     |            |          |           | $U$         | 5           |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1930 06 30 | 024 | 0.6+ | 0.6- | 1997 01 28 | 327 | 0.8- | 0.7+ | 1997 02 17 | 327 | 0.6+ | 0.3- |
| 1989 04 03 | 809 | 0.8+ | 0.2- | 1997 01 28 | 327 | 3.6- | 0.9+ | 1997 02 17 | 327 | 0.1+ | 0.2+ |
| 1989 04 03 | 809 | 0.3- | 0.5+ | 1997 01 30 | 327 | 1.1- | 0.2- | 1997 02 17 | 327 | 0.3- | 0.2+ |
| 1989 04 03 | 809 | 1.4- | 0.4+ | 1997 01 30 | 327 | 0.5- | 0.5- |            |     |      |      |
| 1997 01 28 | 327 | 0.2- | 0.9+ | 1997 01 30 | 327 | 0.2- | 0.9- |            |     |      |      |

1998 MAR. 13

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**1997 CB**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 251.55455  | (2000.0)           | <b>P</b>      | <b>Q</b>    |
|----------|------------|--------------------|---------------|-------------|
| <i>n</i> | 0.27388694 | $\omega$ 191.27198 | +0.97613501   | +0.20261937 |
| <i>a</i> | 2.3483086  | $\Omega$ 156.59218 | -0.18080421   | +0.95757771 |
| <i>e</i> | 0.2792494  | <i>i</i> 11.34349  | -0.12029245   | +0.20491541 |
| <i>P</i> | 3.60       | <i>H</i> 14.5      | <i>G</i> 0.15 | <i>U</i> 4  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1997 02 01 | 557 | 0.0  | 0.1+ | 1997 02 08 | 557 | 0.1- | 0.1- | 1997 04 01 | 557 | 0.1+ | 0.2- |
| 1997 02 01 | 557 | 0.0  | 0.1+ | 1997 02 28 | 557 | 0.5+ | 0.0  | 1997 04 13 | 557 | 0.2- | 0.3+ |
| 1997 02 01 | 557 | 0.2- | 0.3+ | 1997 02 28 | 557 | 0.3+ | 0.0  | 1997 04 13 | 557 | 0.4+ | 0.4+ |
| 1997 02 02 | 557 | 0.1- | 0.2- | 1997 02 28 | 557 | 0.4- | 0.1- | 1998 02 27 | 557 | 0.3+ | 0.3- |
| 1997 02 02 | 557 | 0.7+ | 0.4+ | 1997 03 09 | 557 | 0.4- | 0.3- | 1998 02 27 | 557 | 0.0  | 0.0  |
| 1997 02 02 | 557 | 0.3- | 0.1+ | 1997 03 09 | 557 | 0.1- | 0.4- | 1998 03 01 | 557 | 0.6+ | 0.3+ |
| 1997 02 08 | 557 | 0.0  | 0.3- | 1997 04 01 | 557 | 0.3- | 0.0  | 1998 03 01 | 557 | 0.9- | 0.0  |

**1997 CQ<sub>29</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 348.86809  | (2000.0)           | <b>P</b>      | <b>Q</b>    |
|----------|------------|--------------------|---------------|-------------|
| <i>n</i> | 0.00333403 | $\omega$ 36.68531  | -0.98207811   | -0.18474962 |
| <i>a</i> | 44.3768624 | $\Omega$ 132.62396 | +0.15863517   | -0.91708079 |
| <i>e</i> | 0.0743789  | <i>i</i> 2.90451   | +0.10177165   | -0.35331345 |
| <i>P</i> | 296        | <i>H</i> 6.5       | <i>G</i> 0.15 |             |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1997 02 04 | 568 | 0.4- | 0.2+ | 1997 03 04 | 696 | 0.2- | 0.6- | 1997 04 02 | 568 | 0.1- | 0.3+ |
| 1997 02 04 | 568 | 0.4- | 0.3+ | 1997 03 04 | 696 | 0.1+ | 0.0  | 1998 02 16 | 568 | 0.4- | 0.3+ |
| 1997 02 04 | 568 | 0.4- | 0.2+ | 1997 03 04 | 696 | 0.6- | 1.1+ | 1998 02 16 | 568 | 0.0  | 0.1- |
| 1997 02 07 | 568 | 0.3+ | 0.0  | 1997 03 05 | 696 | 0.1- | 0.9- | 1998 02 16 | 568 | 0.2- | 0.6+ |
| 1997 02 07 | 568 | 0.1+ | 0.2+ | 1997 03 07 | 696 | 0.2- | 0.1- | 1998 02 17 | 568 | 0.1+ | 0.2- |
| 1997 02 09 | 568 | 0.5+ | 0.4- | 1997 03 07 | 696 | 0.2+ | 0.1+ | 1998 02 17 | 568 | 0.5- | 0.3- |
| 1997 02 09 | 568 | 0.6+ | 0.5- | 1997 04 02 | 568 | 0.2+ | 0.2+ | 1998 02 18 | 568 | 0.5+ | 0.1- |
| 1997 02 09 | 568 | 0.0  | 0.4- | 1997 04 02 | 568 | 0.4+ | 0.4+ | 1998 02 18 | 568 | 0.5+ | 0.3- |

**1997 CR<sub>29</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 5.13597    | (2000.0)           | <b>P</b>      | <b>Q</b>    |
|----------|------------|--------------------|---------------|-------------|
| <i>n</i> | 0.00328779 | $\omega$ 3.62388   | -0.65091387   | -0.71260601 |
| <i>a</i> | 44.7919648 | $\Omega$ 127.19798 | +0.68798604   | -0.69947073 |
| <i>e</i> | 0.0720839  | <i>i</i> 19.18273  | +0.32091486   | +0.05416067 |
| <i>P</i> | 300        | <i>H</i> 6.5       | <i>G</i> 0.15 |             |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1997 02 03 | 568 | 0.0  | 0.2+ | 1997 02 09 | 568 | 0.0  | 0.6- | 1998 02 16 | 568 | 0.2- | 0.3+ |
| 1997 02 03 | 568 | 0.3+ | 0.0  | 1997 02 09 | 568 | 0.5- | 0.9- | 1998 02 16 | 568 | 0.2- | 0.4+ |
| 1997 02 03 | 568 | 0.4+ | 0.3+ | 1997 02 09 | 568 | 0.2- | 0.8- | 1998 02 16 | 568 | 0.0  | 0.2+ |
| 1997 02 07 | 568 | 0.4- | 0.1+ | 1997 04 07 | 950 | 0.6+ | 1.0+ | 1998 02 18 | 568 | 0.4+ | 0.6- |
| 1997 02 07 | 568 | 0.4- | 0.3- | 1997 04 07 | 950 | 0.1+ | 1.2+ | 1998 02 18 | 568 | 0.1- | 0.6- |

**1997 CV<sub>29</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Marsden

| <i>M</i> | 57.91104   | (2000.0)           | <b>P</b>      | <b>Q</b>    |
|----------|------------|--------------------|---------------|-------------|
| <i>n</i> | 0.00344813 | $\omega$ 299.59698 | +0.47930802   | -0.86943565 |
| <i>a</i> | 43.3924013 | $\Omega$ 121.28291 | +0.84589906   | +0.42127405 |
| <i>e</i> | 0.1819833  | <i>i</i> 8.05642   | +0.23392010   | +0.25808879 |
| <i>P</i> | 286        | <i>H</i> 7.0       | <i>G</i> 0.15 | <i>U</i> 5  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1997 02 06 | 568 | 0.1+ | 0.0  | 1997 02 09 | 568 | 0.1+ | 0.0  | 1998 02 16 | 568 | 0.3+ | 0.1+ |
| 1997 02 06 | 568 | 0.2- | 0.2- | 1997 02 09 | 568 | 0.5- | 0.0  | 1998 02 16 | 568 | 0.0  | 0.5+ |
| 1997 02 06 | 568 | 0.5+ | 0.2+ | 1997 02 09 | 568 | 0.2+ | 0.1+ | 1998 02 17 | 568 | 0.1+ | 0.0  |
| 1997 02 07 | 568 | 0.1+ | 0.0  | 1997 04 07 | 950 | 0.0  | 0.1+ | 1998 02 17 | 568 | 0.1- | 0.7- |

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1997 02 07 | 568 | 0.1+ | 0.1- | 1997 04 07 | 950 | 0.1+ | 0.0  | 1998 02 18 | 568 | 0.2- | 0.2+ |
| 1997 02 09 | 568 | 0.4- | 0.2- | 1998 02 16 | 568 | 0.1+ | 0.1+ | 1998 02 18 | 568 | 0.2- | 0.2- |

**1997 QE<sub>5</sub> = 1996 JW<sub>4</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Ichikawa

| <i>M</i> | .26889     | (2000.0)           | <b>P</b>      | <b>Q</b>    |
|----------|------------|--------------------|---------------|-------------|
| <i>n</i> | 0.21049594 | $\omega$ 238.67339 | +0.95441540   | -0.28283053 |
| <i>a</i> | 2.7988110  | $\Omega$ 137.54558 | +0.29847373   | +0.90666007 |
| <i>e</i> | 0.2875079  | <i>i</i> 8.12361   | -0.00216099   | +0.31300864 |
| <i>P</i> | 4.68       | <i>H</i> 15.1      | <i>G</i> 0.15 | <i>U</i> 5  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1996 05 10 | 691 | 0.4+ | 0.2- | 1996 05 17 | 691 | 0.6- | 0.7+ | 1997 08 26 | 428 | 0.2- | 0.1- |
| 1996 05 10 | 691 | 0.5+ | 0.2- | 1996 05 17 | 691 | 0.7- | 0.1- | 1997 08 28 | 428 | 0.1- | 0.1+ |
| 1996 05 10 | 691 | 0.5+ | 0.2- | 1997 08 25 | 428 | 0.3- | 0.4- | 1997 09 03 | 428 | 0.6+ | 0.3+ |

**1997 SA<sub>3</sub> = 1991 GQ<sub>9</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Doppler

| <i>M</i> | 72.48150   | (2000.0)           | <b>P</b>      | <b>Q</b>    |
|----------|------------|--------------------|---------------|-------------|
| <i>n</i> | 0.21835020 | $\omega$ 107.16779 | +0.63293830   | +0.77385484 |
| <i>a</i> | 2.7312848  | $\Omega$ 202.14995 | -0.73164370   | +0.58808220 |
| <i>e</i> | 0.0651516  | <i>i</i> 3.52638   | -0.25315334   | +0.23517657 |
| <i>P</i> | 4.51       | <i>H</i> 14.0      | <i>G</i> 0.15 | <i>U</i> 6  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1991 04 10 | 809 | 0.2+ | 0.1+ | 1991 04 19 | 809 | 0.7+ | 0.2- | 1997 09 25 | 595 | 0.5+ | 0.7+ |
| 1991 04 10 | 809 | 0.2- | 0.6+ | 1991 04 19 | 809 | 0.5+ | 0.4+ | 1997 09 26 | 595 | 0.1- | 0.8- |
| 1991 04 10 | 809 | 0.8+ | 1.1- | 1997 09 23 | 595 | 0.7- | 0.5+ | 1997 09 26 | 595 | 0.0  | 0.6- |
| 1991 04 19 | 809 | 0.5+ | 0.3- | 1997 09 24 | 595 | 1.2- | 0.1+ | 1997 10 11 | 595 | 1.0+ | 0.9+ |
| 1991 04 19 | 809 | 2.0- | 1.3+ | 1997 09 24 | 595 | 1.1+ | 0.2+ | 1997 10 11 | 595 | 0.7- | 0.6- |
| 1991 04 19 | 809 | 0.0  | 0.5- | 1997 09 24 | 595 | 0.3- | 0.0  |            |     |      |      |
| 1991 04 19 | 809 | 0.2- | 0.3- | 1997 09 25 | 595 | 0.4+ | 0.3- |            |     |      |      |

**1997 UK<sub>24</sub> = 1951 ST = 1953 GH<sub>2</sub> = 1954 OT = 1961 UG = 1977 QS<sub>4</sub>**  
**= 1987 SA<sub>25</sub> = 1989 EK<sub>11</sub>**

Id. A. Doppler, G. V. Williams

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 46.98557   | (2000.0)           | <b>P</b>      | <b>Q</b>    |
|----------|------------|--------------------|---------------|-------------|
| <i>n</i> | 0.30147808 | $\omega$ 66.89608  | +0.98769998   | -0.14088840 |
| <i>a</i> | 2.2027518  | $\Omega$ 301.14207 | +0.09793108   | +0.89551473 |
| <i>e</i> | 0.0890983  | <i>i</i> 4.54467   | +0.12189443   | +0.42214195 |
| <i>P</i> | 3.27       | <i>H</i> 13.5      | <i>G</i> 0.15 | <i>U</i> 2  |

Residuals in seconds of arc

|            |           |       |       |            |     |       |       |            |     |      |      |
|------------|-----------|-------|-------|------------|-----|-------|-------|------------|-----|------|------|
| 1951 09 29 | 094(21.9- | 9.5+) | X     | 1987 09 23 | 095 | 0.2-  | 0.3+  | 1997 10 27 | 408 | 0.6+ | 0.3- |
| 1953 04 05 | 760       | (1.5+ | 3.9-) | 1989 03 12 | 808 | (0.9+ | 9.3-) | 1997 10 29 | 566 | 0.2- | 0.2+ |
| 1953 04 05 | 760       | (0.1+ | 5.7-) | 1989 03 12 | 808 | 1.5-  | 2.8-  | 1997 10 29 | 566 | 0.2- | 0.3+ |
| 1954 07 29 | 675       | 0.4+  | 1.0-  | 1997 10 25 | 408 | 0.5+  | 0.3-  | 1997 10 29 | 566 | 0.2- | 0.4+ |
| 1954 07 29 | 675       | 0.6+  | 0.6-  | 1997 10 25 | 408 | 0.5+  | 0.4-  | 1997 11 09 | 408 | 0.6- | 0.6- |
| 1961 10 17 | 760       | 0.4-  | 0.2-  | 1997 10 25 | 408 | 0.9-  | 0.1-  | 1997 11 09 | 408 | 0.4+ | 0.1- |
| 1961 10 17 | 760       | 0.6+  | 1.1-  | 1997 10 27 | 408 | 0.2-  | 0.2+  |            |     |      |      |
| 1977 08 21 | 095       | 0.2-  | 0.6-  | 1997 10 27 | 408 | 0.9+  | 0.1-  |            |     |      |      |

**1997 UO<sub>24</sub> = 1991 GP<sub>9</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 50.95631   | (2000.0)           | <b>P</b>      | <b>Q</b>    |
|----------|------------|--------------------|---------------|-------------|
| <i>n</i> | 0.21527681 | $\omega$ 43.12216  | +0.75889125   | +0.65064945 |
| <i>a</i> | 2.7572187  | $\Omega$ 276.26677 | -0.60467169   | +0.68853302 |
| <i>e</i> | 0.0303292  | <i>i</i> 1.56749   | -0.24177720   | +0.32027733 |
| <i>P</i> | 4.58       | <i>H</i> 15.0      | <i>G</i> 0.15 | <i>U</i> 4  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1991 04 10 | 809 | 0.0  | 0.5+ | 1997 10 30 | 621 | 0.4- | 0.2+ | 1997 11 01 | 621 | 0.2+ | 0.3+ |
| 1991 04 10 | 809 | 0.3+ | 0.8+ | 1997 10 30 | 621 | 0.5- | 0.1+ | 1997 11 02 | 621 | 0.9- | 0.7- |

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1991 04 10 | 809 | 0.5− | 0.2+ | 1997 10 30 | 621 | 0.6+ | 0.5+ | 1997 11 02 | 621 | 1.0− | 0.5− |
| 1991 04 19 | 809 | 0.6+ | 0.2− | 1997 10 31 | 621 | 0.5+ | 0.2− | 1997 12 01 | 621 | 0.5+ | 0.3− |
| 1991 04 19 | 809 | 0.3+ | 0.0  | 1997 10 31 | 621 | 0.1− | 0.3− | 1997 12 01 | 621 | 0.3+ | 0.2+ |
| 1991 04 19 | 809 | 0.5− | 1.0− | 1997 10 31 | 621 | 0.6+ | 0.2+ | 1997 12 01 | 621 | 0.5− | 0.4− |
| 1997 10 27 | 621 | 0.0  | 0.2+ | 1997 10 31 | 621 | 0.1− | 0.2− | 1997 12 30 | 621 | 0.3− | 1.3+ |
| 1997 10 27 | 621 | 0.0  | 0.5+ | 1997 11 01 | 621 | 0.5+ | 0.2− | 1997 12 30 | 621 | 0.0  | 0.1− |
| 1997 10 30 | 621 | 0.3+ | 0.0  | 1997 11 01 | 621 | 0.4+ | 0.0  | 1997 12 30 | 621 | 0.2− | 0.1+ |

**1997 VE<sub>6</sub> = 1993 RH<sub>6</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| Williams                               |  |  |  | Williams             |  |  |  |
|----------------------------------------|--|--|--|----------------------|--|--|--|
| <i>M</i> 68.42777 (2000.0)             |  |  |  | <i>P</i> 0.15        |  |  |  |
| <i>n</i> 0.27304741 $\omega$ 101.81417 |  |  |  | <i>Q</i> +0.06602893 |  |  |  |
| <i>a</i> 2.3531196 $\Omega$ 254.40207  |  |  |  | <i>U</i> +0.91706561 |  |  |  |
| <i>e</i> 0.1303628 <i>i</i> 1.12089    |  |  |  | <i>5</i> +0.39323130 |  |  |  |
| <i>P</i> 3.61 <i>H</i> 15.0            |  |  |  | <i>5</i>             |  |  |  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1993 09 15 | 809 | 0.1− | 0.2− | 1997 11 09 | 411 | 0.3+ | 1.1− | 1997 12 05 | 704 | 0.2+ | 0.1− |
| 1993 09 15 | 809 | 1.2− | 0.3+ | 1997 11 09 | 411 | 0.7− | 0.2+ | 1997 12 05 | 704 | 1.5− | 0.9+ |
| 1993 09 15 | 809 | 0.3− | 0.7+ | 1997 11 10 | 411 | 1.2+ | 1.1+ | 1997 12 05 | 704 | 0.8− | 3.2− |
| 1993 09 17 | 809 | 2.0+ | 0.1+ | 1997 11 10 | 411 | 0.1+ | 0.7− | 1997 12 29 | 566 | 0.2+ | 0.3+ |
| 1993 09 17 | 809 | 2.7+ | 0.9+ | 1997 12 04 | 704 | 0.3+ | 1.7− | 1997 12 29 | 566 | 0.7+ | 0.4+ |
| 1993 09 17 | 809 | 1.3+ | 0.6+ | 1997 12 04 | 704 | 0.2+ | 0.7− | 1997 12 29 | 566 | 0.8+ | 0.9+ |
| 1993 09 18 | 809 | 0.3+ | 2.0+ | 1997 12 04 | 704 | 1.1− | 1.1+ | 1997 12 31 | 704 | 0.2− | 1.0+ |
| 1993 09 18 | 809 | 0.3− | 1.1+ | 1997 12 04 | 704 | 0.6+ | 0.2+ | 1997 12 31 | 704 | 0.7+ | 1.2+ |
| 1993 09 18 | 809 | 0.4− | 0.6+ | 1997 12 04 | 704 | 1.1− | 1.8− | 1997 12 31 | 704 | 0.2− | 1.0+ |
| 1993 09 22 | 675 | 1.8− | 2.8− | 1997 12 05 | 704 | 0.4− | 0.1+ | 1997 12 31 | 704 | 1.0+ | 1.9+ |
| 1993 09 22 | 675 | 2.3− | 2.5− | 1997 12 05 | 704 | 0.2− | 0.3− |            |     |      |      |

**1997 WB<sub>1</sub> = 1995 FT<sub>15</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| Ichikawa                              |  |  |  | Ichikawa             |  |  |  |
|---------------------------------------|--|--|--|----------------------|--|--|--|
| <i>M</i> 350.70789 (2000.0)           |  |  |  | <i>P</i> 0.15        |  |  |  |
| <i>n</i> 0.23074917 $\omega$ 61.22328 |  |  |  | <i>Q</i> −0.86091500 |  |  |  |
| <i>a</i> 2.6325459 $\Omega$ 358.19474 |  |  |  | <i>U</i> +0.45851439 |  |  |  |
| <i>e</i> 0.0798443 <i>i</i> 2.36382   |  |  |  | <i>4</i> +0.22043120 |  |  |  |
| <i>P</i> 4.27 <i>H</i> 14.6           |  |  |  | <i>4</i>             |  |  |  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1995 03 28 | 691 | 0.5− | 0.0  | 1995 04 05 | 691 | 0.0  | 0.3+ | 1997 11 24 | 684 | 0.1− | 0.0  |
| 1995 03 28 | 691 | 0.0  | 0.6− | 1997 11 23 | 684 | 0.1− | 0.2− | 1997 11 24 | 684 | 0.0  | 0.0  |
| 1995 03 28 | 691 | 0.3+ | 0.0  | 1997 11 23 | 684 | 0.2+ | 0.2+ | 1997 12 04 | 589 | 0.5− | 0.2− |
| 1995 04 05 | 691 | 0.0  | 0.1+ | 1997 11 23 | 684 | 0.0  | 0.2+ | 1997 12 04 | 589 | 0.1+ | 0.0  |
| 1995 04 05 | 691 | 0.2+ | 0.3+ | 1997 11 24 | 684 | 0.1− | 0.1+ | 1997 12 04 | 589 | 0.5+ | 0.2− |

**1997 WV<sub>7</sub> = 1986 WL<sub>2</sub> = 1993 TD<sub>16</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| Ichikawa                              |  |  |  | Ichikawa             |  |  |  |
|---------------------------------------|--|--|--|----------------------|--|--|--|
| <i>M</i> 326.50836 (2000.0)           |  |  |  | <i>P</i> 0.15        |  |  |  |
| <i>n</i> 0.26900722 $\omega$ 77.41342 |  |  |  | <i>Q</i> −0.87007599 |  |  |  |
| <i>a</i> 2.3766219 $\Omega$ 42.11756  |  |  |  | <i>U</i> −0.45340723 |  |  |  |
| <i>e</i> 0.1456553 <i>i</i> 0.77486   |  |  |  | <i>5</i> −0.19336407 |  |  |  |
| <i>P</i> 3.66 <i>H</i> 15.0           |  |  |  | <i>5</i>             |  |  |  |

Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |       |       |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|-------|-------|
| 1986 11 30 | 046 | 3.0−  | 1.0−  | 1993 10 20 | 809 | 0.3− | 1.1− | 1997 12 03 | 369 | 0.0   | 0.4+  |
| 1986 11 30 | 046 | (5.6− | 1.0−) | 1993 10 20 | 809 | 0.5− | 1.1− | 1997 12 04 | 704 | 1.0+  | 0.0   |
| 1986 12 01 | 046 | 3.0+  | 0.9+  | 1997 11 23 | 369 | 0.1+ | 0.7− | 1997 12 04 | 704 | 1.0+  | 0.7+  |
| 1986 12 01 | 046 | (4.6+ | 3.3+) | 1997 11 23 | 369 | 0.1− | 0.5− | 1997 12 04 | 704 | (3.3+ | 0.9−) |
| 1993 10 09 | 809 | 0.2+  | 0.3+  | 1997 11 23 | 369 | 0.6+ | 0.4− | 1997 12 04 | 704 | 1.7+  | 0.3−  |
| 1993 10 09 | 809 | 0.1−  | 0.4+  | 1997 11 24 | 369 | 0.3− | 0.9+ | 1997 12 04 | 704 | 1.0+  | 0.3+  |
| 1993 10 09 | 809 | 0.8+  | 1.2+  | 1997 11 24 | 369 | 0.4− | 0.9+ | 1997 12 31 | 704 | 0.2+  | 0.8+  |
| 1993 10 11 | 809 | 0.3+  | 0.0   | 1997 11 29 | 704 | 1.5− | 1.6− | 1997 12 31 | 704 | 0.5+  | 0.4+  |
| 1993 10 11 | 809 | 1.0−  | 0.4+  | 1997 11 29 | 704 | 1.7− | 0.4− | 1997 12 31 | 704 | 0.2+  | 0.7+  |
| 1993 10 11 | 809 | 0.6−  | 0.6+  | 1997 11 29 | 704 | 1.8− | 0.4− | 1997 12 31 | 704 | 0.0   | 0.3+  |
| 1993 10 20 | 809 | 1.0+  | 0.3−  | 1997 11 29 | 704 | 0.4− | 1.0− |            |     |       |       |

**1997 WS<sub>32</sub> = 1983 RJ<sub>9</sub> = 1989 GC<sub>8</sub> = 1992 DW<sub>13</sub> = 1994 WQ<sub>13</sub>  
= 1996 FV<sub>23</sub>**Id. G. V. Williams; 1989 GC<sub>8</sub> = 1996 JE<sub>4</sub> (*MPC* 27555) is invalid

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| Williams                               |  |  |  | Williams             |  |  |  |
|----------------------------------------|--|--|--|----------------------|--|--|--|
| <i>M</i> 87.98973 (2000.0)             |  |  |  | <i>P</i> 0.15        |  |  |  |
| <i>n</i> 0.29019760 $\omega$ 217.63076 |  |  |  | <i>Q</i> +0.65888579 |  |  |  |
| <i>a</i> 2.2594713 $\Omega$ 100.98455  |  |  |  | <i>U</i> +0.71179863 |  |  |  |
| <i>e</i> 0.1507536 <i>i</i> 4.33634    |  |  |  | <i>1</i> −0.30546389 |  |  |  |
| <i>P</i> 3.40 <i>H</i> 14.0            |  |  |  | <i>1</i>             |  |  |  |

Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| 1983 09 03 | 808 | (9.9− | 1.5−) | 1996 03 24 | 691 | 0.4− | 0.0  | 1998 01 26 | 691 | 1.3− | 0.6− |
| 1983 09 03 | 808 | 0.3−  | 0.2−  | 1996 03 24 | 691 | 0.6− | 0.1− | 1998 01 26 | 691 | 1.2− | 0.4− |
| 1989 04 06 | 033 | 1.0+  | 0.0   | 1997 11 29 | 704 | 0.6− | 0.1− | 1998 02 26 | 327 | 0.3+ | 0.1− |
| 1989 04 07 | 033 | 1.0+  | 0.8+  | 1997 11 29 | 704 | 0.6+ | 0.3− | 1998 02 26 | 327 | 0.3+ | 0.4− |
| 1989 04 09 | 033 | 0.3+  | 0.3−  | 1997 11 29 | 704 | 0.8+ | 0.0  | 1998 02 26 | 327 | 0.0  | 0.2− |
| 1989 04 09 | 033 | 0.1+  | 0.9−  | 1997 11 29 | 704 | 0.1+ | 0.2+ | 1998 02 27 | 327 | 0.1+ | 0.3− |
| 1992 02 24 | 691 | 0.2−  | 0.0   | 1997 11 29 | 704 | 0.5+ | 0.4+ | 1998 02 27 | 327 | 0.3+ | 0.2− |
| 1992 02 24 | 691 | 0.4−  | 0.1+  | 1997 12 04 | 704 | 0.0  | 0.2− | 1998 02 27 | 327 | 0.0  | 0.2+ |
| 1992 02 24 | 691 | 1.0−  | 0.2+  | 1997 12 04 | 704 | 0.3+ | 0.3+ | 1998 03 01 | 327 | 0.2− | 0.0  |
| 1994 11 29 | 691 | 0.3−  | 0.1+  | 1997 12 04 | 704 | 0.5+ | 0.4+ | 1998 03 01 | 327 | 0.3+ | 0.4+ |
| 1994 11 29 | 691 | 0.2+  | 0.3+  | 1997 12 04 | 704 | 0.0  | 0.1+ | 1998 03 01 | 327 | 0.6− | 0.8− |
| 1994 11 29 | 691 | 0.0   | 0.2+  | 1997 12 04 | 704 | 0.7+ | 0.7+ |            |     |      |      |
| 1996 03 24 | 691 | 0.3−  | 0.1−  | 1998 01 26 | 691 | 1.0− | 0.5− |            |     |      |      |

**1997 WQ<sub>34</sub> = 1981 JO<sub>6</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| Williams                               |  |  |  | Williams             |  |  |  |
|----------------------------------------|--|--|--|----------------------|--|--|--|
| <i>M</i> 89.14795 (2000.0)             |  |  |  | <i>P</i> 0.15        |  |  |  |
| <i>n</i> 0.26510813 $\omega$ 235.69888 |  |  |  | <i>Q</i> +0.58567264 |  |  |  |
| <i>a</i> 2.3998680 $\Omega$ 88.21777   |  |  |  | <i>U</i> +0.76575575 |  |  |  |
| <i>e</i> 0.1061509 <i>i</i> 6.19459    |  |  |  | <i>5</i> −0.31599946 |  |  |  |
| <i>P</i> 3.72 <i>H</i> 14.0            |  |  |  | <i>5</i>             |  |  |  |

Residuals in seconds of arc

|            |     |      |      |            |     |       |       |            |     |      |      |
|------------|-----|------|------|------------|-----|-------|-------|------------|-----|------|------|
| 1981 05 08 | 675 | 0.3− | 0.2+ | 1997 12 04 | 704 | 0.3+  | 0.1−  | 1998 01 27 | 910 | 0.2+ | 0.4+ |
| 1981 05 09 | 675 | 0.3+ | 0.2− | 1997 12 04 | 704 | 1.4−  | 1.6−  | 1998 01 27 | 910 | 0.1+ | 0.2+ |
| 1997 11 29 | 704 | 0.4+ | 0.6+ | 1997 12 04 | 704 | 0.7+  | 0.8−  | 1998 02 19 | 910 | 0.1+ | 0.0  |
| 1997 11 29 | 704 | 0.2+ | 0.1+ | 1997 12 05 | 704 | 1.2+  | 0.0   | 1998 02 19 | 910 | 0.5+ | 0.3+ |
| 1997 11 29 | 704 | 0.3+ | 1.3+ | 1997 12 05 | 704 | 1.4−  | 0.4−  | 1998 02 19 | 910 | 0.7+ | 0.5− |
| 1997 11 29 | 704 | 0.3+ | 0.4+ | 1997 12 05 | 704 | 0.3−  | 0.1+  | 1998 02 20 | 910 | 0.4− | 0.0  |
| 1997 11 29 | 704 | 0.1+ | 0.4+ | 1997 12 05 | 704 | 0.6−  | 0.1−  | 1998 02 20 | 910 | 0.5− | 0.0  |
| 1997 12 04 | 704 | 0.2+ | 0.4− | 1997 12 05 | 704 | (2.4− | 0.1−) | 1998 02 20 | 910 | 0.3− | 0.4− |
| 1997 12 04 | 704 | 0.1+ | 0.1− | 1998 01 27 | 910 | 0.3−  | 0.4+  |            |     |      |      |

**1997 WQ<sub>37</sub> = 1994 CV<sub>11</sub>**

Id. S. Nakano

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|     |            |          |           |             |             |
|-----|------------|----------|-----------|-------------|-------------|
| $M$ | 30.37878   |          | (2000.0)  | $P$         | $Q$         |
| $n$ | 0.19279925 | $\omega$ | 283.11252 | +0.86366150 | −0.49916440 |
| $a$ | 2.9675576  | $\Omega$ | 106.87087 | +0.48621900 | +0.78824145 |
| $e$ | 0.0591407  | $i$      | 4.20498   | +0.13296577 | +0.35987541 |
| $P$ | 5.11       | $H$      | 13.0      | $G$ 0.15    | $U$ 5       |

1998 MAR. 13

M.P.C. 31395

1997 11 29 704 0.5+ 0.4+ 1998 02 23 327 0.1+ 0.2+ 1998 03 01 327 0.4+ 0.3+  
 1997 11 29 704 0.3+ 0.3+ 1998 02 24 327 0.0 0.3- 1998 03 01 327 0.1+ 1.0-

**1997 WB<sub>38</sub> = 1980 KG<sub>2</sub> = 1990 QF<sub>12</sub> = 1990 QJ<sub>18</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Gnädig

| <i>M</i> | 153.25758  |          | (2000.0)  | <b>P</b>    |             | <b>Q</b> |
|----------|------------|----------|-----------|-------------|-------------|----------|
| <i>n</i> | 0.30772265 | $\omega$ | 170.23397 | +0.01728054 | +0.99897825 |          |
| <i>a</i> | 2.1728500  | $\Omega$ | 100.74756 | -0.92018915 | +0.03222647 |          |
| <i>e</i> | 0.1280567  | <i>i</i> | 2.43608   | -0.39109247 | -0.03168449 |          |
| <i>P</i> | 3.20       | <i>H</i> | 14.5      | <i>G</i>    | 0.15        | <i>U</i> |

Residuals in seconds of arc

|            |           |        |      |            |     |      |      |            |     |      |      |
|------------|-----------|--------|------|------------|-----|------|------|------------|-----|------|------|
| 1980 05 18 | 808       | 0.7-   | 0.9- | 1997 11 29 | 704 | 2.5- | 0.4- | 1997 12 05 | 704 | 1.2+ | 0.9+ |
| 1980 05 18 | 808       | 0.1+   | 1.8- | 1997 11 29 | 704 | 2.6- | 0.1- | 1997 12 05 | 704 | 1.4+ | 1.0+ |
| 1990 08 27 | 675       | 0.7+   | 0.3- | 1997 12 04 | 704 | 0.5+ | 0.4+ | 1997 12 31 | 704 | 0.4- | 1.3- |
| 1990 08 27 | 675       | 0.5+   | 0.2+ | 1997 12 04 | 704 | 0.4- | 0.8- | 1997 12 31 | 704 | 1.0+ | 0.9- |
| 1990 08 28 | 095( 5.1- | 12.5-) |      | 1997 12 04 | 704 | 0.0  | 0.1+ | 1997 12 31 | 704 | 0.5+ | 1.1+ |
| 1990 08 28 | 095       | 0.9-   | 0.3- | 1997 12 04 | 704 | 0.2- | 0.4- | 1997 12 31 | 704 | 0.1+ | 0.6- |
| 1997 11 29 | 704       | 1.1-   | 0.2- | 1997 12 05 | 704 | 2.2+ | 0.1+ | 1998 01 03 | 910 | 0.3+ | 0.4- |
| 1997 11 29 | 704       | 1.4-   | 1.0- | 1997 12 05 | 704 | 1.3+ | 0.1+ | 1998 01 03 | 910 | 0.3+ | 0.4- |
| 1997 11 29 | 704       | 1.6-   | 1.0- | 1997 12 05 | 704 | 2.0+ | 0.7+ | 1998 01 03 | 910 | 0.5+ | 0.3- |

**1997 WN<sub>38</sub> = 1996 PO<sub>5</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Ichikawa

| <i>M</i> | 40.35219   |          | (2000.0)  | <b>P</b>    |             | <b>Q</b> |
|----------|------------|----------|-----------|-------------|-------------|----------|
| <i>n</i> | 0.17010988 | $\omega$ | 307.50636 | +0.95584622 | -0.29140669 |          |
| <i>a</i> | 3.2258910  | $\Omega$ | 69.46389  | +0.28078741 | +0.86755618 |          |
| <i>e</i> | 0.1539372  | <i>i</i> | 2.32252   | +0.08669739 | +0.40302408 |          |
| <i>P</i> | 5.79       | <i>H</i> | 13.8      | <i>G</i>    | 0.15        | <i>U</i> |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1996 08 10 | 566 | 1.0- | 0.3+ | 1997 11 26 | 704 | 0.7+ | 0.6+ | 1997 12 04 | 704 | 2.5+ | 1.4+ |
| 1996 08 10 | 566 | 0.7- | 0.0  | 1997 11 29 | 704 | 2.2- | 0.2+ | 1997 12 04 | 704 | 1.4+ | 0.7+ |
| 1996 08 10 | 566 | 0.0  | 0.2+ | 1997 11 29 | 704 | 1.3- | 1.1- | 1997 12 04 | 704 | 0.2+ | 0.5+ |
| 1996 08 19 | 566 | 0.5+ | 0.0  | 1997 11 29 | 704 | 1.5- | 0.3- | 1997 12 31 | 704 | 1.2- | 0.9- |
| 1996 08 19 | 566 | 0.6+ | 0.3- | 1997 11 29 | 704 | 1.2- | 1.4- | 1997 12 31 | 704 | 0.0  | 1.5+ |
| 1996 08 19 | 566 | 0.5+ | 0.1+ | 1997 11 29 | 704 | 0.8- | 1.2- | 1997 12 31 | 704 | 0.5+ | 0.1+ |
| 1997 11 26 | 704 | 0.3+ | 0.7+ | 1997 12 04 | 704 | 0.9+ | 0.1+ | 1997 12 31 | 704 | 1.1- | 0.9+ |
| 1997 11 26 | 704 | 0.6+ | 0.6- | 1997 12 04 | 704 | 1.9+ | 0.9- |            |     |      |      |

**1997 WM<sub>39</sub> = 1993 TC<sub>36</sub> = 1995 GK<sub>6</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Ichikawa

| <i>M</i> | 332.74619  |          | (2000.0)  | <b>P</b>    |             | <b>Q</b> |
|----------|------------|----------|-----------|-------------|-------------|----------|
| <i>n</i> | 0.26539353 | $\omega$ | 351.79833 | -0.30942007 | -0.94967502 |          |
| <i>a</i> | 2.3981472  | $\Omega$ | 116.21456 | +0.87551159 | -0.30451503 |          |
| <i>e</i> | 0.1398085  | <i>i</i> | 3.11494   | +0.37113161 | -0.07340272 |          |
| <i>P</i> | 3.71       | <i>H</i> | 15.1      | <i>G</i>    | 0.15        | <i>U</i> |

Residuals in seconds of arc

|            |     |      |      |            |     |       |       |            |     |      |      |
|------------|-----|------|------|------------|-----|-------|-------|------------|-----|------|------|
| 1993 10 11 | 809 | 1.7+ | 1.3+ | 1995 04 09 | 691 | 0.0   | 0.0   | 1997 11 29 | 704 | 1.6- | 0.5- |
| 1993 10 11 | 809 | 0.8+ | 1.3+ | 1995 04 09 | 691 | 0.2+  | 0.1-  | 1997 11 29 | 704 | 1.8- | 0.0  |
| 1993 10 11 | 809 | 0.5- | 0.5+ | 1995 04 09 | 691 | 0.2+  | 0.0   | 1997 12 04 | 704 | 0.6+ | 0.1- |
| 1993 10 20 | 809 | 1.1- | 1.5- | 1997 11 26 | 704 | (3.5+ | 0.2-) | 1997 12 04 | 704 | 1.5+ | 0.3+ |
| 1993 10 20 | 809 | 0.3- | 0.8- | 1997 11 26 | 704 | 2.5+  | 0.0   | 1997 12 04 | 704 | 0.0  | 1.7+ |
| 1993 10 20 | 809 | 0.6- | 0.8- | 1997 11 26 | 704 | 1.4+  | 0.4-  | 1997 12 04 | 704 | 1.5+ | 0.3+ |
| 1995 04 06 | 691 | 0.0  | 0.0  | 1997 11 29 | 704 | 1.8-  | 1.0-  | 1997 12 04 | 704 | 0.0  | 0.4+ |
| 1995 04 06 | 691 | 0.1- | 0.2+ | 1997 11 29 | 704 | 1.7-  | 0.8-  |            |     |      |      |
| 1995 04 06 | 691 | 0.1- | 0.1- | 1997 11 29 | 704 | 0.7-  | 0.1+  |            |     |      |      |

**1997 WR<sub>49</sub> = 1985 RW<sub>3</sub> = 1996 NN<sub>2</sub>**

Id. A. Gnädig

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 92.45732   |          | (2000.0)  | <b>P</b>    |             | <b>Q</b> |
|----------|------------|----------|-----------|-------------|-------------|----------|
| <i>n</i> | 0.17481242 | $\omega$ | 166.51087 | +0.64948611 | +0.76014598 |          |
| <i>a</i> | 3.1677764  | $\Omega$ | 143.98683 | -0.70053105 | +0.60770268 |          |
| <i>e</i> | 0.2422490  | <i>i</i> | 1.81261   | -0.29567558 | +0.22994682 |          |
| <i>P</i> | 5.64       | <i>H</i> | 13.0      | <i>G</i>    | 0.15        | <i>U</i> |

Residuals in seconds of arc

|            |     |       |       |            |     |       |       |            |     |      |      |
|------------|-----|-------|-------|------------|-----|-------|-------|------------|-----|------|------|
| 1985 09 08 | 809 | 0.3-  | 0.7-  | 1985 09 18 | 809 | 0.7-  | 0.7+  | 1997 11 29 | 704 | 1.6- | 1.1+ |
| 1985 09 08 | 809 | 0.2-  | 0.7-  | 1985 09 18 | 809 | 0.5-  | 0.8+  | 1997 11 29 | 704 | 1.7- | 1.3- |
| 1985 09 08 | 809 | 0.3-  | 0.8-  | 1985 09 20 | 809 | 0.4-  | 0.7+  | 1997 11 29 | 704 | 0.0  | 1.2+ |
| 1985 09 10 | 809 | 0.6+  | 0.3-  | 1985 09 20 | 809 | 0.2-  | 0.7+  | 1997 11 29 | 704 | 1.3- | 0.9- |
| 1985 09 10 | 809 | 0.9+  | 0.3-  | 1985 09 20 | 809 | 0.3-  | 0.5+  | 1997 11 29 | 704 | 1.3- | 1.8+ |
| 1985 09 10 | 809 | 1.0+  | 0.3-  | 1985 09 22 | 809 | 1.7+  | 0.8-  | 1997 12 05 | 704 | 0.3+ | 0.2+ |
| 1985 09 11 | 809 | 0.7+  | 0.9-  | 1985 09 22 | 809 | 1.6+  | 0.8-  | 1997 12 05 | 704 | 0.6- | 0.2+ |
| 1985 09 11 | 809 | 0.8+  | 0.9-  | 1996 07 14 | 809 | 0.3+  | 0.6+  | 1997 12 05 | 704 | 0.6+ | 0.1+ |
| 1985 09 11 | 809 | 0.7+  | 0.7-  | 1996 07 14 | 809 | 0.2+  | 0.4+  | 1997 12 05 | 704 | 1.2+ | 0.1+ |
| 1985 09 14 | 809 | 2.5+  | 0.8+  | 1996 07 14 | 809 | 0.5-  | 0.5+  | 1997 12 05 | 704 | 0.3- | 0.1+ |
| 1985 09 14 | 809 | (2.8+ | 0.8+) | 1996 07 16 | 809 | 0.5-  | 1.0+  | 1998 01 03 | 910 | 0.8+ | 0.0  |
| 1985 09 14 | 809 | (2.8+ | 0.8+) | 1996 07 16 | 809 | 0.6-  | 1.4+  | 1998 01 03 | 910 | 0.5+ | 0.0  |
| 1985 09 17 | 809 | 1.6-  | 1.0-  | 1996 07 16 | 809 | 0.7-  | 1.9+  | 1998 01 03 | 910 | 0.4+ | 0.1+ |
| 1985 09 17 | 809 | 1.4-  | 1.1-  | 1997 11 26 | 704 | (0.3+ | 2.2+) | 1998 02 27 | 327 | 1.5- | 0.7- |
| 1985 09 17 | 809 | 1.3-  | 1.1-  | 1997 11 26 | 704 | 0.9+  | 1.7+  | 1998 02 27 | 327 | 1.0+ | 0.2- |
| 1985 09 18 | 809 | 1.0-  | 0.7+  | 1997 11 26 | 704 | 0.6+  | 0.6+  | 1998 02 27 | 327 | 1.7+ | 1.2+ |

**1997 WT<sub>52</sub> = 1986 WC<sub>9</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Ichikawa

| <i>M</i> | 216.75559  |          | (2000.0)  | <b>P</b>    |             | <b>Q</b> |
|----------|------------|----------|-----------|-------------|-------------|----------|
| <i>n</i> | 0.18462863 | $\omega$ | 157.59635 | -0.72066566 | +0.66477215 |          |
| <i>a</i> | 3.0544757  | $\Omega$ | 65.61242  | -0.66432606 | -0.58099496 |          |
| <i>e</i> | 0.0746978  | <i>i</i> | 12.47706  | -0.19827225 | -0.46959860 |          |
| <i>P</i> | 5.34       | <i>H</i> | 13.2      | <i>G</i>    | 0.15        | <i>U</i> |

Residuals in seconds of arc

|            |     |      |      |            |     |       |       |            |     |      |      |
|------------|-----|------|------|------------|-----|-------|-------|------------|-----|------|------|
| 1986 11 30 | 381 | 0.3+ | 0.9+ | 1997 11 29 | 704 | 1.4-  | 0.3-  | 1997 12 05 | 704 | 0.2- | 0.5+ |
| 1986 11 30 | 381 | 0.1- | 1.1+ | 1997 11 29 | 704 | 0.9-  | 0.3-  | 1997 12 05 | 704 | 0.7+ | 0.3+ |
| 1986 12 01 | 381 | 0.6+ | 1.1- | 1997 12 04 | 704 | 1.5+  | 0.1+  | 1997 12 05 | 704 | 0.2+ | 0.2+ |
| 1986 12 01 | 381 | 0.8- | 0.9- | 1997 12 04 | 704 | 0.5+  | 1.1+  | 1997 12 05 | 704 | 0.2+ | 1.4+ |
| 1997 11 29 | 704 | 0.2+ | 0.4- | 1997 12 04 | 704 | 1.2+  | 0.7-  | 1997 12 05 | 704 | 0.6- | 0.5+ |
| 1997 11 29 | 704 | 0.7- | 0.0  | 1997 12 04 | 704 | 0.9+  | 1.2-  |            |     |      |      |
| 1997 11 29 | 704 | 1.4- | 1.3- | 1997 12 04 | 704 | (3.4- | 1.0-) |            |     |      |      |

**1997 XG<sub>5</sub> = 1991 TY<sub>8</sub> = 1996 VO<sub>20</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 84.67940   |          | (2000.0) | <b>P</b>    |             | <b>Q</b> |
|----------|------------|----------|----------|-------------|-------------|----------|
| <i>n</i> | 0.20685595 | $\omega$ | 17.45897 | +0.65135837 | -0.75851225 |          |
| <i>a</i> | 2.8315487  | $\Omega$ | 31.90533 | +0.69161430 | +0.58278225 |          |
| <i>e</i> | 0.0864414  | <i>i</i> | 2.14534  | +0.31209284 | +0.29158878 |          |
| <i>P</i> | 4.76       | <i>H</i> | 14.5     | <i>G</i>    | 0.15        | <i>U</i> |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1991 10 01 | 691 | 0.5- | 0.4+ | 1996 11 08 | 691 | 0.6- | 0.0  | 1997 12 07 | 910 | 0.1+ | 0.0  |
| 1991 10 01 | 691 | 0.5- | 0.2+ | 1996 11 09 | 691 | 0.3+ | 0.1+ | 1997 12 07 | 910 | 0.1- | 0.3+ |
| 1991 10 01 | 691 | 0.6- | 0.4- | 1996 11 09 | 691 | 0.2+ | 0.1+ | 1998 03 01 | 691 | 0.5+ | 0.4+ |
| 1991 10 13 | 691 | 0.3+ | 0.1- | 1996 11 09 | 691 | 0.2+ | 0.0  | 1998 03 01 | 691 | 0.4+ | 0.3+ |
| 1991 10 13 | 691 | 0.7+ | 0.2+ | 1997 12 06 | 910 | 0.2- | 0.2- | 1998 03 01 | 691 | 0.4+ | 0.2+ |
| 1991 10 13 | 691 | 0.5+ | 0.3- | 1997 12 06 | 910 | 0.6- | 0.2- | 1998 03 05 | 691 | 0.5- | 0.0  |
| 1996 11 08 | 691 | 0.4+ | 0.0  | 1997 12 06 | 910 | 0.0  | 0.3- | 1998 03 05 | 691 | 0.3- | 0.1+ |
| 1996 11 08 | 691 | 0.6- | 0.0  | 1997 12 07 | 910 | 0.4+ | 0.4- | 1998 03 05 | 691 | 0.3- | 0.2- |

**1997 XO<sub>11</sub> = 1983 VT<sub>3</sub> = 1996 LX<sub>1</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Gnädig

| <i>M</i> | 113.39387  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.28202653 | $\omega$ | 43.86501  | +0.50863118   | +0.85473292 |
| <i>a</i> | 2.3029053  | $\Omega$ | 256.96260 | -0.81634389   | +0.44052807 |
| <i>e</i> | 0.1316339  | <i>i</i> | 6.10244   | -0.27363658   | +0.27452987 |
| <i>P</i> | 3.49       | <i>H</i> | 14.0      | <i>G</i> 0.15 | <i>U</i>    |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1983 11 08 | 381 | 0.1+ | 1.2- | 1997 10 23 | 327 | 0.0  | 0.7+ | 1997 12 05 | 704 | 1.1+ | 2.4- |
| 1996 06 12 | 566 | 0.6- | 1.0- | 1997 11 29 | 704 | 1.3- | 2.0+ | 1997 12 05 | 704 | 1.0+ | 2.4- |
| 1996 06 12 | 566 | 0.5- | 1.0- | 1997 11 29 | 704 | 0.4- | 2.0+ | 1997 12 15 | 327 | 0.7- | 0.5+ |
| 1996 06 12 | 566 | 0.6- | 0.9- | 1997 11 29 | 704 | 1.0- | 0.2+ | 1997 12 15 | 327 | 0.6- | 0.3+ |
| 1996 06 22 | 566 | 0.3+ | 0.3- | 1997 11 29 | 704 | 0.2- | 0.6- | 1997 12 15 | 327 | 0.3- | 0.2- |
| 1996 06 22 | 566 | 0.3+ | 0.2- | 1997 11 29 | 704 | 0.8+ | 0.4- | 1997 12 23 | 327 | 0.8- | 0.1- |
| 1996 06 22 | 566 | 0.4+ | 0.7- | 1997 12 05 | 704 | 1.2+ | 0.2- | 1997 12 23 | 327 | 0.7- | 0.1+ |
| 1997 10 23 | 327 | 0.3+ | 0.8+ | 1997 12 05 | 704 | 0.8+ | 1.3- | 1997 12 23 | 327 | 0.8- | 0.2- |
| 1997 10 23 | 327 | 0.1+ | 0.8+ | 1997 12 05 | 704 | 1.9+ | 2.7- |            |     |      |      |

**1997 XN<sub>12</sub> = 1998 AE<sub>10</sub> = 1976 UH<sub>2</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Nakano

| <i>M</i> | 55.17618   |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.28301005 | $\omega$ | 108.74621 | +0.97915013   | +0.19277418 |
| <i>a</i> | 2.2975668  | $\Omega$ | 240.18350 | -0.20279936   | +0.90944780 |
| <i>e</i> | 0.1961450  | <i>i</i> | 4.23395   | -0.01172379   | +0.36843292 |
| <i>P</i> | 3.48       | <i>H</i> | 15.3      | <i>G</i> 0.15 | <i>U</i> 4  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1976 10 24 | 381 | 0.1+ | 0.4+ | 1997 12 05 | 704 | 0.1- | 0.5- | 1998 01 15 | 910 | 0.4- | 0.2+ |
| 1976 10 24 | 381 | 1.8- | 0.5+ | 1997 12 05 | 704 | 0.4+ | 1.4- | 1998 01 17 | 910 | 0.6- | 0.0  |
| 1976 10 26 | 095 | 1.4+ | 0.3+ | 1997 12 05 | 704 | 0.6+ | 0.0  | 1998 01 17 | 910 | 0.4- | 0.4+ |
| 1997 12 04 | 704 | 0.2+ | 0.1+ | 1997 12 05 | 704 | 0.3+ | 0.6- | 1998 01 17 | 910 | 0.2- | 0.3+ |
| 1997 12 04 | 704 | 1.1+ | 0.5+ | 1997 12 05 | 704 | 0.4- | 0.2- | 1998 02 22 | 327 | 0.5- | 0.5+ |
| 1997 12 04 | 704 | 0.2- | 0.5- | 1998 01 15 | 910 | 0.8- | 0.3+ | 1998 02 22 | 327 | 1.2+ | 0.5+ |
| 1997 12 04 | 704 | 0.1- | 0.5- | 1998 01 15 | 910 | 0.6- | 0.5+ | 1998 02 22 | 327 | 0.4+ | 0.2+ |

**1997 YQ<sub>7</sub> = 1974 SS<sub>3</sub> = 1979 YP<sub>2</sub> = 1983 TX<sub>1</sub>**

Id. K. Ichikawa

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 45.20709   |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.22333537 | $\omega$ | 86.74461  | +0.44055901   | -0.89424191 |
| <i>a</i> | 2.6904879  | $\Omega$ | 336.60897 | +0.72421470   | +0.40602517 |
| <i>e</i> | 0.1656807  | <i>i</i> | 11.47621  | +0.53049112   | +0.18834798 |
| <i>P</i> | 4.41       | <i>H</i> | 13.0      | <i>G</i> 0.15 | <i>U</i> 4  |

Residuals in seconds of arc

|            |           |       |      |            |     |      |      |            |     |      |      |
|------------|-----------|-------|------|------------|-----|------|------|------------|-----|------|------|
| 1974 09 22 | 095       | 0.2-  | 0.3+ | 1997 12 27 | 411 | 0.1+ | 0.2- | 1998 01 28 | 411 | 0.0  | 0.3- |
| 1979 12 24 | 095(12.1+ | 2.9+) |      | 1997 12 27 | 411 | 0.2+ | 0.2- | 1998 01 28 | 411 | 0.1+ | 0.0  |
| 1983 10 09 | 675       | 1.3-  | 2.2+ | 1997 12 28 | 411 | 0.2+ | 0.3+ | 1998 02 19 | 699 | 0.2- | 0.2+ |
| 1983 10 09 | 675       | 0.4-  | 0.9- | 1997 12 28 | 411 | 0.4+ | 0.7- | 1998 02 19 | 699 | 0.1+ | 0.2- |
| 1983 10 12 | 688       | 1.7+  | 1.1- | 1998 01 05 | 411 | 0.0  | 0.4+ | 1998 02 19 | 699 | 1.3- | 0.1- |
| 1983 10 12 | 688       | 0.2+  | 0.5- | 1998 01 05 | 411 | 0.6+ | 0.8+ |            |     |      |      |

**1997 YB<sub>8</sub> = 1954 OS = 1993 BH**Id. B. G. Marsden (*MPC* 31256), G. V. Williams

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 131.69835  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.19074602 | $\omega$ | 190.31114 | +0.79044978   | +0.59733875 |
| <i>a</i> | 2.9888152  | $\Omega$ | 132.12610 | -0.54816700   | +0.78860450 |
| <i>e</i> | 0.0674025  | <i>i</i> | 10.53126  | -0.27331683   | +0.14590875 |
| <i>P</i> | 5.17       | <i>H</i> | 12.5      | <i>G</i> 0.15 | <i>U</i> 2  |

Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| 1954 07 29 | 675 | 0.1+  | 0.0   | 1997 12 27 | 046 | 0.3+ | 0.1- | 1998 01 02 | 046 | 0.1- | 0.5- |
| 1954 07 29 | 675 | 0.0   | 0.0   | 1997 12 28 | 046 | 0.2+ | 0.1- | 1998 01 02 | 046 | 0.0  | 0.6- |
| 1989 03 30 | 675 | 0.3-  | 0.2-  | 1997 12 28 | 046 | 0.0  | 0.3- | 1998 01 13 | 046 | 0.1+ | 0.4- |
| 1989 03 30 | 675 | 0.2-  | 1.4-  | 1997 12 28 | 046 | 0.2+ | 0.0  | 1998 01 13 | 046 | 0.3+ | 0.5- |
| 1993 01 16 | 372 | 0.4-  | 0.0   | 1997 12 28 | 046 | 0.2+ | 0.2- | 1998 01 13 | 046 | 0.1- | 0.4- |
| 1993 01 16 | 372 | 1.6-  | 0.7-  | 1997 12 28 | 046 | 0.4+ | 0.1- | 1998 01 15 | 046 | 0.1+ | 0.2- |
| 1993 01 18 | 372 | 0.4-  | 3.8+  | 1997 12 28 | 046 | 0.0  | 0.1- | 1998 01 15 | 046 | 0.6- | 0.2+ |
| 1993 01 18 | 372 | 1.7+  | 1.9+  | 1997 12 30 | 046 | 0.1- | 0.6- | 1998 01 15 | 046 | 0.4- | 0.2- |
| 1993 01 25 | 372 | 0.3+  | 1.9+  | 1997 12 30 | 046 | 0.2- | 0.4- | 1998 01 26 | 046 | 0.5- | 0.0  |
| 1993 01 25 | 372 | (1.7- | 4.9+) | 1997 12 30 | 046 | 0.1- | 0.5- | 1998 01 26 | 046 | 0.1- | 0.5+ |
| 1997 12 27 | 046 | 0.4+  | 0.1+  | 1997 12 31 | 046 | 0.0  | 0.7- | 1998 01 26 | 046 | 0.5+ | 0.3+ |
| 1997 12 27 | 046 | 0.1+  | 0.0   | 1997 12 31 | 046 | 0.2- | 0.7- | 1998 01 26 | 046 | 0.1+ | 0.2- |
| 1997 12 27 | 046 | 0.2+  | 0.0   | 1997 12 31 | 046 | 0.2- | 0.6- |            |     |      |      |
| 1997 12 27 | 046 | 0.3+  | 0.1+  | 1998 01 01 | 046 | 0.1- | 0.6- |            |     |      |      |

**1997 YY<sub>8</sub> = 1994 AU<sub>3</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Ichikawa

| <i>M</i> | 7.88126    |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.22847083 | $\omega$ | 332.00582 | +0.45143191   | -0.85156481 |
| <i>a</i> | 2.6500184  | $\Omega$ | 90.06285  | +0.86035372   | +0.33617242 |
| <i>e</i> | 0.1653984  | <i>i</i> | 15.45883  | +0.23664469   | +0.40227538 |
| <i>P</i> | 4.31       | <i>H</i> | 12.8      | <i>G</i> 0.15 | <i>U</i> 5  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1994 01 11 | 675 | 0.9- | 0.4+ | 1997 12 25 | 566 | 0.1- | 1.0- | 1997 12 30 | 566 | 2.1+ | 1.8- |
| 1994 01 11 | 675 | 0.2- | 0.5- | 1997 12 25 | 566 | 1.0- | 1.6+ | 1997 12 31 | 385 | 0.7- | 0.8+ |
| 1994 01 16 | 675 | 1.3+ | 0.1- | 1997 12 25 | 566 | 0.1- | 1.3- | 1997 12 31 | 385 | 0.3- | 0.6+ |
| 1994 01 16 | 675 | 0.2- | 0.2+ | 1997 12 27 | 888 | 0.2+ | 0.5+ | 1997 12 31 | 385 | 0.6- | 1.0+ |
| 1997 12 25 | 566 | 0.7- | 1.3+ | 1997 12 27 | 888 | 0.1+ | 0.1+ | 1997 12 31 | 886 | 0.6- | 0.6+ |
| 1997 12 25 | 566 | 0.0  | 1.1- | 1997 12 30 | 566 | 1.7+ | 1.5- | 1997 12 31 | 886 | 1.0- | 0.4+ |
| 1997 12 25 | 566 | 0.6- | 1.3+ | 1997 12 30 | 566 | 1.7+ | 1.4- |            |     |      |      |

**1997 YQ<sub>14</sub> = 1993 FC<sub>38</sub> = 1997 CN<sub>14</sub>**

Id. G. V. Williams

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Marsden

| <i>M</i> | 282.37376  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.17442582 | $\omega$ | 209.43222 | -0.80463963   | +0.59376230 |
| <i>a</i> | 3.1724554  | $\Omega$ | 6.99259   | -0.54285552   | -0.73484520 |
| <i>e</i> | 0.1448522  | <i>i</i> | 0.55527   | -0.24054717   | -0.32779394 |
| <i>P</i> | 5.65       | <i>H</i> | 14.0      | <i>G</i> 0.15 | <i>U</i> 4  |

Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| 1993 03 21 | 809 | 1.2-  | 1.3-  | 1997 02 10 | 691 | 0.5- | 0.5- | 1998 01 28 | 566 | 0.2- | 0.5- |
| 1993 03 22 | 809 | 0.0   | 1.3-  | 1997 12 31 | 684 | 0.6+ | 0.1- | 1998 01 28 | 566 | 0.1+ | 0.4- |
| 1993 03 24 | 809 | (2.3+ | 2.1+) | 1997 12 31 | 684 | 0.4+ | 0.2+ | 1998 01 28 | 566 | 0.4- | 0.1+ |
| 1997 02 04 | 691 | 0.6+  | 1.0-  | 1998 01 02 | 684 | 0.2+ | 0.2+ | 1998 02 19 | 684 | 0.8+ | 0.7+ |
| 1997 02 04 | 691 | 0.8+  | 0.5-  | 1998 01 02 | 684 | 0.6+ | 0.0  | 1998 02 19 | 684 | 0.6+ | 0.6+ |
| 1997 02 04 | 691 | 1.0+  | 0.6-  | 1998 01 25 | 691 | 0.8- | 0.2+ | 1998 02 26 | 684 | 0.3+ | 0.8+ |
| 1997 02 10 | 691 | 0.4-  | 0.5-  | 1998 01 25 | 691 | 0.7- | 0.4+ | 1998 02 26 | 684 | 0.3+ | 0.7+ |
| 1997 02 10 | 691 | 0.6-  | 0.6-  | 1998 01 25 | 691 | 0.9- | 0.3+ |            |     |      |      |

**1997 YU<sub>16</sub> = 1988 XV<sub>4</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Ichikawa

| <i>M</i> | 248.46669  |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.23135919 | $\omega$ | 146.26587 | -0.77033846   | +0.63563959 |
| <i>a</i> | 2.6279164  | $\Omega$ | 73.28355  | -0.59603043   | -0.68973314 |
| <i>e</i> | 0.0220664  | <i>i</i> | 3.01699   | -0.22655326   | -0.34674271 |
| <i>P</i> | 4.26       | <i>H</i> | 13.5      | <i>G</i> 0.15 | <i>U</i> 6  |

Residuals in seconds of arc

|            |           |       |      |            |     |      |      |            |     |      |      |
|------------|-----------|-------|------|------------|-----|------|------|------------|-----|------|------|
| 1988 12 05 | 381       | 0.0   | 1.4+ | 1998 01 03 | 327 | 0.2+ | 0.4+ | 1998 01 07 | 327 | 0.1+ | 0.3+ |
| 1988 12 06 | 381(23.2- | 3.6-) |      | 1998 01 03 | 327 | 0.3+ | 0.6+ | 1998 01 07 | 327 | 0.3+ | 0.2+ |
| 1988 12 07 | 381       | 0.7+  | 1.0- | 1998 01 05 | 327 | 0.1+ | 0.1- | 1998 01 07 | 327 | 0.2- | 0.2+ |
| 1988 12 08 | 381       | 0.8-  | 0.4- | 1998 01 05 | 327 | 0.3+ | 0.1- | 1998 01 17 | 327 | 0.1- | 0.1+ |

1998 MAR. 13

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1997 12 29 | 327 | 0.2+ | 0.1+ | 1998 01 05 | 327 | 0.4+ | 0.0  | 1998 01 17 | 327 | 0.6+ | 0.1+ |
| 1997 12 29 | 327 | 0.2+ | 0.7- | 1998 01 07 | 691 | 1.1- | 0.1- | 1998 01 17 | 327 | 0.0  | 0.2- |
| 1997 12 29 | 327 | 0.4+ | 0.6- | 1998 01 07 | 691 | 1.2- | 0.1- |            |     |      |      |
| 1998 01 03 | 327 | 0.5+ | 0.1+ | 1998 01 07 | 691 | 1.0- | 0.1- |            |     |      |      |

1998 AC<sub>8</sub> = 1979 SW<sub>6</sub> = 1979 TX = 1981 AP<sub>2</sub> = 1996 TM<sub>52</sub>

|                                                  |            |          |      |           |          |      |             |          |   |             |  |
|--------------------------------------------------|------------|----------|------|-----------|----------|------|-------------|----------|---|-------------|--|
| Epoch 1997 Dec. 18.0 TT = JDT 2450800.5 Williams |            |          |      |           |          |      |             |          |   |             |  |
| <i>M</i>                                         | 19.19252   |          |      | (2000.0)  |          |      | <b>P</b>    |          |   | <b>Q</b>    |  |
| <i>n</i>                                         | 0.17282620 | $\omega$ |      | 230.39610 |          |      | +0.34309092 |          |   | -0.93929784 |  |
| <i>a</i>                                         | 3.1920009  | $\Omega$ |      | 199.53918 |          |      | +0.86439302 |          |   | +0.31691979 |  |
| <i>e</i>                                         | 0.1518450  | <i>i</i> |      | 0.49006   |          |      | +0.36757765 |          |   | +0.13145877 |  |
| <i>P</i>                                         | 5.70       | <i>H</i> | 13.0 |           | <i>G</i> | 0.15 |             | <i>U</i> | 2 |             |  |

|                             |     |      |      |            |     |      |      |            |     |      |      |
|-----------------------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| Residuals in seconds of arc |     |      |      |            |     |      |      |            |     |      |      |
| 1979 09 23                  | 095 | 1.0+ | 1.2- | 1998 01 02 | 704 | 0.1+ | 0.3- | 1998 01 08 | 704 | 0.3+ | 0.3- |
| 1979 10 14                  | 095 | 0.2- | 0.8- | 1998 01 02 | 704 | 0.7- | 0.2- | 1998 01 08 | 704 | 0.1- | 0.2- |
| 1981 01 08                  | 381 | 0.9+ | 2.3- | 1998 01 02 | 704 | 0.1- | 0.4- | 1998 01 08 | 704 | 0.3- | 0.7+ |
| 1981 01 08                  | 381 | 1.3- | 0.6+ | 1998 01 02 | 704 | 0.0  | 0.3- | 1998 01 08 | 704 | 0.2- | 0.9+ |
| 1996 10 05                  | 809 | 0.1- | 0.1- | 1998 01 02 | 704 | 0.0  | 0.2- | 1998 01 26 | 704 | 0.0  | 0.7+ |
| 1996 10 05                  | 809 | 0.8- | 0.7- | 1998 01 06 | 704 | 0.2+ | 0.0  | 1998 01 26 | 704 | 0.4- | 0.5+ |
| 1996 10 05                  | 809 | 0.9- | 0.2- | 1998 01 06 | 704 | 0.7+ | 0.0  | 1998 01 26 | 704 | 0.0  | 0.3+ |
| 1996 10 06                  | 809 | 0.6+ | 1.1+ | 1998 01 06 | 704 | 0.3+ | 0.4+ | 1998 01 26 | 704 | 0.3- | 0.5+ |
| 1996 10 06                  | 809 | 0.4+ | 0.8+ | 1998 01 08 | 704 | 0.4+ | 0.6- | 1998 01 26 | 704 | 0.1- | 0.2+ |
| 1996 10 06                  | 809 | 0.0  | 0.9+ | 1998 01 08 | 704 | 0.1+ | 0.4+ |            |     |      |      |

1998 AA<sub>10</sub> = 1994 BV<sub>3</sub>

|                                                 |            |          |      |           |          |      |             |          |   |             |  |
|-------------------------------------------------|------------|----------|------|-----------|----------|------|-------------|----------|---|-------------|--|
| Epoch 1997 Dec. 18.0 TT = JDT 2450800.5 Marsden |            |          |      |           |          |      |             |          |   |             |  |
| <i>M</i>                                        | 231.66197  |          |      | (2000.0)  |          |      | <b>P</b>    |          |   | <b>Q</b>    |  |
| <i>n</i>                                        | 0.23600634 | $\omega$ |      | 302.87988 |          |      | -0.55035063 |          |   | +0.80394196 |  |
| <i>a</i>                                        | 2.5933050  | $\Omega$ |      | 292.10993 |          |      | -0.66149012 |          |   | -0.58454147 |  |
| <i>e</i>                                        | 0.0817311  | <i>i</i> |      | 14.07892  |          |      | -0.50945560 |          |   | -0.10949248 |  |
| <i>P</i>                                        | 4.18       | <i>H</i> | 14.0 |           | <i>G</i> | 0.15 |             | <i>U</i> | 4 |             |  |

|                             |     |      |      |            |     |      |      |            |     |      |      |
|-----------------------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| Residuals in seconds of arc |     |      |      |            |     |      |      |            |     |      |      |
| 1994 01 16                  | 010 | 0.6+ | 1.0- | 1998 01 17 | 046 | 0.1- | 0.3+ | 1998 01 29 | 046 | 0.3+ | 0.1- |
| 1994 01 16                  | 010 | 0.1- | 0.2- | 1998 01 17 | 046 | 0.2- | 0.1+ | 1998 01 29 | 046 | 0.5+ | 0.2- |
| 1994 01 17                  | 010 | 0.0  | 1.1+ | 1998 01 17 | 046 | 0.2- | 0.4+ | 1998 02 10 | 046 | 0.9+ | 0.4+ |
| 1994 01 17                  | 010 | 0.2- | 0.1+ | 1998 01 17 | 046 | 0.5- | 0.2+ | 1998 02 10 | 046 | 0.9+ | 0.3+ |
| 1994 01 17                  | 010 | 0.2- | 0.2+ | 1998 01 26 | 046 | 0.4+ | 0.4- | 1998 02 10 | 046 | 0.7+ | 0.1+ |
| 1998 01 15                  | 046 | 0.2- | 0.1+ | 1998 01 26 | 046 | 0.5+ | 0.2- | 1998 02 14 | 046 | 1.1- | 0.6- |
| 1998 01 15                  | 046 | 0.3- | 0.4+ | 1998 01 26 | 046 | 0.5+ | 0.4- | 1998 02 14 | 046 | 0.7- | 1.1- |
| 1998 01 15                  | 046 | 0.3- | 0.1+ | 1998 01 27 | 046 | 0.2+ | 0.2- | 1998 02 15 | 046 | 0.6- | 0.7+ |
| 1998 01 15                  | 046 | 0.2- | 0.1- | 1998 01 27 | 046 | 0.3+ | 0.2- | 1998 02 15 | 046 | 0.9- | 0.2+ |
| 1998 01 15                  | 046 | 0.3- | 0.1- | 1998 01 27 | 046 | 0.5+ | 0.0  |            |     |      |      |

1998 BQ = 1987 WG<sub>2</sub> = 1992 GX

|                                                  |            |          |      |           |          |      |             |          |   |             |  |
|--------------------------------------------------|------------|----------|------|-----------|----------|------|-------------|----------|---|-------------|--|
| Epoch 1997 Dec. 18.0 TT = JDT 2450800.5 Williams |            |          |      |           |          |      |             |          |   |             |  |
| <i>M</i>                                         | 316.70645  |          |      | (2000.0)  |          |      | <b>P</b>    |          |   | <b>Q</b>    |  |
| <i>n</i>                                         | 0.28546746 | $\omega$ |      | 356.86257 |          |      | -0.22602768 |          |   | -0.96621025 |  |
| <i>a</i>                                         | 2.2843623  | $\Omega$ |      | 106.17491 |          |      | +0.89652335 |          |   | -0.25607683 |  |
| <i>e</i>                                         | 0.1399690  | <i>i</i> |      | 7.41171   |          |      | +0.38099523 |          |   | +0.02936676 |  |
| <i>P</i>                                         | 3.45       | <i>H</i> | 14.0 |           | <i>G</i> | 0.15 |             | <i>U</i> | 3 |             |  |

|                             |     |       |       |            |     |      |      |            |     |      |      |
|-----------------------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| Residuals in seconds of arc |     |       |       |            |     |      |      |            |     |      |      |
| 1987 11 26                  | 033 | 0.2+  | 0.4-  | 1998 01 17 | 540 | 0.7+ | 0.8- | 1998 01 26 | 540 | 0.2- | 0.7+ |
| 1987 11 26                  | 033 | 0.2-  | 0.1+  | 1998 01 17 | 540 | 0.6+ | 1.0- | 1998 02 17 | 540 | 0.7- | 1.1+ |
| 1992 04 05                  | 372 | (1.9- | 2.5-) | 1998 01 17 | 540 | 0.0  | 0.4+ | 1998 02 17 | 540 | 1.3- | 0.6+ |
| 1992 04 05                  | 372 | 0.0   | 0.3-  | 1998 01 17 | 540 | 1.0- | 1.1- | 1998 02 17 | 540 | 0.2- | 1.1+ |
| 1992 04 10                  | 372 | 0.3-  | 0.2-  | 1998 01 19 | 684 | 0.6+ | 0.3- | 1998 02 17 | 540 | 0.7- | 1.2+ |
| 1992 04 10                  | 372 | (3.5- | 3.9+) | 1998 01 19 | 684 | 0.6+ | 0.1- |            |     |      |      |
| 1998 01 17                  | 540 | 0.3+  | 1.5-  | 1998 01 26 | 540 | 1.1+ | 0.3+ |            |     |      |      |

M.P.C. 31397

1998 BB<sub>2</sub> = 1997 WG<sub>27</sub> = 1988 FU<sub>2</sub> = 1991 XV<sub>5</sub>

|                                                 |            |          |      |           |          |      |             |          |   |             |  |
|-------------------------------------------------|------------|----------|------|-----------|----------|------|-------------|----------|---|-------------|--|
| Epoch 1997 Dec. 18.0 TT = JDT 2450800.5 Marsden |            |          |      |           |          |      |             |          |   |             |  |
| <i>M</i>                                        | 221.22902  |          |      | (2000.0)  |          |      | <b>P</b>    |          |   | <b>Q</b>    |  |
| <i>n</i>                                        | 0.17886295 | $\omega$ |      | 157.59612 |          |      | -0.15598876 |          |   | +0.94172148 |  |
| <i>a</i>                                        | 3.1197691  | $\Omega$ |      | 102.39830 |          |      | -0.94621047 |          |   | -0.05587137 |  |
| <i>e</i>                                        | 0.1381925  | <i>i</i> |      | 17.76762  |          |      | -0.28346651 |          |   | -0.33172135 |  |
| <i>P</i>                                        | 5.51       | <i>H</i> | 12.5 |           | <i>G</i> | 0.15 |             | <i>U</i> | 3 |             |  |

|                             |     |       |       |            |     |      |      |            |     |      |      |
|-----------------------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| Residuals in seconds of arc |     |       |       |            |     |      |      |            |     |      |      |
| 1988 03 19                  | 675 | 0.1-  | 0.4+  | 1998 01 17 | 560 | 0.1- | 0.3- | 1998 01 27 | 560 | 1.0+ | 0.3- |
| 1988 03 20                  | 675 | 0.2+  | 0.2-  | 1998 01 17 | 560 | 0.5- | 0.2- | 1998 02 01 | 560 | 0.3- | 0.3- |
| 1991 12 11                  | 033 | 0.2+  | 0.0   | 1998 01 17 | 560 | 0.1+ | 0.3- | 1998 02 01 | 560 | 0.2+ | 0.3- |
| 1991 12 12                  | 033 | 0.6-  | 0.5+  | 1998 01 20 | 560 | 0.3+ | 0.1- | 1998 02 01 | 560 | 0.3+ | 0.5+ |
| 1991 12 12                  | 033 | 0.3+  | 0.0   | 1998 01 20 | 560 | 0.4+ | 1.0+ | 1998 02 04 | 012 | 0.1+ | 1.1+ |
| 1997 11 28                  | 691 | (2.0- | 0.8-) | 1998 01 20 | 560 | 0.0  | 0.2+ | 1998 02 04 | 012 | 0.3- | 0.8+ |
| 1997 11 28                  | 691 | 1.6-  | 0.2+  | 1998 01 24 | 560 | 1.4+ | 0.5+ | 1998 02 04 | 012 | 0.3- | 0.3+ |
| 1997 11 28                  | 691 | 1.6-  | 0.2+  | 1998 01 24 | 560 | 1.7+ | 0.7- | 1998 02 18 | 012 | 0.0  | 0.3+ |
| 1997 12 05                  | 691 | 1.7-  | 0.1-  | 1998 01 24 | 560 | 1.4+ | 1.6- | 1998 02 18 | 012 | 0.2+ | 0.1- |
| 1997 12 05                  | 691 | 1.7-  | 0.0   | 1998 01 27 | 560 | 0.9+ | 0.2- | 1998 02 18 | 012 | 0.0  | 0.2- |
| 1997 12 05                  | 691 | 1.7-  | 0.1-  | 1998 01 27 | 560 | 0.7+ | 0.2- |            |     |      |      |

1998 BA<sub>3</sub> = 1979 SO<sub>7</sub> = 1996 RU<sub>26</sub>

|                                                  |            |          |      |           |          |      |             |          |   |             |  |
|--------------------------------------------------|------------|----------|------|-----------|----------|------|-------------|----------|---|-------------|--|
| Epoch 1997 Dec. 18.0 TT = JDT 2450800.5 Ichikawa |            |          |      |           |          |      |             |          |   |             |  |
| <i>M</i>                                         | 180.92828  |          |      | (2000.0)  |          |      | <b>P</b>    |          |   | <b>Q</b>    |  |
| <i>n</i>                                         | 0.28914418 | $\omega$ |      | 63.16544  |          |      | +0.52215437 |          |   | +0.85257778 |  |
| <i>a</i>                                         | 2.2649559  | $\Omega$ |      | 238.32784 |          |      | -0.79120236 |          |   | +0.47480709 |  |
| <i>e</i>                                         | 0.1279061  | <i>i</i> |      | 1.45335   |          |      | -0.31836086 |          |   | +0.21833312 |  |
| <i>P</i>                                         | 3.41       | <i>H</i> | 15.1 |           | <i>G</i> | 0.15 |             | <i>U</i> | 6 |             |  |

|                             |     |      |      |            |     |      |      |            |     |      |      |
|-----------------------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| Residuals in seconds of arc |     |      |      |            |     |      |      |            |     |      |      |
| 1979 09 23                  | 095 | 0.7- | 1.7+ | 1996 09 17 | 691 | 0.5+ | 0.7- | 1998 01 23 | 684 | 0.5- | 0.2+ |
| 1996 09 14                  | 566 | 0.3- | 0.1- | 1998 01 19 | 684 | 1.1+ | 1.5- | 1998 01 26 | 684 | 0.3- | 0.1+ |
| 1996 09 14                  | 566 | 0.3+ | 0.1+ | 1998 01 19 | 684 | 0.7+ | 1.5- | 1998 01 26 | 684 | 0.2- | 0.0  |
| 1996 09 14                  | 566 | 1.0- | 0.5+ | 1998 01 22 | 684 | 0.4- | 0.4- | 1998 01 27 | 684 | 0.0  | 1.8+ |
| 1996 09 17                  | 691 | 0.7+ | 0.8- | 1998 01 22 | 684 | 0.1- | 0.4- | 1998 01 27 | 684 | 0.0  | 1.5+ |
| 1996 09 17                  | 691 | 0.5+ | 0.7- | 1998 01 23 | 684 | 0.5- | 0.0  |            |     |      |      |

1998 BW<sub>3</sub> = 1978 WF<sub>3</sub>

|                                                 |            |          |      |           |          |      |             |          |   |             |  |
|-------------------------------------------------|------------|----------|------|-----------|----------|------|-------------|----------|---|-------------|--|
| Epoch 1997 Dec. 18.0 TT = JDT 2450800.5 Marsden |            |          |      |           |          |      |             |          |   |             |  |
| <i>M</i>                                        | 21.16969   |          |      | (2000.0)  |          |      | <b>P</b>    |          |   | <b>Q</b>    |  |
| <i>n</i>                                        | 0.26356263 | $\omega$ |      | 218.77136 |          |      | +0.15288037 |          |   | -0.98793466 |  |
| <i>a</i>                                        | 2.4092405  | $\Omega$ |      | 222.45124 |          |      | +0.91558697 |          |   | +0.15102243 |  |
| <i>e</i>                                        | 0.0996755  | <i>i</i> |      | 2.10169   |          |      | +0.37192484 |          |   | +0.03431244 |  |
| <i>P</i>                                        | 3.74       | <i>H</i> | 16.0 |           | <i>G</i> | 0.15 |             | <i>U</i> | 4 |             |  |

|                             |     |      |      |            |     |      |      |            |     |      |      |
|-----------------------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| Residuals in seconds of arc |     |      |      |            |     |      |      |            |     |      |      |
| 1978 11 29                  | 675 | 1.1- | 0.3- | 1998 01 22 | 684 | 0.3- | 0.1- | 1998 01 27 | 684 | 0.1+ | 0.0  |
| 1978 11 30                  | 675 | 1.1+ | 0.0  | 1998 01 23 | 684 | 0.1- | 0.2- | 1998 02 19 | 684 | 0.2- | 0.1- |
| 1997 12 30                  | 566 | 0.1+ | 0.5+ | 1998 01 23 | 684 | 0.9+ | 0.4- | 1998 02 19 | 684 | 0.1+ | 0.0  |
| 1997 12 30                  | 566 | 0.3+ | 0.4+ | 1998 01 26 | 684 | 0.3- | 0.2- | 1998 02 24 | 684 | 0.2- | 0.2+ |
| 1997 12 30                  | 566 | 0.0  | 0.6+ | 1998 01 26 | 684 | 0.1- | 0.3- | 1998 02 24 | 684 | 0.3+ | 0.1- |
| 1998 01 22                  | 684 | 0.2- | 0.1- | 1998 01 27 | 684 | 0.6- | 0.1- |            |     |      |      |

1998 BD<sub>5</sub> = 1989 OV = 1995 QN<sub>10</sub>

|                                         |            |          |           |          |             |             |   |
|-----------------------------------------|------------|----------|-----------|----------|-------------|-------------|---|
| Epoch 1997 Dec. 18.0 TT = JDT 2450800.5 |            |          |           |          | Williams    |             |   |
| <i>M</i>                                | 222.48687  |          | (2000.0)  |          | <b>P</b>    | <b>Q</b>    |   |
| <i>n</i>                                | 0.17976344 | $\omega$ | 115.90326 |          | −0.08310819 | +0.99519968 |   |
| <i>a</i>                                | 3.1093419  | $\Omega$ | 149.19428 |          | −0.94661376 | −0.06262997 |   |
| <i>e</i>                                | 0.1292524  | <i>i</i> | 5.79148   |          | −0.31147299 | −0.07520029 |   |
| <i>P</i>                                | 5.48       | <i>H</i> | 13.0      | <i>G</i> | 0.15        | <i>U</i>    | 3 |

## M.P.C. 31398

1998 MAR. 13

|            |     |       |       |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| 1995 08 25 | 809 | 0.1+  | 0.2+  | 1997 12 29 | 566 | 0.4+ | 0.1+ | 1998 01 25 | 566 | 0.5+ | 0.3+ |
| 1995 08 26 | 809 | 0.7+  | 0.4-  | 1997 12 29 | 566 | 0.3+ | 0.2+ | 1998 01 25 | 566 | 0.1+ | 0.5+ |
| 1995 08 28 | 809 | 0.0   | 1.0-  | 1997 12 29 | 566 | 0.1+ | 0.3- | 1998 01 25 | 566 | 0.3+ | 0.4+ |
| 1995 08 29 | 809 | 0.6+  | 0.1-  | 1998 01 18 | 910 | 1.1+ | 0.3+ | 1998 02 26 | 566 | 1.6- | 0.5- |
| 1995 09 01 | 809 | (3.0- | 0.2+) | 1998 01 18 | 910 | 1.3+ | 0.4+ | 1998 02 26 | 566 | 1.6- | 0.2- |
| 1995 09 19 | 809 | 0.5+  | 0.9+  | 1998 01 18 | 910 | 0.8+ | 0.5+ | 1998 02 26 | 566 | 1.5- | 0.3- |
| 1995 09 23 | 809 | 0.9-  | 0.0   | 1998 01 23 | 910 | 0.1+ | 0.3+ |            |     |      |      |

1998 BW<sub>6</sub> = 1996 VW<sub>39</sub>

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            |          |           | Williams    |             |          |          |
|----------|------------|----------|-----------|-------------|-------------|----------|----------|
| <i>M</i> |            |          |           | (2000.0)    |             | <b>P</b> | <b>Q</b> |
| <i>n</i> | 0.18454007 | $\omega$ | 134.47553 | -0.97316777 | -0.22977368 |          |          |
| <i>a</i> | 3.0554529  | $\Omega$ | 32.24646  | +0.20409565 | -0.88644728 |          |          |
| <i>e</i> | 0.1231634  | <i>i</i> | 1.30892   | +0.10625186 | -0.40176520 |          |          |
| <i>P</i> | 5.34       | <i>H</i> | 14.0      | <i>G</i>    | 0.15        | <i>U</i> | 4        |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1996 11 08 | 587 | 1.5+ | 0.3- | 1997 12 01 | 327 | 0.0  | 0.4- | 1998 02 04 | 411 | 0.2- | 0.5- |
| 1996 11 08 | 587 | 1.2+ | 0.1+ | 1997 12 01 | 327 | 0.1- | 0.1+ | 1998 02 04 | 411 | 0.7- | 0.1- |
| 1996 11 08 | 587 | 0.6+ | 0.1+ | 1998 01 24 | 411 | 0.5- | 0.1- | 1998 02 17 | 411 | 0.9- | 0.6- |
| 1996 11 08 | 587 | 1.0+ | 0.1- | 1998 01 24 | 411 | 0.1- | 0.6- | 1998 02 17 | 411 | 0.3- | 0.1+ |
| 1996 11 10 | 691 | 1.4- | 0.2+ | 1998 01 25 | 411 | 0.5+ | 0.0  | 1998 03 01 | 699 | 1.8+ | 1.6+ |
| 1996 11 10 | 691 | 1.5- | 0.3+ | 1998 01 25 | 411 | 0.3+ | 0.1- | 1998 03 01 | 699 | 0.2- | 0.9+ |
| 1996 11 10 | 691 | 1.5- | 0.1+ | 1998 01 31 | 411 | 0.5+ | 0.8- | 1998 03 01 | 699 | 0.3+ | 0.8+ |
| 1997 12 01 | 327 | 0.1+ | 0.4+ | 1998 01 31 | 411 | 0.4- | 0.4- |            |     |      |      |

1998 BB<sub>7</sub> = 1996 US<sub>4</sub>

Id. S. Nakano

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            |          |           | Williams    |             |          |          |
|----------|------------|----------|-----------|-------------|-------------|----------|----------|
| <i>M</i> |            |          |           | (2000.0)    |             | <b>P</b> | <b>Q</b> |
| <i>n</i> | 0.26557421 | $\omega$ | 229.56926 | -0.81743460 | +0.57539298 |          |          |
| <i>a</i> | 2.3970593  | $\Omega$ | 345.49212 | -0.49062916 | -0.71996208 |          |          |
| <i>e</i> | 0.0763158  | <i>i</i> | 6.16424   | -0.30180077 | -0.38804320 |          |          |
| <i>P</i> | 3.71       | <i>H</i> | 15.0      | <i>G</i>    | 0.15        | <i>U</i> | 4        |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1996 10 17 | 910 | 0.0  | 0.2+ | 1998 01 24 | 411 | 1.0- | 0.4- | 1998 02 18 | 411 | 0.3+ | 0.3+ |
| 1996 10 18 | 910 | 0.0  | 0.5+ | 1998 01 24 | 411 | 0.4- | 1.3- | 1998 02 24 | 566 | 0.3+ | 0.3- |
| 1996 10 18 | 910 | 0.0  | 0.3+ | 1998 01 25 | 411 | 0.4+ | 0.3+ | 1998 02 24 | 566 | 0.2+ | 0.2- |
| 1996 10 18 | 910 | 0.0  | 0.3- | 1998 01 25 | 411 | 0.2+ | 0.5- | 1998 02 24 | 566 | 0.1- | 0.2+ |
| 1996 10 18 | 910 | 0.0  | 0.1+ | 1998 01 31 | 411 | 0.1+ | 0.7+ | 1998 02 26 | 699 | 0.1+ | 0.8- |
| 1996 10 18 | 910 | 0.1- | 0.2- | 1998 01 31 | 411 | 0.8+ | 0.3+ | 1998 02 26 | 699 | 0.3- | 0.8+ |
| 1996 10 18 | 910 | 0.1+ | 0.2- | 1998 02 04 | 411 | 0.6- | 0.5+ | 1998 02 26 | 699 | 0.3- | 0.5- |
| 1996 10 18 | 910 | 0.1- | 0.1- | 1998 02 04 | 411 | 0.4+ | 0.9+ |            |     |      |      |
| 1996 10 18 | 910 | 0.0  | 0.3- | 1998 02 18 | 411 | 0.3- | 0.0  |            |     |      |      |

1998 BH<sub>7</sub> = 1949 OP = 1976 SZ<sub>8</sub> = 1992 LL<sub>1</sub>

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            |          |           | Williams    |             |          |          |
|----------|------------|----------|-----------|-------------|-------------|----------|----------|
| <i>M</i> |            |          |           | (2000.0)    |             | <b>P</b> | <b>Q</b> |
| <i>n</i> | 0.29559213 | $\omega$ | 61.92779  | -0.41666556 | +0.90905872 |          |          |
| <i>a</i> | 2.2318969  | $\Omega$ | 183.44892 | -0.84220397 | -0.38661670 |          |          |
| <i>e</i> | 0.0845949  | <i>i</i> | 1.36844   | -0.34217289 | -0.15536981 |          |          |
| <i>P</i> | 3.33       | <i>H</i> | 14.5      | <i>G</i>    | 0.15        | <i>U</i> | 2        |

Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| 1949 07 28 | 024 | 0.4-  | 1.0+  | 1998 01 24 | 566 | 0.1- | 0.1- | 1998 01 29 | 566 | 0.3- | 0.2+ |
| 1949 07 30 | 024 | (2.9- | 7.6+) | 1998 01 24 | 566 | 0.1- | 0.1+ | 1998 01 29 | 566 | 0.1- | 0.3+ |
| 1976 09 29 | 095 | 1.1+  | 2.4-  | 1998 01 24 | 566 | 0.2- | 0.0  | 1998 01 29 | 566 | 0.3- | 0.0  |
| 1992 06 03 | 809 | 0.4+  | 0.1+  | 1998 01 25 | 566 | 1.1- | 0.7- | 1998 02 22 | 566 | 0.7+ | 0.5+ |
| 1992 06 03 | 809 | 0.5-  | 0.3-  | 1998 01 25 | 566 | 0.8- | 0.9- | 1998 02 22 | 566 | 0.1+ | 0.8+ |
| 1992 06 03 | 809 | 0.2-  | 0.3-  | 1998 01 25 | 566 | 0.1- | 0.1- | 1998 02 22 | 566 | 0.4+ | 0.3+ |
| 1992 06 09 | 809 | 1.0+  | 1.0-  | 1998 01 25 | 566 | 0.9- | 0.7- | 1998 02 23 | 566 | 0.5+ | 0.1+ |
| 1992 06 09 | 809 | (2.4- | 0.6-) | 1998 01 25 | 566 | 0.2- | 0.0  | 1998 02 23 | 566 | 0.6+ | 0.2+ |
| 1992 06 09 | 809 | 1.2-  | 1.5-  | 1998 01 25 | 566 | 0.1- | 0.0  | 1998 02 23 | 566 | 0.6+ | 0.2+ |
| 1997 10 09 | 691 | 0.2-  | 0.8-  | 1998 01 28 | 566 | 0.1- | 0.2+ | 1998 02 28 | 910 | 0.7+ | 0.5- |

|            |     |      |      |            |     |      |     |            |     |      |      |
|------------|-----|------|------|------------|-----|------|-----|------------|-----|------|------|
| 1997 10 09 | 691 | 0.3- | 0.5- | 1998 01 28 | 566 | 0.2- | 0.0 | 1998 02 28 | 910 | 0.7+ | 0.4- |
| 1997 10 09 | 691 | 0.4- | 0.5- | 1998 01 28 | 566 | 0.1- | 0.0 | 1998 02 28 | 910 | 0.6+ | 0.4- |

1998 BD<sub>8</sub> = 1979 SM<sub>12</sub> = 1983 PS

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

|          |            |          |           | (2000.0)    |             | <b>P</b> | <b>Q</b> |
|----------|------------|----------|-----------|-------------|-------------|----------|----------|
| <i>M</i> | 94.34835   |          |           |             |             |          |          |
| <i>n</i> | 0.23174754 | $\omega$ | 48.30721  | +0.95257319 | -0.27951199 |          |          |
| <i>a</i> | 2.6249798  | $\Omega$ | 327.38473 | +0.16727761 | +0.81125370 |          |          |
| <i>e</i> | 0.1878831  | <i>i</i> | 12.89904  | +0.25420959 | +0.51355670 |          |          |
| <i>P</i> | 4.25       | <i>H</i> | 13.0      | <i>G</i>    | 0.15        | <i>U</i> | 3        |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1979 09 21 | 049 | 0.2+ | 0.3- | 1998 01 26 | 411 | 0.5+ | 0.6- | 1998 03 01 | 691 | 0.9- | 0.0  |
| 1983 08 13 | 688 | 0.4- | 0.7- | 1998 01 26 | 411 | 0.4+ | 0.7- | 1998 03 01 | 691 | 0.9- | 0.3+ |
| 1983 08 13 | 688 | 1.6+ | 1.2- | 1998 01 31 | 411 | 1.0+ | 0.3- | 1998 03 01 | 691 | 0.9- | 0.1- |
| 1998 01 25 | 566 | 0.4+ | 0.6- | 1998 01 31 | 411 | 0.0  | 0.2- | 1998 03 04 | 691 | 0.7- | 0.2+ |
| 1998 01 25 | 566 | 0.2+ | 0.8- | 1998 02 04 | 411 | 0.2- | 0.7- | 1998 03 04 | 691 | 0.8- | 0.1+ |
| 1998 01 25 | 566 | 0.3+ | 0.5- | 1998 02 04 | 411 | 0.4+ | 0.2- | 1998 03 04 | 691 | 0.7- | 0.1+ |
| 1998 01 25 | 411 | 0.6- | 0.8+ | 1998 02 18 | 411 | 0.0  | 0.0  |            |     |      |      |
| 1998 01 25 | 411 | 0.7+ | 0.6+ | 1998 02 18 | 411 | 0.0  | 0.0  |            |     |      |      |

1998 BE<sub>8</sub> = 1988 BD<sub>1</sub> = 1990 VA<sub>10</sub>

Id. A. Gnädig

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

|          |            |          |           | (2000.0)    |             | <b>P</b> | <b>Q</b> |
|----------|------------|----------|-----------|-------------|-------------|----------|----------|
| <i>M</i> | 59.37784   |          |           |             |             |          |          |
| <i>n</i> | 0.30084465 | $\omega$ | 65.00559  | +0.66724706 | -0.74455144 |          |          |
| <i>a</i> | 2.2058426  | $\Omega$ | 343.08851 | +0.65529559 | +0.59995880 |          |          |
| <i>e</i> | 0.1530433  | <i>i</i> | 4.06160   | +0.35407491 | +0.29273298 |          |          |
| <i>P</i> | 3.28       | <i>H</i> | 14.5      | <i>G</i>    | 0.15        | <i>U</i> | 4        |

Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| 1988 01 21 | 511 | 1.2-  | 2.0+  | 1998 01 25 | 566 | 0.4+ | 0.7- | 1998 01 31 | 411 | 0.0  | 0.1+ |
| 1988 01 21 | 511 | 1.8+  | 1.4+  | 1998 01 25 | 566 | 0.1+ | 0.3- | 1998 01 31 | 411 | 0.2- | 0.2+ |
| 1988 01 21 | 511 | (1.7+ | 3.6+) | 1998 01 25 | 411 | 0.5- | 0.6- | 1998 02 04 | 411 | 1.1- | 0.1+ |
| 1990 11 13 | 675 | 0.9+  | 0.0   | 1998 01 25 | 411 | 0.3+ | 1.5- | 1998 02 04 | 411 | 1.2- | 0.7+ |
| 1990 11 13 | 675 | 0.5-  | 1.0-  | 1998 01 26 | 411 | 0.4+ | 0.6- | 1998 02 18 | 411 | 0.3+ | 0.3+ |
| 1998 01 25 | 566 | 0.1+  | 0.5-  | 1998 01 26 | 411 | 0.2- | 0.6- | 1998 02 18 | 411 | 0.3+ | 0.3+ |

1998 BL<sub>8</sub> = 1985 PH<sub>2</sub>

Id. S. Nakano

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

|          |            |          |           | (2000.0)    |             | <b>P</b> | <b>Q</b> |
|----------|------------|----------|-----------|-------------|-------------|----------|----------|
| <i>M</i> | 165.34893  |          |           |             |             |          |          |
| <i>n</i> | 0.27529241 | $\omega$ | 350.52582 | +0.83965304 | +0.53552540 |          |          |
| <i>a</i> | 2.3403091  | $\Omega$ | 336.39807 | -0.48233011 | +0.65861246 |          |          |
| <i>e</i> | 0.2185851  | <i>i</i> | 13.06787  | -0.24968065 | +0.52862290 |          |          |
| <i>P</i> | 3.58       | <i>H</i> | 13.5      | <i>G</i>    | 0.15        | <i>U</i> | 5        |

Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| 1985 08 13 | 095 | (4.0- | 3.4+) | 1998 01 26 | 411 | 1.0+ | 0.0  | 1998 02 21 | 411 | 0.1+ | 0.1+ |
| 1985 08 15 | 095 | 0.3+  | 0.4-  | 1998 01 26 | 411 | 0.2- | 0.6+ | 1998 02 21 | 411 | 0.0  | 1.0- |
| 1985 08 17 | 095 | 0.6-  | 0.7+  | 1998 01 28 | 411 | 0.7- | 0.1+ | 1998 02 26 | 699 | 0.3+ | 0.6+ |
| 1985 08 19 | 095 | (4.2- | 8.6+) | 1998 01 28 | 411 | 0.1- | 0.5- | 1998 02 26 | 699 | 0.6+ | 0.3+ |
| 1998 01 25 | 411 | 0.1+  | 0.3-  | 1998 01 31 | 411 | 0.8+ | 0.6+ | 1998 02 26 | 699 | 0.6- | 1.0+ |
| 1998 01 25 | 411 | 0.8-  | 0.2-  | 1998 01 31 | 411 | 0.3- | 0.8- |            |     |      |      |

1998 BN<sub>8</sub> = 1996 TF<sub>1</sub>

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

|          |            |          |           | (2000.0)    |             | <b>P</b> | <b>Q</b> |
|----------|------------|----------|-----------|-------------|-------------|----------|----------|
| <i>M</i> | 299.35674  |          |           |             |             |          |          |
| <i>n</i> | 0.29397623 | $\omega$ | 198.59124 | -0.94095408 | +0.33853019 |          |          |
| <i>a</i> | 2.2400682  | $\Omega$ | 1.19988   | -0.29973423 | -0.83083102 |          |          |
| <i>e</i> | 0.1029665  | <i>i</i> | 4.52549   | -0.15736841 | -0.44172063 |          |          |
| <i>P</i> | 3.35       | <i>H</i> | 15.5      | <i>G</i>    | 0.15        | <i>U</i> | 5        |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1996 10 06 | 817 | 0.4+ | 0.0  | 1998 01 26 | 411 | 0.1+ | 0.3- | 1998 02 23 | 411 | 0.2+ | 0.8+ |
| 1996 10 06 | 817 | 0.4- | 0.1- | 1998 01 26 | 411 | 0.3+ | 0.4- | 1998 02 23 | 411 | 0.3+ | 0.2+ |
| 1996 10 06 | 817 | 1.1+ | 0.1+ | 1998 01 28 | 566 | 0.4+ | 0.4+ | 1998 02 24 | 566 | 0.4+ | 0.7- |
| 1996 10 06 | 817 | 0.3+ | 0.1- | 1998 01 28 | 566 | 0.0  | 0.1+ | 1998 02 24 | 566 | 0.3+ | 0.5- |
| 1996 10 07 | 817 | 0.4- | 0.1- | 1998 01 28 | 566 | 0.3+ | 0.5+ | 1998 02 24 | 566 | 0.1- | 0.4- |
| 1996 10 07 | 817 | 0.6- | 0.0  | 1998 01 31 | 411 | 0.2- | 0.6+ | 1998 02 26 | 699 | 1.0- | 0.3- |
| 1996 10 07 | 817 | 0.4- | 0.1+ | 1998 01 31 | 411 | 0.7- | 0.6+ | 1998 02 26 | 699 | 0.2+ | 0.6+ |
| 1998 01 25 | 411 | 0.1- | 0.2- | 1998 02 21 | 411 | 0.2- | 0.3+ | 1998 02 26 | 699 | 0.0  | 0.1+ |
| 1998 01 25 | 411 | 0.1- | 0.8- | 1998 02 21 | 411 | 0.1+ | 0.7- |            |     |      |      |

**1998 BQ<sub>s</sub> = 1991 JT<sub>4</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 302.31574  | (2000.0) | <b>P</b>  | <b>Q</b>                 |
|----------|------------|----------|-----------|--------------------------|
| <i>n</i> | 0.26462813 | $\omega$ | 73.25215  | -0.91587286              |
| <i>a</i> | 2.4027691  | $\Omega$ | 129.79929 | -0.39700547              |
| <i>e</i> | 0.1363907  | <i>i</i> | 6.18386   | -0.05969557              |
| <i>P</i> | 3.72       | <i>H</i> | 15.5      | <i>G</i> 0.15 <i>U</i> 5 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1991 05 13 | 809 | 0.5+ | 0.1+ | 1998 01 22 | 691 | 0.7- | 0.2- | 1998 02 21 | 411 | 0.2- | 0.1+ |
| 1991 05 13 | 809 | 0.2+ | 0.9+ | 1998 01 25 | 411 | 0.5+ | 0.0  | 1998 02 25 | 566 | 0.1+ | 0.9- |
| 1991 05 13 | 809 | 0.4+ | 0.7- | 1998 01 25 | 411 | 1.4+ | 0.1- | 1998 02 25 | 566 | 0.1+ | 0.9- |
| 1991 05 17 | 809 | 0.3- | 0.1+ | 1998 01 26 | 411 | 0.2+ | 0.7+ | 1998 02 25 | 566 | 0.3+ | 0.6- |
| 1991 05 17 | 809 | 0.4+ | 0.1- | 1998 01 26 | 411 | 0.2- | 0.0  | 1998 02 26 | 699 | 0.1- | 0.6- |
| 1991 05 17 | 809 | 1.1- | 0.0  | 1998 01 31 | 411 | 0.2- | 1.0+ | 1998 02 26 | 699 | 1.0- | 0.4+ |
| 1998 01 22 | 691 | 0.8- | 0.0  | 1998 01 31 | 411 | 0.3- | 0.5+ | 1998 02 26 | 699 | 1.4+ | 0.1+ |
| 1998 01 22 | 691 | 0.8- | 0.2- | 1998 02 21 | 411 | 0.4+ | 0.6+ |            |     |      |      |

**1998 BR<sub>s</sub> = 1977 DZ<sub>5</sub> = 1982 BG<sub>4</sub> = 1996 YG<sub>3</sub>**

Id. K. Ichikawa

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 2.99336    | (2000.0) | <b>P</b>  | <b>Q</b>                 |
|----------|------------|----------|-----------|--------------------------|
| <i>n</i> | 0.18817921 | $\omega$ | 155.20210 | -0.69846330              |
| <i>a</i> | 3.0159326  | $\Omega$ | 338.93734 | +0.62606583              |
| <i>e</i> | 0.0463079  | <i>i</i> | 9.47488   | +0.34668516              |
| <i>P</i> | 5.24       | <i>H</i> | 13.5      | <i>G</i> 0.15 <i>U</i> 2 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1977 02 19 | 381 | 0.9+ | 0.1+ | 1996 12 27 | 327 | 0.3+ | 0.2+ | 1998 01 26 | 411 | 0.1- | 0.1+ |
| 1977 02 19 | 381 | 0.5- | 0.2+ | 1996 12 27 | 327 | 0.5+ | 0.2+ | 1998 01 31 | 411 | 0.2+ | 0.4- |
| 1982 01 26 | 381 | 0.9+ | 1.3- | 1998 01 24 | 566 | 0.1+ | 0.0  | 1998 01 31 | 411 | 0.1- | 0.1- |
| 1982 01 26 | 381 | 2.1- | 1.2- | 1998 01 24 | 566 | 0.4+ | 0.0  | 1998 02 21 | 411 | 0.2+ | 0.6+ |
| 1996 12 24 | 327 | 0.7- | 0.3+ | 1998 01 24 | 566 | 0.0  | 0.0  | 1998 02 21 | 411 | 0.0  | 0.1- |
| 1996 12 24 | 327 | 0.8- | 0.3+ | 1998 01 25 | 411 | 0.3- | 0.0  | 1998 02 26 | 699 | 0.3- | 1.3+ |
| 1996 12 24 | 327 | 0.2- | 0.3+ | 1998 01 25 | 411 | 0.6- | 0.1+ | 1998 02 26 | 699 | 0.3+ | 0.4+ |
| 1996 12 27 | 327 | 0.4+ | 0.1+ | 1998 01 26 | 411 | 0.3+ | 0.5- | 1998 02 26 | 699 | 0.8+ | 0.2+ |

**1998 BX<sub>s</sub> = 1990 QK<sub>10</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 10.14384   | (2000.0) | <b>P</b>  | <b>Q</b>                 |
|----------|------------|----------|-----------|--------------------------|
| <i>n</i> | 0.18855347 | $\omega$ | 136.59279 | -0.45311426              |
| <i>a</i> | 3.0119404  | $\Omega$ | 340.09114 | +0.75890869              |
| <i>e</i> | 0.0682589  | <i>i</i> | 10.66991  | +0.46770191              |
| <i>P</i> | 5.23       | <i>H</i> | 14.5      | <i>G</i> 0.15 <i>U</i> 5 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1990 08 16 | 809 | 0.7+ | 1.4- | 1998 01 19 | 327 | 0.5- | 0.4+ | 1998 01 31 | 910 | 1.2+ | 0.3+ |
| 1990 08 16 | 809 | 1.0+ | 0.2+ | 1998 01 19 | 327 | 0.3- | 0.5+ | 1998 01 31 | 910 | 1.1+ | 0.3+ |
| 1990 08 16 | 809 | 0.0  | 0.6- | 1998 01 19 | 327 | 0.3- | 0.3+ | 1998 01 31 | 910 | 1.2+ | 0.4+ |
| 1990 08 26 | 809 | 0.3- | 0.1- | 1998 01 24 | 566 | 1.3- | 0.9- | 1998 02 01 | 327 | 0.2- | 0.3+ |
| 1990 08 26 | 809 | 0.2+ | 0.7+ | 1998 01 24 | 566 | 1.2- | 1.0- | 1998 02 01 | 327 | 0.1- | 0.5+ |
| 1990 08 26 | 809 | 1.3- | 0.7+ | 1998 01 24 | 566 | 1.1- | 0.8- | 1998 02 01 | 327 | 0.3- | 0.3+ |
| 1998 01 18 | 327 | 0.3- | 0.2+ | 1998 01 29 | 910 | 1.1+ | 0.3+ | 1998 02 13 | 327 | 0.0  | 0.6- |

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1998 01 18 | 327 | 0.2- | 0.3+ | 1998 01 30 | 910 | 0.9+ | 0.4+ | 1998 02 13 | 327 | 0.7- | 0.9- |
| 1998 01 18 | 327 | 0.1+ | 0.3+ | 1998 01 30 | 910 | 0.9+ | 0.4+ | 1998 02 13 | 327 | 0.3- | 1.3- |

**1998 BX<sub>9</sub> = 1992 YT<sub>1</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 346.98848  | (2000.0) | <b>P</b>  | <b>Q</b>                 |
|----------|------------|----------|-----------|--------------------------|
| <i>n</i> | 0.18305940 | $\omega$ | 351.84654 | +0.19083367              |
| <i>a</i> | 3.0719068  | $\Omega$ | 86.95156  | +0.91251696              |
| <i>e</i> | 0.0351544  | <i>i</i> | 12.64149  | +0.36179458              |
| <i>P</i> | 5.38       | <i>H</i> | 14.0      | <i>G</i> 0.15 <i>U</i> 4 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1992 12 18 | 010 | 0.7+ | 0.5- | 1998 01 22 | 691 | 0.2- | 0.4+ | 1998 02 22 | 327 | 0.2- | 0.3- |
| 1992 12 19 | 010 | 1.1+ | 0.2- | 1998 01 22 | 691 | 0.1+ | 0.4- | 1998 02 22 | 327 | 0.2+ | 0.1- |
| 1992 12 19 | 010 | 1.0+ | 0.0  | 1998 01 22 | 691 | 0.1+ | 0.4+ | 1998 02 22 | 327 | 0.3+ | 0.5+ |
| 1992 12 19 | 010 | 0.2+ | 0.4- | 1998 01 26 | 691 | 0.1+ | 0.1- | 1998 02 26 | 327 | 0.5- | 0.1- |
| 1992 12 19 | 010 | 0.7- | 0.6+ | 1998 01 26 | 691 | 0.1- | 0.2- | 1998 02 26 | 327 | 0.4+ | 0.2+ |
| 1992 12 20 | 010 | 2.3- | 0.5+ | 1998 01 26 | 691 | 0.0  | 0.1- | 1998 02 26 | 327 | 0.1- | 0.2- |

**1998 BK<sub>10</sub> = 1995 FS<sub>9</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 109.26580  | (2000.0) | <b>P</b>  | <b>Q</b>                 |
|----------|------------|----------|-----------|--------------------------|
| <i>n</i> | 0.24121985 | $\omega$ | 282.83607 | +0.93315240              |
| <i>a</i> | 2.5558029  | $\Omega$ | 57.06393  | -0.26511749              |
| <i>e</i> | 0.2292554  | <i>i</i> | 6.90880   | -0.24277419              |
| <i>P</i> | 4.09       | <i>H</i> | 14.5      | <i>G</i> 0.15 <i>U</i> 4 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1995 03 26 | 691 | 0.2+ | 0.2+ | 1998 01 24 | 426 | 0.3+ | 0.1+ | 1998 02 17 | 426 | 0.5+ | 0.2+ |
| 1995 03 26 | 691 | 0.2- | 0.1+ | 1998 01 24 | 426 | 0.4+ | 0.4- | 1998 02 18 | 426 | 1.3- | 0.7+ |
| 1995 03 26 | 691 | 0.1+ | 0.2+ | 1998 01 24 | 426 | 0.5+ | 0.3- | 1998 02 18 | 426 | 0.3- | 0.8- |
| 1995 04 07 | 691 | 0.2- | 0.1- | 1998 01 26 | 426 | 1.1- | 0.4+ | 1998 02 18 | 426 | 0.4+ | 0.3+ |
| 1995 04 07 | 691 | 0.1+ | 0.2- | 1998 01 26 | 426 | 0.3+ | 0.1+ | 1998 02 20 | 426 | 0.5- | 0.5- |
| 1995 04 07 | 691 | 0.1+ | 0.3- | 1998 01 26 | 426 | 0.7- | 0.5+ | 1998 02 20 | 426 | 0.7- | 0.5- |
| 1997 12 30 | 566 | 0.2- | 0.4+ | 1998 01 27 | 426 | 0.3- | 0.7- | 1998 02 23 | 725 | 0.8+ | 0.1+ |
| 1997 12 30 | 566 | 0.6+ | 0.1- | 1998 01 27 | 426 | 0.6+ | 0.2- | 1998 02 23 | 725 | 0.6+ | 0.3- |
| 1997 12 30 | 566 | 0.2- | 0.3+ | 1998 02 17 | 426 | 0.4+ | 0.7+ |            |     |      |      |

**1998 BV<sub>12</sub> = 1977 XN<sub>2</sub> = 1990 HP<sub>5</sub> = 1991 RL<sub>32</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 168.25617  | (2000.0) | <b>P</b>  | <b>Q</b>                 |
|----------|------------|----------|-----------|--------------------------|
| <i>n</i> | 0.20264434 | $\omega$ | 324.00005 | +0.53442322              |
| <i>a</i> | 2.8706466  | $\Omega$ | 338.30096 | -0.77006681              |
| <i>e</i> | 0.0625381  | <i>i</i> | 1.30087   | -0.34840913              |
| <i>P</i> | 4.86       | <i>H</i> | 12.6      | <i>G</i> 0.15 <i>U</i> 2 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1977 12 07 | 675 | 0.4+ | 0.1+ | 1998 01 20 | 704 | 0.5- | 1.2+ | 1998 01 24 | 704 | 1.2+ | 0.1+ |
| 1977 12 08 | 675 | 0.3- | 0.8- | 1998 01 20 | 704 | 0.2+ | 0.3- | 1998 01 24 | 704 | 0.4+ | 0.0  |
| 1990 04 29 | 413 | 0.2+ | 0.2- | 1998 01 23 | 704 | 0.4+ | 0.1- | 1998 01 24 | 704 | 0.2+ | 0.1- |
| 1990 05 01 | 413 | 0.7- | 0.0  | 1998 01 23 | 691 | 0.9- | 0.2- | 1998 01 25 | 704 | 0.6+ | 0.0  |
| 1990 05 02 | 413 | 0.5+ | 0.0  | 1998 01 23 | 704 | 0.9+ | 0.1+ | 1998 01 25 | 704 | 0.1+ | 0.1+ |
| 1991 09 11 | 402 | 0.4- | 0.0  | 1998 01 23 | 691 | 1.0- | 0.2- | 1998 01 25 | 704 | 0.1+ | 0.4- |
| 1991 09 11 | 402 | 0.3+ | 0.4+ | 1998 01 23 | 704 | 0.6+ | 0.2+ | 1998 01 25 | 704 | 0.2+ | 0.7+ |
| 1998 01 20 | 704 | 0.2+ | 0.2- | 1998 01 23 | 691 | 1.0- | 0.3- | 1998 01 30 | 691 | 1.8- | 0.3+ |
| 1998 01 20 | 704 | 1.0+ | 0.1- | 1998 01 23 | 704 | 0.8+ | 0.4- | 1998 01 30 | 691 | 1.7- | 0.2+ |
| 1998 01 20 | 704 | 0.4+ | 0.8+ | 1998 01 23 | 704 | 0.7+ | 0.5- | 1998 01 30 | 691 | 1.4- | 0.2- |
| 1998 01 20 | 704 | 0.4+ | 0.2- | 1998 01 24 | 704 | 0.1+ | 0.4- |            |     |      |      |

**1998 BB<sub>15</sub> = 1993 RQ<sub>7</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 333.78255  |          | (2000.0)  | <b>P</b>    |             | <b>Q</b> |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.29763013 | $\omega$ | 322.83099 | -0.78945357 | -0.61380977 |          |   |
| <i>a</i> | 2.2216968  | $\Omega$ | 179.30203 | +0.57764696 | -0.74337828 |          |   |
| <i>e</i> | 0.1314020  | <i>i</i> | 3.73238   | +0.20757422 | -0.26575608 |          |   |
| <i>P</i> | 3.31       | <i>H</i> | 14.5      | <i>G</i>    | 0.15        | <i>U</i> | 5 |

Residuals in seconds of arc

|            |     |             |      |            |     |      |      |            |     |      |      |
|------------|-----|-------------|------|------------|-----|------|------|------------|-----|------|------|
| 1993 09 15 | 809 | 1.6+        | 0.3- | 1993 09 18 | 809 | 0.6- | 0.2- | 1998 01 24 | 566 | 0.2- | 0.9- |
| 1993 09 15 | 809 | 1.4+        | 0.2+ | 1993 09 18 | 675 | 1.2- | 0.7+ | 1998 01 28 | 566 | 0.5- | 0.1+ |
| 1993 09 15 | 809 | 1.0+        | 0.1- | 1993 09 18 | 675 | 0.9- | 0.2+ | 1998 01 28 | 566 | 0.2- | 0.1- |
| 1993 09 17 | 809 | (3.8- 0.4-) |      | 1997 12 28 | 566 | 0.3+ | 0.0  | 1998 01 28 | 566 | 0.2- | 0.0  |
| 1993 09 17 | 809 | (4.0- 0.5+) |      | 1997 12 28 | 566 | 0.1+ | 0.1- | 1998 02 13 | 327 | 0.1+ | 0.1+ |
| 1993 09 17 | 809 | (3.0- 0.6+) |      | 1997 12 28 | 566 | 0.2+ | 0.2+ | 1998 02 13 | 327 | 0.4+ | 0.5+ |
| 1993 09 18 | 809 | 0.4-        | 0.2+ | 1998 01 24 | 566 | 0.0  | 0.1+ | 1998 02 13 | 327 | 0.4+ | 0.3+ |
| 1993 09 18 | 809 | 0.8-        | 0.5- | 1998 01 24 | 566 | 0.3- | 0.1- |            |     |      |      |

**1998 BC<sub>15</sub> = 1953 QV = 1996 VP<sub>11</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 254.46598  |          | (2000.0)  | <b>P</b>    |             | <b>Q</b> |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.27704983 | $\omega$ | 316.62441 | -0.52257368 | +0.84634470 |          |   |
| <i>a</i> | 2.3304017  | $\Omega$ | 281.61937 | -0.75068827 | -0.51403738 |          |   |
| <i>e</i> | 0.1900650  | <i>i</i> | 6.03849   | -0.40420771 | -0.13952141 |          |   |
| <i>P</i> | 3.56       | <i>H</i> | 14.5      | <i>G</i>    | 0.15        | <i>U</i> | 2 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1953 08 16 | 675 | 0.1- | 0.3- | 1997 10 03 | 691 | 0.0  | 0.5- | 1998 01 28 | 566 | 0.3+ | 0.4- |
| 1953 08 16 | 675 | 0.4+ | 0.5- | 1997 10 03 | 691 | 0.3+ | 0.3- | 1998 01 28 | 566 | 0.5+ | 0.5- |
| 1996 11 04 | 691 | 0.2- | 0.2- | 1998 01 18 | 910 | 1.2+ | 0.4+ | 1998 02 23 | 566 | 0.6- | 1.0- |
| 1996 11 04 | 691 | 0.0  | 0.1+ | 1998 01 18 | 910 | 1.3+ | 0.3+ | 1998 02 23 | 566 | 0.6- | 0.3- |
| 1996 11 04 | 691 | 0.3- | 0.3+ | 1998 01 18 | 910 | 0.3+ | 0.2+ | 1998 02 23 | 566 | 0.6- | 0.2- |
| 1996 11 13 | 691 | 0.2+ | 0.2+ | 1998 01 24 | 566 | 0.4- | 0.1+ | 1998 02 24 | 566 | 0.2- | 0.3+ |
| 1996 11 13 | 691 | 0.1+ | 0.2+ | 1998 01 24 | 566 | 0.6- | 0.0  | 1998 02 24 | 566 | 0.3- | 0.4+ |
| 1996 11 13 | 691 | 0.0  | 0.1+ | 1998 01 24 | 566 | 0.8- | 0.2+ | 1998 02 24 | 566 | 0.4- | 0.4+ |
| 1997 10 03 | 691 | 0.3- | 0.3- | 1998 01 28 | 566 | 0.4+ | 0.0  |            |     |      |      |

**1998 BX<sub>24</sub> = 1996 TW<sub>9</sub>**

Id. S. Nakano

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 312.00340  |          | (2000.0)  | <b>P</b>    |             | <b>Q</b> |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.23911638 | $\omega$ | 44.87384  | -0.96606885 | +0.25377558 |          |   |
| <i>a</i> | 2.5707696  | $\Omega$ | 149.73087 | -0.25554988 | -0.91215154 |          |   |
| <i>e</i> | 0.2074764  | <i>i</i> | 5.47021   | -0.03748653 | -0.32183464 |          |   |
| <i>P</i> | 4.12       | <i>H</i> | 14.0      | <i>G</i>    | 0.15        | <i>U</i> | 4 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1996 10 15 | 046 | 0.5- | 0.4- | 1996 10 15 | 046 | 0.3+ | 0.3- | 1998 02 02 | 411 | 0.4+ | 0.2- |
| 1996 10 15 | 046 | 0.5- | 0.5- | 1996 10 15 | 046 | 0.2+ | 0.6+ | 1998 02 02 | 411 | 0.4+ | 0.5+ |
| 1996 10 15 | 046 | 0.3- | 0.3+ | 1996 10 16 | 046 | 0.2+ | 0.1- | 1998 02 18 | 411 | 1.3+ | 1.5- |
| 1996 10 15 | 046 | 0.3+ | 0.1- | 1998 01 28 | 411 | 0.2- | 1.0- | 1998 02 18 | 411 | 0.4- | 0.4- |
| 1996 10 15 | 046 | 0.1+ | 0.2+ | 1998 01 28 | 411 | 0.1- | 0.9+ | 1998 02 26 | 566 | 0.0  | 0.2+ |
| 1996 10 15 | 046 | 0.8- | 0.3+ | 1998 01 29 | 411 | 0.0  | 0.0  | 1998 02 26 | 566 | 0.3- | 0.6+ |
| 1996 10 15 | 046 | 0.9+ | 0.1- | 1998 01 29 | 411 | 0.6- | 0.5+ | 1998 02 26 | 566 | 0.5- | 0.3+ |

**1998 BY<sub>24</sub> = 1996 VR<sub>18</sub>**

Id. S. Nakano

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 211.75649  |          | (2000.0)  | <b>P</b>    |             | <b>Q</b> |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.20549969 | $\omega$ | 1.87701   | +0.18979890 | +0.98159935 |          |   |
| <i>a</i> | 2.8439935  | $\Omega$ | 279.06446 | -0.90108122 | +0.16567507 |          |   |
| <i>e</i> | 0.0156724  | <i>i</i> | 1.21589   | -0.38990898 | +0.09494467 |          |   |
| <i>P</i> | 4.80       | <i>H</i> | 13.5      | <i>G</i>    | 0.15        | <i>U</i> | 4 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1996 11 06 | 691 | 0.4- | 0.1- | 1998 01 25 | 566 | 0.4- | 0.4+ | 1998 02 18 | 411 | 0.6+ | 0.0  |
| 1996 11 06 | 691 | 0.3- | 0.1+ | 1998 01 28 | 411 | 0.3- | 0.0  | 1998 02 26 | 566 | 0.7+ | 0.3+ |
| 1996 11 06 | 691 | 0.2- | 0.1+ | 1998 01 28 | 411 | 0.1+ | 1.1- | 1998 02 26 | 566 | 0.3+ | 0.1- |
| 1996 11 08 | 691 | 0.9+ | 0.1+ | 1998 01 29 | 411 | 0.2+ | 0.1- | 1998 02 26 | 566 | 0.4+ | 0.0  |
| 1996 11 08 | 691 | 0.2- | 0.1+ | 1998 01 29 | 411 | 0.8+ | 0.3- | 1998 03 04 | 411 | 0.7- | 1.0+ |
| 1996 11 08 | 691 | 0.1+ | 0.1- | 1998 02 02 | 411 | 0.3- | 0.6+ | 1998 03 04 | 411 | 0.7- | 0.3- |
| 1998 01 25 | 566 | 0.2- | 0.0  | 1998 02 02 | 411 | 0.2+ | 0.0  |            |     |      |      |
| 1998 01 25 | 566 | 0.7- | 0.0  | 1998 02 18 | 411 | 0.1+ | 0.4- |            |     |      |      |

**1998 BH<sub>25</sub> = 1983 GP<sub>1</sub> = 1991 KV<sub>1</sub>**

Id. S. Nakano

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 288.58892  |          | (2000.0)  | <b>P</b>    |             | <b>Q</b> |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.25804343 | $\omega$ | 140.86170 | -0.86233992 | +0.50413258 |          |   |
| <i>a</i> | 2.4434728  | $\Omega$ | 69.47314  | -0.47626633 | -0.77602922 |          |   |
| <i>e</i> | 0.0750260  | <i>i</i> | 2.88398   | -0.17187278 | -0.37898416 |          |   |
| <i>P</i> | 3.82       | <i>H</i> | 14.5      | <i>G</i>    | 0.15        | <i>U</i> | 4 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1983 04 09 | 095 | 0.4+ | 0.8+ | 1998 01 29 | 411 | 0.6- | 0.3+ | 1998 02 26 | 699 | 0.4+ | 0.2- |
| 1991 05 17 | 809 | 0.1+ | 0.0  | 1998 01 29 | 411 | 0.0  | 0.2+ | 1998 02 26 | 699 | 1.3+ | 0.7- |
| 1991 05 17 | 809 | 0.3+ | 0.1+ | 1998 02 02 | 411 | 0.0  | 0.7+ | 1998 02 26 | 699 | 0.1- | 0.3+ |
| 1991 05 17 | 809 | 0.5- | 0.6- | 1998 02 02 | 411 | 0.4- | 0.1- | 1998 03 04 | 411 | 1.5- | 0.1- |
| 1998 01 28 | 411 | 0.3+ | 0.7+ | 1998 02 18 | 411 | 0.1+ | 0.2- | 1998 03 04 | 411 | 1.0+ | 0.1- |
| 1998 01 28 | 411 | 0.5- | 0.6- | 1998 02 18 | 411 | 0.1- | 0.8- |            |     |      |      |

**1998 BL<sub>25</sub> = 1991 RE<sub>41</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 15.67967   |          | (2000.0)  | <b>P</b>    |             | <b>Q</b> |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.21110069 | $\omega$ | 322.60138 | -0.40572299 | -0.91330292 |          |   |
| <i>a</i> | 2.7934631  | $\Omega$ | 151.28482 | +0.85545449 | -0.39315999 |          |   |
| <i>e</i> | 0.0502009  | <i>i</i> | 4.24808   | +0.32184853 | -0.10631559 |          |   |
| <i>P</i> | 4.67       | <i>H</i> | 14.1      | <i>G</i>    | 0.15        | <i>U</i> | 5 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1991 09 10 | 033 | 0.7- | 0.1- | 1998 01 28 | 411 | 0.4- | 1.5+ | 1998 02 18 | 411 | 0.4+ | 0.4- |
| 1991 09 10 | 033 | 0.4+ | 0.2- | 1998 01 28 | 411 | 1.4- | 0.9+ | 1998 02 18 | 411 | 0.1- | 0.3- |
| 1991 09 13 | 033 | 0.3+ | 0.3+ | 1998 01 29 | 411 | 0.4- | 0.7- | 1998 03 04 | 411 | 0.1+ | 0.6- |
| 1998 01 26 | 566 | 0.6+ | 0.4+ | 1998 01 29 | 411 | 0.1- | 1.0- | 1998 03 04 | 411 | 0.1- | 1.2+ |
| 1998 01 26 | 566 | 0.6+ | 0.3+ | 1998 02 02 | 411 | 0.0  | 0.9- |            |     |      |      |
| 1998 01 26 | 566 | 0.4+ | 0.1+ | 1998 02 02 | 411 | 0.5+ | 0.4- |            |     |      |      |

**1998 BM<sub>25</sub> = 1977 DF<sub>10</sub> = 1984 EP<sub>1</sub>**

Id. S. Nakano

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> | 348.62937  |          | (2000.0)  | <b>P</b>    |             | <b>Q</b> |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.28042304 | $\omega$ | 157.57137 | -0.76437732 | -0.64398850 |          |   |
| <i>a</i> | 2.3116757  | $\Omega$ | 342.22427 | +0.57467688 | -0.65815094 |          |   |
| <i>e</i> | 0.1359739  | <i>i</i> | 5.96374   | +0.29235902 | -0.39002071 |          |   |
| <i>P</i> | 3.51       | <i>H</i> | 15.0      | <i>G</i>    | 0.15        | <i>U</i> | 4 |

Residuals in seconds of arc

|            |     |      |      |            |           |       |      |            |     |      |      |
|------------|-----|------|------|------------|-----------|-------|------|------------|-----|------|------|
| 1977 02 19 | 381 | 0.0  | 1.4+ | 1984 03 06 | 809       | 0.2-  | 0.6- | 1998 02 18 | 411 | 0.4+ | 0.1- |
| 1977 02 19 | 381 | 1.2+ | 1.5+ | 1984 03 06 | 809       | 0.2+  | 0.5- | 1998 02 26 | 699 | 0.5+ | 0.7+ |
| 1984 03 02 | 809 | 0.2+ | 0.1+ | 1984 03 11 | 809(47.4- | 3.7+) |      | 1998 02 26 | 699 | 0.4+ | 0.6+ |
| 1984 03 02 | 809 | 0.3+ | 0.2+ | 1984 03 11 | 809(47.4- | 3.8+) |      | 1998 02 26 | 699 | 0.2+ | 0.7+ |
| 1984 03 02 | 809 | 0.3+ | 0.4+ | 1984 03 11 | 809(47.3- | 3.9+) |      | 1998 02 26 | 566 | 0.4- | 0.4+ |
| 1984 03 04 | 809 | 1.1- | 1.0- | 1998 01 28 | 411       | 0.2-  | 0.1- | 1998 02 26 | 566 | 0.3- | 0.2+ |
| 1984 03 04 | 809 | 0.8- | 0.7- | 1998 01 28 | 411       | 0.1+  | 0.1- | 1998 02 26 | 566 | 0.3- | 0.3+ |
| 1984 03 04 | 809 | 0.6- | 0.6- | 1998 01 29 | 411       | 0.2-  | 0.3- | 1998 02 28 | 699 | 0.1+ | 0.6+ |
| 1984 03 05 | 809 | 0.1- | 0.3- | 1998 01 29 | 411       | 0.1+  | 0.9- | 1998 02 28 | 699 | 0.1+ | 0.4+ |
| 1984 03 05 | 809 | 0.1+ | 0.2- | 1998 02 04 | 411       | 0.0   | 0.4- | 1998 02 28 | 699 | 0.1- | 0.3- |
| 1984 03 05 | 809 | 0.4+ | 0.3- | 1998 02 04 | 411       | 0.8-  | 0.1- | 1998 03 04 | 411 | 0.7- | 0.1- |
| 1984 03 06 | 809 | 0.4- | 0.6- | 1998 02 18 | 411       | 0.7+  | 0.2+ | 1998 03 04 | 411 | 0.5+ | 0.5- |

1998 MAR. 13

M.P.C. 31401

**1998 BP<sub>25</sub> = 1982 JR**

Id. S. Nakano

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> |            | (2000.0) |           | <b>P</b>    |             | <b>Q</b> |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.17620300 | $\omega$ | 61.87786  | −0.97024532 | +0.23903677 |          |   |
| <i>a</i> | 3.1510878  | $\Omega$ | 131.92406 | −0.23632674 | −0.90031534 |          |   |
| <i>e</i> | 0.1484371  | <i>i</i> | 2.96930   | −0.05266582 | −0.36372202 |          |   |
| <i>P</i> | 5.59       | <i>H</i> | 13.0      | <i>G</i>    | 0.15        | <i>U</i> | 5 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1982 05 15 | 675 | 1.4+ | 0.1+ | 1998 01 28 | 411 | 0.2+ | 0.9+ | 1998 02 22 | 566 | 1.0− | 0.9− |
| 1982 05 16 | 675 | 0.7− | 1.0− | 1998 01 29 | 411 | 1.6+ | 1.0+ | 1998 02 22 | 566 | 0.8− | 1.0− |
| 1982 05 16 | 675 | 0.3− | 0.9+ | 1998 01 29 | 411 | 0.6+ | 0.6− | 1998 02 27 | 566 | 0.4+ | 0.6− |
| 1982 05 17 | 675 | 0.4− | 0.0  | 1998 02 02 | 411 | 0.1+ | 0.0  | 1998 02 27 | 566 | 0.5+ | 0.4− |
| 1998 01 26 | 566 | 0.3− | 0.1+ | 1998 02 02 | 411 | 0.5− | 0.5− | 1998 02 27 | 566 | 0.2+ | 0.2− |
| 1998 01 26 | 566 | 0.6− | 0.4− | 1998 02 18 | 411 | 0.0  | 0.5+ | 1998 03 04 | 411 | 0.4+ | 1.7+ |
| 1998 01 26 | 566 | 0.1− | 0.2− | 1998 02 18 | 411 | 0.4− | 0.7+ | 1998 03 04 | 411 | 0.7+ | 0.6+ |
| 1998 01 28 | 411 | 0.3+ | 0.1+ | 1998 02 22 | 566 | 1.1− | 1.0− |            |     |      |      |

**1998 BC<sub>26</sub> = 1974 YK = 1983 EC<sub>3</sub>**

Id. S. Nakano

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> |            | (2000.0) |           | <b>P</b>    |             | <b>Q</b> |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.26269375 | $\omega$ | 319.30128 | +0.90785923 | −0.39641153 |          |   |
| <i>a</i> | 2.4145501  | $\Omega$ | 64.54514  | +0.41311416 | +0.79010786 |          |   |
| <i>e</i> | 0.1804008  | <i>i</i> | 8.69911   | +0.07161225 | +0.46753338 |          |   |
| <i>P</i> | 3.75       | <i>H</i> | 12.5      | <i>G</i>    | 0.15        | <i>U</i> | 5 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1974 12 19 | 330 | 0.0  | 0.2+ | 1998 02 04 | 411 | 0.2+ | 0.5− | 1998 03 01 | 411 | 0.2− | 0.3+ |
| 1983 03 14 | 095 | 0.0  | 0.0  | 1998 02 04 | 411 | 0.4+ | 0.2− | 1998 03 01 | 411 | 0.3− | 0.1+ |
| 1998 01 29 | 411 | 0.1− | 0.1− | 1998 02 17 | 411 | 0.2+ | 0.1− | 1998 03 04 | 411 | 0.1+ | 0.4+ |
| 1998 01 29 | 411 | 0.3− | 0.3− | 1998 02 17 | 411 | 0.6− | 0.3+ | 1998 03 04 | 411 | 1.2+ | 0.6+ |
| 1998 01 30 | 411 | 0.2− | 0.1− | 1998 02 21 | 411 | 0.3− | 0.1+ |            |     |      |      |
| 1998 01 30 | 411 | 0.0  | 0.5− | 1998 02 21 | 411 | 0.3− | 0.2− |            |     |      |      |

**1998 BL<sub>26</sub> = 1991 VV<sub>11</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> |            | (2000.0) |           | <b>P</b>    |             | <b>Q</b> |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.21714876 | $\omega$ | 87.29209  | −0.63627379 | +0.77081465 |          |   |
| <i>a</i> | 2.7413499  | $\Omega$ | 143.13147 | −0.72709952 | −0.58547689 |          |   |
| <i>e</i> | 0.0341227  | <i>i</i> | 3.02192   | −0.25784094 | −0.25112066 |          |   |
| <i>P</i> | 4.54       | <i>H</i> | 15.5      | <i>G</i>    | 0.15        | <i>U</i> | 6 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1991 11 08 | 691 | 0.6− | 0.0  | 1991 11 09 | 691 | 1.9+ | 0.3+ | 1998 01 30 | 910 | 0.6− | 0.4+ |
| 1991 11 08 | 691 | 0.6− | 0.5+ | 1991 11 09 | 691 | 1.0− | 0.2+ | 1998 01 30 | 910 | 0.1+ | 0.7+ |
| 1991 11 08 | 691 | 0.4− | 0.1+ | 1991 11 09 | 691 | 0.3− | 0.0  | 1998 01 30 | 910 | 0.4− | 0.5− |
| 1991 11 08 | 691 | 0.3− | 0.6− | 1998 01 28 | 910 | 0.2+ | 0.2− | 1998 02 27 | 910 | 0.0  | 0.1− |
| 1991 11 08 | 691 | 0.7+ | 0.3− | 1998 01 28 | 910 | 0.1+ | 0.2− | 1998 02 27 | 910 | 0.2+ | 0.1+ |
| 1991 11 08 | 691 | 0.7+ | 0.3− | 1998 01 28 | 910 | 0.5+ | 0.0  | 1998 02 27 | 910 | 0.1− | 0.1− |

**1998 BE<sub>30</sub> = 1995 SJ<sub>55</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> |            | (2000.0) |           | <b>P</b>    |             | <b>Q</b> |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.19042707 | $\omega$ | 208.99159 | −0.84265281 | +0.53832473 |          |   |
| <i>a</i> | 2.9921516  | $\Omega$ | 3.64545   | −0.45068315 | −0.69297699 |          |   |
| <i>e</i> | 0.0496931  | <i>i</i> | 10.82985  | −0.29465394 | −0.47957208 |          |   |
| <i>P</i> | 5.18       | <i>H</i> | 13.5      | <i>G</i>    | 0.15        | <i>U</i> | 4 |

Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| 1995 09 19 | 809 | 1.1+  | 0.5+  | 1998 01 28 | 566 | 0.3− | 0.1+ | 1998 01 31 | 411 | 0.1− | 0.0  |
| 1995 09 20 | 809 | 1.4+  | 0.0   | 1998 01 28 | 566 | 0.5− | 0.1+ | 1998 02 23 | 411 | 0.1+ | 0.1− |
| 1995 09 23 | 809 | (5.2+ | 2.8−) | 1998 01 28 | 566 | 0.4− | 0.0  | 1998 02 23 | 411 | 0.5+ | 0.1− |

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1995 09 27 | 691 | 1.0− | 0.1− | 1998 01 30 | 411 | 0.1− | 0.0  | 1998 03 06 | 411 | 0.1+ | 0.4− |
| 1995 09 27 | 691 | 0.8− | 0.3− | 1998 01 30 | 411 | 0.3+ | 0.4+ | 1998 03 06 | 411 | 0.2+ | 0.2− |
| 1995 09 27 | 691 | 0.6− | 0.3− | 1998 01 31 | 411 | 0.1+ | 0.1+ |            |     |      |      |

**1998 BK<sub>30</sub> = 1979 SL<sub>8</sub> = 1983 QP**

Id. G. V. Williams, A. Gnädig

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> |            | (2000.0) |           | <b>P</b>    |             | <b>Q</b> |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.23236305 | $\omega$ | 137.71080 | +0.15834310 | −0.98672436 |          |   |
| <i>a</i> | 2.6203421  | $\Omega$ | 303.14807 | +0.89397910 | +0.15878636 |          |   |
| <i>e</i> | 0.0596269  | <i>i</i> | 2.47050   | +0.41920024 | +0.03408706 |          |   |
| <i>P</i> | 4.24       | <i>H</i> | 13.5      | <i>G</i>    | 0.15        | <i>U</i> | 4 |

Residuals in seconds of arc

|            |     |      |      |            |     |       |       |            |     |      |      |
|------------|-----|------|------|------------|-----|-------|-------|------------|-----|------|------|
| 1979 09 24 | 095 | 0.6− | 1.3+ | 1998 01 29 | 132 | 0.2−  | 1.1−  | 1998 02 15 | 132 | 0.4+ | 0.5+ |
| 1983 08 30 | 675 | 0.9+ | 0.1+ | 1998 01 29 | 132 | 0.1+  | 0.9−  | 1998 02 15 | 132 | 0.4− | 1.3+ |
| 1983 08 31 | 675 | 1.2+ | 0.9+ | 1998 01 29 | 132 | 1.5−  | 0.0   | 1998 02 20 | 910 | 0.9+ | 0.2+ |
| 1983 09 01 | 675 | 0.9− | 1.1− | 1998 02 07 | 958 | 0.7−  | 0.7−  | 1998 02 20 | 910 | 0.9+ | 0.2+ |
| 1983 09 02 | 675 | 0.6− | 0.8− | 1998 02 07 | 958 | 1.6−  | 1.1+  | 1998 02 20 | 910 | 0.9+ | 0.1+ |
| 1998 01 25 | 566 | 0.2− | 1.6− | 1998 02 07 | 958 | (2.7− | 1.4+) | 1998 02 24 | 133 | 1.2+ | 0.4+ |
| 1998 01 25 | 566 | 0.3− | 1.7− | 1998 02 15 | 141 | 0.3−  | 0.1+  | 1998 02 24 | 133 | 0.7+ | 1.0− |
| 1998 01 25 | 566 | 0.0  | 1.6− | 1998 02 15 | 141 | 0.4−  | 0.9+  | 1998 02 24 | 133 | 0.4+ | 0.1− |
| 1998 01 28 | 132 | 0.7− | 0.4+ | 1998 02 15 | 141 | 0.3−  | 0.8+  | 1998 02 25 | 132 | 1.2+ | 1.5+ |
| 1998 01 28 | 132 | 0.3− | 0.4+ | 1998 02 15 | 141 | 0.1−  | 0.9+  | 1998 02 25 | 132 | 1.3+ | 0.9− |
| 1998 01 29 | 132 | 0.0  | 0.3+ | 1998 02 15 | 141 | 0.4−  | 0.8+  | 1998 02 25 | 132 | 0.5− | 0.2− |

**1998 BA<sub>31</sub> = 1977 ET<sub>5</sub> = 1993 TR<sub>16</sub>**

Id. A. Gnädig

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> |           | (2000.0) |           | <b>P</b>    |             | <b>Q</b> |   |
|----------|-----------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 21.21390  | $\omega$ | 259.92001 | +0.26226741 | −0.96496258 |          |   |
| <i>a</i> | 2.3303844 | $\Omega$ | 174.85476 | +0.91641815 | +0.24647918 |          |   |
| <i>e</i> | 0.1626330 | <i>i</i> | 5.07900   | +0.30231371 | +0.08997356 |          |   |
| <i>P</i> | 3.56      | <i>H</i> | 15.0      | <i>G</i>    | 0.15        | <i>U</i> | 2 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1977 03 12 | 381 | 0.0  | 0.3+ | 1993 10 11 | 809 | 1.0+ | 1.3− | 1998 01 26 | 691 | 0.3− | 0.3− |
| 1977 03 12 | 381 | 0.1+ | 1.2− | 1993 10 11 | 809 | 0.1− | 0.5− | 1998 01 26 | 691 | 0.4− | 0.5− |
| 1977 03 14 | 381 | 2.1− | 1.2+ | 1993 10 20 | 809 | 0.4+ | 0.2+ | 1998 01 31 | 691 | 0.2− | 0.1+ |
| 1977 03 14 | 381 | 1.5+ | 0.8− | 1993 10 20 | 809 | 0.4+ | 0.4+ | 1998 01 31 | 691 | 0.0  | 0.2− |
| 1993 10 09 | 809 | 0.1− | 0.4+ | 1993 10 20 | 809 | 0.5+ | 0.6+ | 1998 01 31 | 691 | 0.1+ | 0.1− |
| 1993 10 09 | 809 | 0.5− | 0.0  | 1997 12 29 | 566 | 0.2+ | 0.1+ | 1998 02 02 | 691 | 1.3+ | 0.0  |
| 1993 10 09 | 809 | 1.2− | 0.1+ | 1997 12 29 | 566 | 0.1− | 0.1+ | 1998 02 02 | 691 | 1.1+ | 0.4+ |
| 1993 10 11 | 809 | 0.9+ | 0.1+ | 1997 12 29 | 566 | 0.0  | 0.3+ | 1998 02 02 | 691 | 0.6+ | 0.2+ |

**1998 BS<sub>33</sub> = 1994 EA<sub>3</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> |           | (2000.0) |           | <b>P</b>    |             | <b>Q</b> |   |
|----------|-----------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 329.18090 | $\omega$ | 62.48684  | −0.99495383 | −0.01026875 |          |   |
| <i>a</i> | 2.4642442 | $\Omega$ | 116.77665 | −0.02534870 | −0.93675204 |          |   |
| <i>e</i> | 0.1374296 | <i>i</i> | 6.41879   | +0.09707891 | −0.34984305 |          |   |
| <i>P</i> | 3.87      | <i>H</i> | 14.5      | <i>G</i>    | 0.15        | <i>U</i> | 4 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1994 03 11 | 098 | 1.5− | 0.4− | 1998 02 01 | 411 | 0.4+ | 0.1− | 1998 02 23 | 411 | 0.3− | 0.2+ |
| 1994 03 12 | 098 | 1.8+ | 0.6+ | 1998 02 01 | 411 | 0.1− | 0.1− | 1998 02 26 | 699 | 0.1+ | 0.2+ |
| 1994 03 12 | 098 | 0.5− | 0.8− | 1998 02 04 | 411 | 0.2+ | 0.1− | 1998 02 26 | 699 | 0.2+ | 0.5+ |
| 1997 12 07 | 910 | 0.0  | 0.2+ | 1998 02 04 | 411 | 0.3+ | 0.4− | 1998 02 26 | 699 | 0.1− | 0.3− |
| 1997 12 07 | 910 | 0.1− | 0.1+ | 1998 02 22 | 566 | 0.0  | 0.3− | 1998 03 01 | 411 | 0.3+ | 1.0− |
| 1997 12 07 | 910 | 0.0  | 0.1+ | 1998 02 22 | 566 | 0.0  | 0.4− | 1998 03 01 | 411 | 0.2+ | 0.3+ |
| 1998 01 31 | 411 | 0.1− | 0.5+ | 1998 02 22 | 566 | 0.3− | 0.2− | 1998 03 06 | 411 | 0.3− | 0.2+ |
| 1998 01 31 | 411 | 0.3+ | 0.3+ | 1998 02 23 | 411 | 0.1− | 0.3+ | 1998 03 06 | 411 | 0.3− | 0.7+ |

**1998 BT<sub>33</sub> = 1978 NK<sub>6</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> |            | (2000.0) |           | <b>P</b>    |             | <b>Q</b> |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.27610218 | $\omega$ | 309.32321 | +0.85139228 | -0.51397842 |          |   |
| <i>a</i> | 2.3357310  | $\Omega$ | 81.84120  | +0.50789774 | +0.75795805 |          |   |
| <i>e</i> | 0.1551169  | <i>i</i> | 6.07025   | +0.13103841 | +0.40165379 |          |   |
| <i>P</i> | 3.57       | <i>H</i> | 14.0      | <i>G</i>    | 0.15        | <i>U</i> | 5 |

Residuals in seconds of arc

|            |     |       |       |   |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|---|------------|-----|------|------|------------|-----|------|------|
| 1978 07 10 | 675 | 0.0   | 1.9+  | Y | 1998 02 01 | 411 | 0.2- | 0.2- | 1998 02 23 | 411 | 0.3+ | 0.5+ |
| 1978 07 11 | 675 | (7.9- | 0.6+) | Y | 1998 02 02 | 411 | 0.1+ | 0.1+ | 1998 02 26 | 566 | 0.1- | 0.2- |
| 1978 07 13 | 675 | 0.0   | 1.7-  | Y | 1998 02 02 | 411 | 0.2+ | 0.0  | 1998 02 26 | 566 | 0.1- | 0.1- |
| 1998 01 31 | 411 | 0.3-  | 0.1+  |   | 1998 02 04 | 411 | 0.3+ | 0.2+ | 1998 02 26 | 566 | 0.4+ | 0.5- |
| 1998 01 31 | 411 | 0.2-  | 0.4+  |   | 1998 02 04 | 411 | 0.0  | 0.1+ | 1998 03 06 | 411 | 0.5+ | 0.4- |
| 1998 02 01 | 411 | 0.0   | 0.2+  |   | 1998 02 23 | 411 | 0.3+ | 0.5+ | 1998 03 06 | 411 | 1.1- | 0.4- |

**1998 BA<sub>34</sub> = 1988 FS<sub>1</sub> = 1994 JT<sub>9</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> |            | (2000.0) |           | <b>P</b>    |             | <b>Q</b> |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.18412655 | $\omega$ | 320.37597 | +0.84039977 | -0.50743567 |          |   |
| <i>a</i> | 3.0600259  | $\Omega$ | 71.11324  | +0.53414761 | +0.71605189 |          |   |
| <i>e</i> | 0.0660935  | <i>i</i> | 11.60674  | +0.09173086 | +0.47935241 |          |   |
| <i>P</i> | 5.35       | <i>H</i> | 13.5      | <i>G</i>    | 0.15        | <i>U</i> | 3 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1988 03 18 | 033 | 0.3- | 0.5+ | 1998 01 25 | 098 | 1.0+ | 0.8+ | 1998 01 29 | 566 | 0.6+ | 0.0  |
| 1988 03 18 | 033 | 0.5+ | 0.2- | 1998 01 25 | 098 | 0.3+ | 0.6- | 1998 01 29 | 566 | 0.6+ | 0.0  |
| 1994 05 14 | 691 | 0.2- | 0.1- | 1998 01 27 | 098 | 0.8- | 0.3- | 1998 01 29 | 566 | 0.7+ | 0.3- |
| 1994 05 14 | 691 | 0.1- | 0.2- | 1998 01 27 | 098 | 0.7+ | 0.5+ | 1998 02 21 | 557 | 0.3- | 0.6+ |
| 1997 12 26 | 566 | 0.2- | 0.3+ | 1998 01 28 | 566 | 0.5- | 1.0- | 1998 02 21 | 557 | 0.1- | 0.7+ |
| 1997 12 26 | 566 | 0.3- | 0.1- | 1998 01 28 | 566 | 1.0- | 0.9- | 1998 02 21 | 557 | 0.1- | 0.9+ |
| 1997 12 26 | 566 | 0.2- | 0.0  | 1998 01 28 | 566 | 0.5- | 0.7- |            |     |      |      |

**1998 BG<sub>34</sub> = 1993 FP<sub>59</sub> = 1994 NK<sub>10</sub>**

Id. A. Doppler, G. V. Williams

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> |            | (2000.0) |           | <b>P</b>    |             | <b>Q</b> |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.17773322 | $\omega$ | 230.30116 | +0.39186349 | +0.91986118 |          |   |
| <i>a</i> | 3.1329754  | $\Omega$ | 62.77738  | -0.83804805 | +0.36463261 |          |   |
| <i>e</i> | 0.1816469  | <i>i</i> | 1.11311   | -0.37962937 | +0.14456303 |          |   |
| <i>P</i> | 5.55       | <i>H</i> | 15.0      | <i>G</i>    | 0.15        | <i>U</i> | 5 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1993 03 19 | 809 | 0.4+ | 0.3+ | 1994 07 09 | 809 | 0.8- | 0.5- | 1998 01 28 | 691 | 0.2- | 0.3+ |
| 1993 03 20 | 809 | 0.1+ | 0.1- | 1994 07 09 | 809 | 0.1- | 0.0  | 1998 01 28 | 691 | 0.1+ | 0.2+ |
| 1993 03 24 | 809 | 0.5- | 0.2- | 1994 07 09 | 809 | 0.1- | 0.4+ | 1998 01 28 | 691 | 0.0  | 0.2+ |
| 1994 07 08 | 809 | 0.1- | 0.4- | 1998 01 22 | 691 | 0.2- | 0.4- | 1998 02 02 | 691 | 0.6+ | 0.2+ |
| 1994 07 08 | 809 | 0.3+ | 0.6+ | 1998 01 22 | 691 | 0.2- | 0.3- | 1998 02 02 | 691 | 0.0  | 0.2- |
| 1994 07 08 | 809 | 0.8+ | 0.2- | 1998 01 22 | 691 | 0.5- | 0.1- | 1998 02 02 | 691 | 0.3+ | 0.1+ |

**1998 BF<sub>41</sub> = 1964 WF<sub>1</sub> = 1969 UD<sub>2</sub> = 1977 EW<sub>3</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> |            | (2000.0) |           | <b>P</b>    |             | <b>Q</b> |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.18237739 | $\omega$ | 282.19959 | +0.34279197 | -0.93907064 |          |   |
| <i>a</i> | 3.0795604  | $\Omega$ | 147.71760 | +0.87926167 | +0.31124553 |          |   |
| <i>e</i> | 0.1616801  | <i>i</i> | 2.71494   | +0.33074548 | +0.14585115 |          |   |
| <i>P</i> | 5.40       | <i>H</i> | 13.5      | <i>G</i>    | 0.15        | <i>U</i> | 2 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1964 11 30 | 330 | 0.0  | 0.1+ | 1998 01 31 | 691 | 0.3- | 0.1- | 1998 02 25 | 426 | 0.2+ | 1.0- |
| 1969 10 17 | 095 | 0.4+ | 1.1- | 1998 01 31 | 691 | 0.7- | 0.1+ | 1998 02 25 | 426 | 0.4- | 0.5+ |
| 1977 03 15 | 381 | 1.8- | 0.6+ | 1998 01 31 | 691 | 0.9- | 0.0  | 1998 02 27 | 426 | 0.3+ | 0.3- |
| 1977 03 15 | 381 | 1.3+ | 1.7- | 1998 02 23 | 557 | 0.3+ | 0.2+ | 1998 02 27 | 426 | 0.2- | 0.1- |
| 1998 01 25 | 566 | 0.3- | 0.5+ | 1998 02 23 | 557 | 0.2+ | 0.1+ | 1998 02 27 | 426 | 0.1+ | 0.1- |

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1998 01 25 | 566 | 0.4- | 0.3+ | 1998 02 23 | 557 | 0.2+ | 0.1- | 1998 02 28 | 910 | 0.3+ | 0.4- |
| 1998 01 25 | 566 | 0.3- | 0.3+ | 1998 02 23 | 557 | 0.3+ | 0.1+ | 1998 02 28 | 910 | 0.5+ | 0.2- |
| 1998 01 29 | 566 | 0.1- | 0.5+ | 1998 02 24 | 426 | 0.0  | 0.3- | 1998 02 28 | 910 | 0.6+ | 0.3- |
| 1998 01 29 | 566 | 0.2- | 0.4+ | 1998 02 24 | 426 | 0.7+ | 0.1+ |            |     |      |      |
| 1998 01 29 | 566 | 0.3- | 0.2- | 1998 02 24 | 426 | 0.7+ | 0.3+ |            |     |      |      |

**1998 BB<sub>42</sub> = 1981 AV<sub>3</sub> = 1988 XU<sub>3</sub> = 1992 WE<sub>8</sub> = 1994 CJ<sub>18</sub>  
= 1996 TC<sub>61</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> |            | (2000.0) |          | <b>P</b>    |             | <b>Q</b> |   |
|----------|------------|----------|----------|-------------|-------------|----------|---|
| <i>n</i> | 0.23476431 | $\omega$ | 34.09864 | +0.66062009 | -0.75014139 |          |   |
| <i>a</i> | 2.6024437  | $\Omega$ | 14.62800 | +0.66012038 | +0.56174529 |          |   |
| <i>e</i> | 0.1306577  | <i>i</i> | 6.70325  | +0.35752227 | +0.34889844 |          |   |
| <i>P</i> | 4.20       | <i>H</i> | 13.5     | <i>G</i>    | 0.15        | <i>U</i> | 2 |

Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |       |       |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|-------|-------|
| 1981 01 08 | 381 | 0.1-  | 0.4+  | 1996 10 06 | 809 | 0.0  | 0.1+ | 1998 02 14 | 627 | 0.6+  | 1.1+  |
| 1981 01 08 | 381 | (6.9+ | 9.2+) | 1996 10 06 | 809 | 0.2- | 1.1+ | 1998 02 14 | 627 | 1.1+  | 0.3+  |
| 1988 12 01 | 054 | 0.7+  | 1.2-  | 1996 10 06 | 809 | 1.1- | 0.2+ | 1998 02 15 | 958 | (1.0+ | 2.8-) |
| 1992 11 19 | 675 | (1.4+ | 3.7-) | 1996 10 07 | 809 | 0.5+ | 0.1+ | 1998 02 15 | 958 | 0.5+  | 1.4-  |
| 1992 11 19 | 675 | (2.3+ | 4.1-) | 1996 10 07 | 809 | 0.2- | 0.3- | 1998 02 15 | 958 | 0.7-  | 1.6-  |
| 1992 11 21 | 675 | (4.6+ | 3.4-) | 1996 10 07 | 809 | 0.0  | 0.2+ | 1998 02 17 | 627 | 0.5-  | 0.5+  |
| 1994 02 08 | 809 | 1.2+  | 0.0   | 1998 01 29 | 627 | 0.3- | 1.1+ | 1998 02 17 | 627 | 0.2-  | 0.8+  |
| 1994 02 08 | 809 | 1.1+  | 0.3+  | 1998 01 29 | 627 | 0.1- | 0.6+ | 1998 02 18 | 958 | 1.9-  | 0.8-  |
| 1994 02 08 | 809 | 0.5+  | 0.4-  | 1998 01 29 | 627 | 0.2+ | 0.8+ | 1998 02 18 | 627 | 0.3+  | 0.7+  |
| 1994 02 10 | 809 | 0.0   | 0.6+  | 1998 02 04 | 627 | 1.0+ | 0.2- | 1998 02 18 | 958 | 0.6-  | 0.4-  |
| 1994 02 10 | 809 | 0.7-  | 1.0+  | 1998 02 04 | 627 | 0.1- | 0.6- | 1998 02 24 | 122 | 0.0   | 0.3+  |
| 1994 02 10 | 809 | 1.1-  | 0.0   | 1998 02 04 | 627 | 0.4- | 0.2- | 1998 02 24 | 122 | 0.0   | 0.4+  |
| 1994 02 13 | 809 | 0.7-  | 1.5-  | 1998 02 06 | 627 | 1.4+ | 0.5- | 1998 02 24 | 122 | 0.1-  | 0.5+  |
| 1994 02 13 | 809 | (1.1- | 2.4-) | 1998 02 06 | 627 | 0.9+ | 0.7+ | 1998 03 02 | 627 | 0.0   | 0.0   |
| 1994 02 13 | 809 | (1.1- | 2.5-) | 1998 02 07 | 627 | 0.6- | 0.8- |            |     |       |       |

**1998 BJ<sub>42</sub> = 1995 DD<sub>12</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> |            | (2000.0) |           | <b>P</b>    |             | <b>Q</b> |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>n</i> | 0.27934398 | $\omega$ | 318.41417 | -0.41277871 | -0.91068796 |          |   |
| <i>a</i> | 2.3176250  | $\Omega$ | 155.95195 | +0.84579299 | -0.38982805 |          |   |
| <i>e</i> | 0.1705496  | <i>i</i> | 2.27285   | +0.33800585 | -0.13668039 |          |   |
| <i>P</i> | 3.53       | <i>H</i> | 15.0      | <i>G</i>    | 0.15        | <i>U</i> | 4 |

Residuals in seconds of arc

|            |     |       |       |            |     |       |       |            |     |      |      |
|------------|-----|-------|-------|------------|-----|-------|-------|------------|-----|------|------|
| 1995 02 24 | 691 | 0.6+  | 0.6-  | 1997 11 01 | 691 | 0.8-  | 0.9-  | 1998 01 26 | 327 | 0.6- | 0.3+ |
| 1995 02 24 | 691 | 0.0   | 0.2-  | 1997 11 01 | 691 | 0.9-  | 0.9-  | 1998 01 29 | 327 | 0.1+ | 0.9- |
| 1995 02 24 | 691 | 0.4+  | 0.3-  | 1997 11 06 | 704 | (3.5- | 0.4+) | 1998 01 29 | 327 | 0.3+ | 0.4- |
| 1995 02 25 | 098 | 0.5+  | 0.8+  | 1997 11 06 | 704 | (3.5- | 0.5-) | 1998 01 29 | 327 | 0.3- | 0.4- |
| 1995 02 25 | 098 | 1.1-  | 1.1+  | 1997 11 06 | 704 | (3.1- | 0.8-) | 1998 02 15 | 327 | 0.1- | 0.1+ |
| 1995 02 26 | 098 | 0.8-  | 0.9-  | 1997 11 06 | 704 | (3.1- | 0.2-) | 1998 02 15 | 327 | 0.1+ | 0.1+ |
| 1995 02 26 | 098 | (2.6- | 1.4-) | 1997 11 06 | 704 | (3.8- | 0.7-) | 1998 02 15 | 327 | 0.2- | 0.2- |
| 1995 02 27 | 098 | 0.5+  | 0.2+  | 1997 11 29 | 704 | 0.1+  | 0.6-  | 1998 02 16 | 327 | 0.1+ | 0.3+ |
| 1995 02 27 | 098 | (2.7- | 0.9-) | 1997 11 29 | 704 | 0.6+  | 0.2+  | 1998 02 16 | 327 | 0.7- | 0.1- |
| 1997 10 29 | 704 | 0.2+  | 1.7+  | 1997 11 29 | 704 | 0.1+  | 1.3+  | 1998 02 16 | 327 | 0.1- | 0.2+ |
| 1997 10 29 | 704 | 0.2+  | 0.2-  | 1997 11 29 | 704 | (0.6+ | 2.7+) | 1998 02 16 | 327 | 0.2- | 0.1- |
| 1997 10 29 | 704 | 0.9+  | 1.4+  | 1997 11 29 | 704 | (2.9- | 0.6-) | 1998 02 22 | 327 | 1.2- | 1.0- |
| 1997 10 29 | 704 | 0.4+  | 0.6-  | 1998 01 26 | 327 | 0.2+  | 0.4-  | 1998 02 22 | 327 | 0.5+ | 1.3+ |
| 1997 11 01 | 691 | 0.8-  | 0.6-  | 1998 01 26 | 327 | 0.6+  | 0.4-  | 1998 02 22 | 327 | 1.5+ | 0.9+ |

**1998 BW<sub>43</sub> = 1980 FC<sub>11</sub> = 1987 SY<sub>21</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> |            | (2000.0) |          | <b>P</b>    |             | <b>Q</b> |   |
|----------|------------|----------|----------|-------------|-------------|----------|---|
| <i>n</i> | 0.21223337 | $\omega$ | 5.07537  | +0.75772109 | -0.64660592 |          |   |
| <i>a</i> | 2.7835152  | $\Omega$ | 35.71283 | +0.59329340 | +0.62636284 |          |   |
| <i>e</i> | 0.2205440  | <i>i</i> | 8.67953  | +0.27177508 | +0.43539680 |          |   |
| <i>P</i> | 4.64       | <i>H</i> | 13.0     | <i>G</i>    | 0.15        | <i>U</i> | 4 |

1998 MAR. 13

M.P.C. 31403

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1980 03 16 | 095 | 0.2− | 0.3− | 1998 01 25 | 098 | 1.2− | 0.2− | 1998 02 02 | 098 | 0.1− | 0.2+ |
| 1987 09 18 | 095 | 0.3+ | 1.4− | 1998 01 27 | 098 | 0.3− | 0.4+ | 1998 02 27 | 108 | 0.2− | 1.2− |
| 1987 09 21 | 095 | 0.1− | 1.1+ | 1998 01 27 | 098 | 0.7− | 0.5+ | 1998 02 27 | 108 | 1.4+ | 0.6− |
| 1998 01 25 | 098 | 0.5− | 0.8+ | 1998 02 02 | 098 | 0.2+ | 0.1− | 1998 02 27 | 108 | 1.8+ | 0.3+ |

**1998 BU<sub>45</sub> = 1996 RK<sub>15</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 332.33161  |          | (2000.0)  |             | <b>P</b>    |          | <b>Q</b> |
|----------|------------|----------|-----------|-------------|-------------|----------|----------|
| <i>n</i> | 0.26853806 | $\omega$ | 191.68897 | −0.88778629 | −0.45989575 |          |          |
| <i>a</i> | 2.3793892  | $\Omega$ | 320.91403 | +0.42456934 | −0.80303898 |          |          |
| <i>e</i> | 0.1539847  | <i>i</i> | 1.65457   | +0.17769743 | −0.37897796 |          |          |
| <i>P</i> | 3.67       | <i>H</i> | 15.0      | <i>G</i>    | 0.15        | <i>U</i> | 3        |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1996 09 13 | 691 | 0.5− | 0.2+ | 1998 01 24 | 566 | 1.0+ | 0.2− | 1998 02 23 | 566 | 0.4+ | 0.2+ |
| 1996 09 13 | 691 | 0.3− | 0.4+ | 1998 01 24 | 566 | 0.8+ | 0.5− | 1998 02 23 | 566 | 0.1− | 0.3+ |
| 1996 09 13 | 691 | 0.4− | 0.0  | 1998 01 25 | 691 | 0.3− | 0.5− | 1998 02 23 | 566 | 0.3− | 0.5+ |
| 1996 09 15 | 691 | 0.2+ | 0.2+ | 1998 01 25 | 691 | 0.2− | 0.2− | 1998 02 28 | 910 | 0.3+ | 0.0  |
| 1996 09 15 | 691 | 0.2+ | 0.6− | 1998 01 30 | 691 | 0.9− | 0.3− | 1998 02 28 | 910 | 0.3+ | 0.1+ |
| 1996 09 15 | 691 | 0.4+ | 0.3+ | 1998 01 30 | 691 | 0.8− | 0.2+ | 1998 02 28 | 910 | 0.1+ | 0.3+ |
| 1997 12 07 | 910 | 0.2− | 0.3+ | 1998 01 30 | 691 | 0.9− | 0.4− | 1998 03 01 | 910 | 0.4+ | 0.2+ |
| 1997 12 08 | 910 | 0.1+ | 0.1+ | 1998 02 22 | 566 | 0.5− | 0.2+ | 1998 03 01 | 910 | 0.2+ | 0.2+ |
| 1997 12 08 | 910 | 0.1+ | 0.1+ | 1998 02 22 | 566 | 0.5− | 0.0  | 1998 03 01 | 910 | 0.3+ | 0.1+ |
| 1998 01 24 | 566 | 1.0+ | 0.3− | 1998 02 22 | 566 | 0.1− | 0.1+ |            |     |      |      |

**1998 BO<sub>46</sub> = 1995 MT**

Id. S. Nakano

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 342.01778  |          | (2000.0)  |             | <b>P</b>    |          | <b>Q</b> |
|----------|------------|----------|-----------|-------------|-------------|----------|----------|
| <i>n</i> | 0.21716488 | $\omega$ | 178.90904 | −0.82883384 | −0.55772245 |          |          |
| <i>a</i> | 2.7412143  | $\Omega$ | 327.06654 | +0.51270459 | −0.72527303 |          |          |
| <i>e</i> | 0.1679091  | <i>i</i> | 4.69489   | +0.22398320 | −0.40363931 |          |          |
| <i>P</i> | 4.54       | <i>H</i> | 14.5      | <i>G</i>    | 0.15        | <i>U</i> | 4        |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1995 06 26 | 327 | 0.0  | 0.7− | 1998 01 26 | 566 | 0.2+ | 0.1+ | 1998 02 17 | 403 | 0.0  | 0.5+ |
| 1995 06 26 | 327 | 0.0  | 0.2+ | 1998 01 26 | 566 | 0.1+ | 0.2+ | 1998 02 17 | 403 | 0.4+ | 0.3+ |
| 1995 06 26 | 327 | 0.4+ | 0.1+ | 1998 01 26 | 566 | 0.4+ | 0.2+ | 1998 02 21 | 403 | 0.1+ | 0.1− |
| 1995 06 26 | 327 | 0.0  | 0.0  | 1998 01 30 | 691 | 0.3− | 0.0  | 1998 02 21 | 403 | 0.1+ | 0.1+ |
| 1995 06 27 | 327 | 0.0  | 0.0  | 1998 01 30 | 691 | 0.4− | 0.2− | 1998 02 22 | 403 | 0.4− | 0.6− |
| 1995 06 27 | 327 | 0.1− | 0.3+ | 1998 01 30 | 691 | 0.3− | 0.2− | 1998 02 22 | 403 | 0.3− | 0.9+ |
| 1995 06 27 | 327 | 0.1− | 0.1− | 1998 02 15 | 403 | 0.2− | 1.2− |            |     |      |      |
| 1995 06 27 | 327 | 0.1− | 0.1+ | 1998 02 15 | 403 | 0.5+ | 0.1+ |            |     |      |      |

**1998 CH = 1997 AP<sub>13</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Marsden

| <i>M</i> | 53.24522   |          | (2000.0)  |             | <b>P</b>    |          | <b>Q</b> |
|----------|------------|----------|-----------|-------------|-------------|----------|----------|
| <i>n</i> | 0.22330205 | $\omega$ | 293.41863 | +0.69843904 | −0.61197909 |          |          |
| <i>a</i> | 2.6907556  | $\Omega$ | 106.49763 | +0.71133803 | +0.65058359 |          |          |
| <i>e</i> | 0.0684782  | <i>i</i> | 22.76562  | −0.07862001 | +0.44969165 |          |          |
| <i>P</i> | 4.41       | <i>H</i> | 13.0      | <i>G</i>    | 0.15        | <i>U</i> | 3        |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1997 01 11 | 566 | 0.1− | 0.1− | 1998 02 02 | 046 | 0.2− | 0.1− | 1998 02 05 | 046 | 0.1+ | 0.2− |
| 1997 01 11 | 566 | 0.4− | 0.2+ | 1998 02 03 | 046 | 0.1+ | 0.2+ | 1998 02 06 | 046 | 0.1+ | 0.4− |
| 1997 01 11 | 566 | 0.5− | 0.1− | 1998 02 03 | 046 | 0.0  | 0.2+ | 1998 02 06 | 046 | 0.1+ | 0.1− |
| 1997 01 12 | 566 | 1.0+ | 0.0  | 1998 02 03 | 046 | 0.1+ | 0.2+ | 1998 02 06 | 046 | 0.0  | 0.1− |
| 1997 01 12 | 566 | 0.1+ | 0.2− | 1998 02 03 | 046 | 0.3+ | 0.2+ | 1998 02 10 | 046 | 0.3− | 0.2− |
| 1997 01 12 | 566 | 0.0  | 0.1+ | 1998 02 04 | 046 | 0.0  | 0.1− | 1998 02 10 | 046 | 0.4− | 0.3− |
| 1998 02 02 | 046 | 0.1− | 0.2+ | 1998 02 04 | 046 | 0.1+ | 0.0  | 1998 02 10 | 046 | 0.4− | 0.3− |
| 1998 02 02 | 046 | 0.0  | 0.3+ | 1998 02 04 | 046 | 0.0  | 0.1− | 1998 02 18 | 046 | 0.1+ | 0.2+ |
| 1998 02 02 | 046 | 0.2− | 0.2+ | 1998 02 05 | 046 | 0.1+ | 0.1− | 1998 02 18 | 046 | 0.1+ | 0.3+ |
| 1998 02 02 | 046 | 0.1− | 0.0  | 1998 02 05 | 046 | 0.2+ | 0.1− | 1998 02 18 | 046 | 0.2+ | 0.2+ |

**1998 CR = 1990 RT**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Marsden

| <i>M</i> | 94.46887   |          | (2000.0)  |             | <b>P</b>    |          | <b>Q</b> |
|----------|------------|----------|-----------|-------------|-------------|----------|----------|
| <i>n</i> | 0.18507143 | $\omega$ | 228.55505 | +0.84839987 | −0.52659151 |          |          |
| <i>a</i> | 3.0496017  | $\Omega$ | 162.99609 | +0.52384690 | +0.82049973 |          |          |
| <i>e</i> | 0.1404769  | <i>i</i> | 10.64665  | +0.07617146 | +0.22244456 |          |          |
| <i>P</i> | 5.33       | <i>H</i> | 13.0      | <i>G</i>    | 0.15        | <i>U</i> | 5        |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1990 09 13 | 809 | 0.3− | 0.2+ | 1998 02 04 | 046 | 0.4+ | 0.3+ | 1998 02 07 | 046 | 0.5+ | 0.2+ |
| 1990 09 13 | 809 | 0.2+ | 0.1+ | 1998 02 04 | 046 | 0.0  | 0.4+ | 1998 02 07 | 809 | 0.2− | 0.4+ |
| 1990 09 13 | 809 | 0.4+ | 0.2+ | 1998 02 04 | 046 | 0.1+ | 0.3+ | 1998 02 07 | 809 | 0.9− | 0.9+ |
| 1990 09 13 | 675 | 0.3− | 0.2+ | 1998 02 04 | 046 | 0.0  | 0.4+ | 1998 02 07 | 809 | 0.3− | 0.3+ |
| 1990 09 13 | 675 | 0.6− | 1.1− | 1998 02 04 | 046 | 0.0  | 0.3+ | 1998 02 10 | 046 | 0.5+ | 0.5− |
| 1990 09 14 | 809 | 0.0  | 0.4+ | 1998 02 06 | 046 | 0.3+ | 0.2+ | 1998 02 10 | 046 | 0.4+ | 0.1− |
| 1990 09 14 | 809 | 0.5+ | 0.2+ | 1998 02 06 | 046 | 0.1+ | 0.3+ | 1998 02 10 | 046 | 0.3+ | 0.1− |
| 1990 09 14 | 809 | 0.7+ | 0.1+ | 1998 02 06 | 046 | 0.0  | 0.2+ | 1998 02 19 | 046 | 0.8− | 0.6− |
| 1990 09 18 | 675 | 0.0  | 0.3− | 1998 02 06 | 809 | 0.4+ | 1.2− | 1998 02 19 | 046 | 0.9− | 0.6− |
| 1990 09 18 | 675 | 0.5− | 0.0  | 1998 02 06 | 809 | 0.4− | 2.0− | 1998 02 19 | 046 | 0.7− | 0.7− |
| 1998 02 04 | 046 | 0.4+ | 0.2+ | 1998 02 06 | 809 | 0.8− | 0.5− | 1998 03 06 | 046 | 0.3+ | 0.3+ |
| 1998 02 04 | 046 | 0.3+ | 0.2+ | 1998 02 07 | 046 | 0.5+ | 0.2+ | 1998 03 06 | 046 | 0.2− | 0.4+ |
| 1998 02 04 | 046 | 0.4+ | 0.2+ | 1998 02 07 | 046 | 0.6+ | 0.1+ | 1998 03 06 | 046 | 0.3− | 0.3+ |

**1998 CA<sub>1</sub> = 1997 WK<sub>22</sub> = 1983 PH = 1983 PC<sub>1</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Nakano

| <i>M</i> | 121.47260  |          | (2000.0)  |             | <b>P</b>    |          | <b>Q</b> |
|----------|------------|----------|-----------|-------------|-------------|----------|----------|
| <i>n</i> | 0.30168551 | $\omega$ | 28.37900  | +0.99534318 | +0.06643256 |          |          |
| <i>a</i> | 2.2017420  | $\Omega$ | 327.58099 | −0.09240952 | +0.86379731 |          |          |
| <i>e</i> | 0.2282743  | <i>i</i> | 7.48614   | +0.02743048 | +0.49944061 |          |          |
| <i>P</i> | 3.27       | <i>H</i> | 14.2      | <i>G</i>    | 0.15        | <i>U</i> | 4        |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1983 08 05 | 095 | 1.2− | 0.3− | 1997 12 01 | 327 | 1.0+ | 0.7+ | 1998 02 06 | 360 | 0.4+ | 0.2− |
| 1983 08 14 | 046 | 1.3+ | 0.0  | 1998 02 04 | 360 | 0.2+ | 0.1+ | 1998 02 06 | 360 | 0.2+ | 0.1− |
| 1997 11 28 | 327 | 0.1+ | 0.4− | 1998 02 04 | 360 | 0.3+ | 0.2+ | 1998 02 06 | 360 | 0.2+ | 0.3− |
| 1997 11 28 | 327 | 0.3− | 0.5− | 1998 02 04 | 360 | 0.0  | 0.2+ | 1998 02 15 | 360 | 0.0  | 0.0  |
| 1997 11 28 | 327 | 0.6− | 0.4− | 1998 02 05 | 360 | 0.0  | 0.2− | 1998 02 15 | 360 | 0.0  | 0.2− |
| 1997 12 01 | 327 | 0.3− | 0.1− | 1998 02 05 | 360 | 0.5− | 0.3− | 1998 02 21 | 360 | 0.2− | 0.1+ |
| 1997 12 01 | 327 | 0.2− | 1.0+ | 1998 02 05 | 360 | 0.4− | 0.0  | 1998 02 21 | 360 | 0.2− | 0.1+ |

**1998 CF<sub>1</sub> = 1978 RN<sub>10</sub> = 1982 FH<sub>1</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 271.52521  |          | (2000.0)  |             | <b>P</b>    |          | <b>Q</b> |
|----------|------------|----------|-----------|-------------|-------------|----------|----------|
| <i>n</i> | 0.17598640 | $\omega$ | 184.08474 | −0.78376210 | +0.62087620 |          |          |
| <i>a</i> | 3.1536728  | $\Omega$ | 34.31027  | −0.56904789 | −0.70813238 |          |          |
| <i>e</i> | 0.1143385  | <i>i</i> | 1.54081   | −0.24880007 | −0.33624587 |          |          |
| <i>P</i> | 5.60       | <i>H</i> | 12.0      | <i>G</i>    | 0.15        | <i>U</i> | 4        |

Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |       |       |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|-------|-------|
| 1978 09 02 | 809 | 0.7+  | 1.3−  | 1982 03 27 | 046 | 1.2+ | 1.0− | 1998 02 13 | 327 | 1.7−  | 1.0+  |
| 1978 09 02 | 809 | 0.2+  | 0.2−  | 1997 12 30 | 566 | 0.6+ | 1.5− | 1998 02 13 | 327 | 0.0   | 0.7+  |
| 1978 09 02 | 809 | 0.5+  | 0.5−  | 1997 12 30 | 566 | 0.6+ | 1.2− | 1998 02 13 | 327 | (2.6+ | 0.6+) |
| 1978 09 02 | 809 | 0.2+  | 0.6−  | 1997 12 30 | 566 | 1.0+ | 1.1− | 1998 02 17 | 327 | 0.5−  | 0.1+  |
| 1978 09 02 | 809 | 0.7+  | 0.2+  | 1998 01 25 | 566 | 0.0  | 1.3− | 1998 02 17 | 327 | 0.6−  | 0.5+  |
| 1978 09 06 | 809 | 0.4−  | 2.0−  | 1998 01 25 | 566 | 0.4− | 1.1− | 1998 02 17 | 327 | 0.6−  | 0.4+  |
| 1982 03 24 | 046 | 1.2+  | 0.6−  | 1998 01 25 | 566 | 0.1− | 1.5− | 1998 03 01 | 327 | 0.2+  | 0.1+  |
| 1982 03 24 | 046 | (2.5− | 2.7+) | 1998 02 01 | 327 | 0.3+ | 1.1+ | 1998 03 01 | 327 | 0.1−  | 0.0   |
| 1982 03 27 | 046 | 1.7−  | 0.3+  | 1998 02 01 | 327 | 0.0  | 0.2+ | 1998 03 01 | 327 | 0.4+  | 0.2+  |
| 1982 03 27 | 046 | 2.0−  | 1.8−  | 1998 02 01 | 327 | 0.1− | 0.1+ |            |     |       |       |
| 1982 03 27 | 046 | (3.5+ | 0.6−) | 1998 02 06 | 327 | 0.3+ | 0.5+ |            |     |       |       |

**1998 CH<sub>1</sub> = 1996 VQ<sub>39</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> |            | (2000.0) |           | <b>P</b>    |             | <b>Q</b> |   | Williams |  |
|----------|------------|----------|-----------|-------------|-------------|----------|---|----------|--|
| <i>n</i> | 0.19865523 | $\omega$ | 232.17400 | +0.50860481 | −0.86098970 |          |   |          |  |
| <i>a</i> | 2.9089486  | $\Omega$ | 187.25878 | +0.80009797 | +0.47443822 |          |   |          |  |
| <i>e</i> | 0.0736231  | <i>i</i> | 1.91848   | +0.31806349 | +0.18331699 |          |   |          |  |
| <i>P</i> | 4.96       | <i>H</i> | 14.5      | <i>G</i>    | 0.15        | <i>U</i> | 4 |          |  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1996 11 07 | 327 | 0.6− | 0.2+ | 1998 01 25 | 566 | 0.2− | 0.1+ | 1998 02 06 | 327 | 1.0+ | 0.4− |
| 1996 11 07 | 327 | 0.3+ | 0.4+ | 1998 01 25 | 566 | 0.0  | 0.1− | 1998 02 06 | 327 | 0.4+ | 0.1− |
| 1996 11 07 | 327 | 0.1+ | 0.3+ | 1998 01 25 | 566 | 0.4− | 0.3+ | 1998 02 06 | 327 | 0.3+ | 0.1+ |
| 1996 12 12 | 327 | 0.5− | 0.6− | 1998 02 05 | 327 | 0.1− | 0.5− | 1998 02 17 | 327 | 0.2− | 0.0  |
| 1996 12 12 | 327 | 0.1+ | 0.3− | 1998 02 05 | 327 | 0.3− | 0.3+ | 1998 02 17 | 327 | 0.3− | 0.1− |
| 1996 12 12 | 327 | 0.7+ | 0.1− | 1998 02 05 | 327 | 0.1+ | 0.3+ | 1998 02 17 | 327 | 0.2− | 0.0  |

**1998 CL<sub>1</sub> = 1993 FP<sub>74</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> |            | (2000.0) |           | <b>P</b>    |             | <b>Q</b> |   | Marsden |  |
|----------|------------|----------|-----------|-------------|-------------|----------|---|---------|--|
| <i>n</i> | 0.18384374 | $\omega$ | 227.35999 | −0.52732111 | −0.84885353 |          |   |         |  |
| <i>a</i> | 3.0631633  | $\Omega$ | 254.50018 | +0.79039996 | −0.47402673 |          |   |         |  |
| <i>e</i> | 0.1761165  | <i>i</i> | 2.20943   | +0.31176970 | −0.23397937 |          |   |         |  |
| <i>P</i> | 5.36       | <i>H</i> | 15.0      | <i>G</i>    | 0.15        | <i>U</i> | 6 |         |  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1993 03 21 | 809 | 0.6− | 0.2+ | 1998 02 07 | 118 | 0.1+ | 0.3− | 1998 02 18 | 118 | 0.2− | 0.4+ |
| 1993 03 22 | 809 | 0.9− | 0.3− | 1998 02 07 | 809 | 0.7+ | 1.1+ | 1998 02 18 | 118 | 0.5− | 0.2+ |
| 1993 03 22 | 809 | 1.4+ | 0.1+ | 1998 02 07 | 809 | 0.0  | 1.4+ | 1998 02 18 | 118 | 0.0  | 0.0  |
| 1998 02 06 | 809 | 0.7− | 0.0  | 1998 02 07 | 809 | 0.5− | 1.4+ | 1998 02 18 | 118 | 0.1+ | 0.1+ |
| 1998 02 06 | 809 | 0.7− | 0.4− | 1998 02 07 | 118 | 0.6+ | 0.3− | 1998 02 18 | 118 | 0.1+ | 0.1+ |
| 1998 02 06 | 809 | 1.1− | 0.6− | 1998 02 07 | 118 | 1.3+ | 0.6− | 1998 02 19 | 118 | 0.1− | 0.1− |
| 1998 02 07 | 118 | 0.4+ | 0.6− | 1998 02 09 | 118 | 0.2+ | 0.4− | 1998 02 19 | 118 | 0.2+ | 0.2− |
| 1998 02 07 | 118 | 0.5+ | 0.5− | 1998 02 09 | 118 | 0.5− | 0.4− |            |     |      |      |

**1998 CV<sub>1</sub> = 1989 YQ<sub>1</sub> = 1990 BR<sub>5</sub> = 1994 NB<sub>3</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> |            | (2000.0) |           | <b>P</b>    |             | <b>Q</b> |   | Williams |  |
|----------|------------|----------|-----------|-------------|-------------|----------|---|----------|--|
| <i>n</i> | 0.12683108 | $\omega$ | 296.59813 | +0.65759873 | −0.74105455 |          |   |          |  |
| <i>a</i> | 3.9233067  | $\Omega$ | 111.60473 | +0.73265418 | +0.58713093 |          |   |          |  |
| <i>e</i> | 0.2058848  | <i>i</i> | 8.38967   | +0.17544730 | +0.32575363 |          |   |          |  |
| <i>P</i> | 7.77       | <i>H</i> | 12.0      | <i>G</i>    | 0.15        | <i>U</i> | 3 |          |  |

Residuals in seconds of arc

|            |     |       |       |            |     |       |       |            |     |       |       |
|------------|-----|-------|-------|------------|-----|-------|-------|------------|-----|-------|-------|
| 1989 12 30 | 413 | 0.9−  | 0.7−  | 1994 07 11 | 809 | 0.8−  | 0.5+  | 1998 02 13 | 327 | 0.5−  | 1.0−  |
| 1989 12 30 | 413 | 1.4+  | 0.7+  | 1994 07 11 | 809 | 0.1−  | 0.7+  | 1998 02 21 | 327 | 0.2−  | 0.0   |
| 1989 12 31 | 413 | 0.5−  | 0.7+  | 1994 07 12 | 809 | (0.9+ | 2.2+) | 1998 02 21 | 327 | 0.0   | 0.1−  |
| 1989 12 31 | 413 | 1.3+  | 1.1+  | 1994 07 12 | 809 | 0.4−  | 1.2+  | 1998 02 21 | 327 | 0.2−  | 0.1−  |
| 1990 01 21 | 372 | (3.0− | 3.2−) | 1994 07 12 | 809 | 0.5−  | 1.3+  | 1998 02 23 | 327 | 0.4−  | 0.1−  |
| 1990 01 21 | 372 | 1.0−  | 0.5−  | 1998 01 28 | 566 | 0.6+  | 0.7+  | 1998 02 23 | 327 | 0.2−  | 0.1+  |
| 1994 07 08 | 809 | (2.1− | 2.4−) | 1998 01 28 | 566 | 0.3+  | 0.5+  | 1998 02 23 | 327 | 0.4−  | 0.2+  |
| 1994 07 08 | 809 | 1.7−  | 1.4−  | 1998 01 28 | 566 | 0.4+  | 0.7+  | 1998 02 25 | 566 | 0.7−  | 0.6−  |
| 1994 07 08 | 809 | (3.3− | 1.6−) | 1998 02 01 | 327 | 0.8+  | 0.3−  | 1998 02 25 | 566 | (1.5− | 2.3−) |
| 1994 07 09 | 809 | 1.2+  | 1.1−  | 1998 02 01 | 327 | 0.9+  | 0.2−  | 1998 02 25 | 566 | (0.1+ | 2.5−) |
| 1994 07 09 | 809 | 0.7+  | 1.5−  | 1998 02 01 | 327 | 0.6+  | 0.1−  | 1998 03 02 | 327 | 0.3−  | 0.3+  |
| 1994 07 09 | 809 | 0.2+  | 0.1+  | 1998 02 13 | 327 | 0.0   | 0.5−  | 1998 03 02 | 327 | 0.2−  | 0.3+  |
| 1994 07 11 | 809 | 1.4+  | 1.3+  | 1998 02 13 | 327 | 0.2−  | 0.6−  | 1998 03 02 | 327 | 0.3−  | 0.2+  |

**1998 CZ<sub>1</sub> = 1994 LK<sub>7</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> |            | (2000.0) |           | <b>P</b>    |             | <b>Q</b> |   | Williams |  |
|----------|------------|----------|-----------|-------------|-------------|----------|---|----------|--|
| <i>n</i> | 0.23434743 | $\omega$ | 137.58469 | −0.58898508 | +0.77448501 |          |   |          |  |
| <i>a</i> | 2.6055290  | $\Omega$ | 95.02307  | −0.78962529 | −0.49073081 |          |   |          |  |
| <i>e</i> | 0.1153400  | <i>i</i> | 13.39669  | −0.17201304 | −0.39919450 |          |   |          |  |
| <i>P</i> | 4.21       | <i>H</i> | 13.5      | <i>G</i>    | 0.15        | <i>U</i> | 4 |          |  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1994 06 06 | 691 | 0.5− | 0.0  | 1998 02 06 | 327 | 0.1− | 0.2+ | 1998 02 21 | 327 | 0.2− | 0.1+ |
| 1994 06 06 | 691 | 0.1− | 0.3+ | 1998 02 09 | 327 | 0.2− | 0.1+ | 1998 02 21 | 327 | 0.3− | 0.0  |
| 1994 06 07 | 691 | 0.2+ | 0.2− | 1998 02 09 | 327 | 0.3+ | 0.0  | 1998 02 21 | 327 | 0.1− | 0.3+ |
| 1994 06 07 | 691 | 0.1+ | 0.1− | 1998 02 09 | 327 | 0.1+ | 0.3− | 1998 02 21 | 327 | 0.3− | 0.1+ |
| 1994 06 07 | 691 | 0.3+ | 0.0  | 1998 02 13 | 327 | 0.2− | 0.1− | 1998 03 02 | 327 | 0.1+ | 0.1− |
| 1998 02 06 | 327 | 0.2− | 0.5− | 1998 02 13 | 327 | 0.4+ | 0.1+ | 1998 03 02 | 327 | 0.2+ | 0.1+ |
| 1998 02 06 | 327 | 0.3+ | 0.0  | 1998 02 13 | 327 | 0.1+ | 0.1+ | 1998 03 02 | 327 | 0.2+ | 0.0  |

**1998 CB<sub>2</sub> = 1980 TD<sub>10</sub> = 1987 YK<sub>1</sub> = 1990 UG<sub>13</sub> = 1990 VP<sub>9</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> |            | (2000.0) |           | <b>P</b>    |             | <b>Q</b> |   | Williams |  |
|----------|------------|----------|-----------|-------------|-------------|----------|---|----------|--|
| <i>n</i> | 0.30367773 | $\omega$ | 334.03472 | +0.09866591 | −0.99402724 |          |   |          |  |
| <i>a</i> | 2.1921020  | $\Omega$ | 110.27369 | +0.92144520 | +0.07356406 |          |   |          |  |
| <i>e</i> | 0.0761168  | <i>i</i> | 2.84967   | +0.37577091 | +0.08061122 |          |   |          |  |
| <i>P</i> | 3.25       | <i>H</i> | 14.5      | <i>G</i>    | 0.15        | <i>U</i> | 2 |          |  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1980 10 15 | 095 | 0.5+ | 1.1− | 1998 02 14 | 596 | 0.1− | 2.1+ | 1998 02 24 | 596 | 1.3+ | 0.3− |
| 1987 12 25 | 033 | 0.9+ | 1.0+ | 1998 02 14 | 596 | 0.5− | 1.6+ | 1998 02 24 | 596 | 0.1− | 0.3− |
| 1987 12 25 | 033 | 0.2− | 0.7+ | 1998 02 15 | 596 | 0.7+ | 0.9− | 1998 02 26 | 566 | 0.1+ | 0.3− |
| 1988 01 11 | 033 | 0.4− | 0.5− | 1998 02 15 | 596 | 0.2− | 0.3− | 1998 02 26 | 566 | 0.2− | 0.1− |
| 1988 01 11 | 033 | 0.4− | 1.0− | 1998 02 15 | 596 | 0.2− | 1.6+ | 1998 02 26 | 566 | 0.2− | 0.4− |
| 1990 10 23 | 095 | 1.6− | 0.7+ | 1998 02 17 | 596 | 0.6− | 0.2− | 1998 03 03 | 596 | 0.1+ | 1.1− |
| 1990 11 13 | 046 | 1.5+ | 0.2+ | 1998 02 17 | 596 | 0.3− | 0.3− | 1998 03 03 | 596 | 0.3− | 0.8− |
| 1990 11 13 | 046 | 0.1− | 0.7− | 1998 02 17 | 596 | 0.3− | 0.2+ | 1998 03 03 | 596 | 0.2− | 0.6− |
| 1998 02 14 | 596 | 1.1+ | 0.2+ | 1998 02 24 | 596 | 0.1− | 0.7− |            |     |      |      |

**1998 CC<sub>2</sub> = 1990 EG<sub>3</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i> |            | (2000.0) |           | <b>P</b>    |             | <b>Q</b> |   | Williams |  |
|----------|------------|----------|-----------|-------------|-------------|----------|---|----------|--|
| <i>n</i> | 0.24214007 | $\omega$ | 138.71036 | −0.15042434 | −0.98663536 |          |   |          |  |
| <i>a</i> | 2.5493234  | $\Omega$ | 319.82462 | +0.87965190 | −0.10465947 |          |   |          |  |
| <i>e</i> | 0.2122186  | <i>i</i> | 5.57160   | +0.45120401 | −0.12488823 |          |   |          |  |
| <i>P</i> | 4.07       | <i>H</i> | 14.5      | <i>G</i>    | 0.15        | <i>U</i> | 5 |          |  |

Residuals in seconds of arc

|            |     |       |       |            |     |       |       |            |     |       |       |
|------------|-----|-------|-------|------------|-----|-------|-------|------------|-----|-------|-------|
| 1990 03 02 | 809 | 0.5+  | 0.4+  | 1998 02 07 | 611 | (3.1+ | 0.6−) | 1998 02 19 | 113 | 1.0−  | 0.2+  |
| 1990 03 02 | 809 | 0.1−  | 0.1−  | 1998 02 14 | 611 | 0.9+  | 0.3+  | 1998 02 19 | 113 | 0.8−  | 0.1+  |
| 1990 03 02 | 809 | 0.3−  | 0.7−  | 1998 02 14 | 611 | 0.8+  | 0.3−  | 1998 02 20 | 611 | 0.8+  | 0.2+  |
| 1990 03 04 | 809 | 0.0   | 0.6+  | 1998 02 14 | 611 | 1.6−  | 0.3+  | 1998 02 20 | 611 | 1.4+  | 0.1+  |
| 1990 03 04 | 809 | 0.3+  | 0.3+  | 1998 02 14 | 611 | (4.1− | 1.0−) | 1998 02 20 | 113 | 1.2−  | 0.2−  |
| 1990 03 04 | 809 | 0.3−  | 0.5−  | 1998 02 14 | 611 | (2.4− | 1.3+) | 1998 02 21 | 113 | 1.1−  | 0.2+  |
| 1990 04 15 | 809 | (6.7+ | 4.8+) | 1998 02 14 | 611 | (2.1− | 2.6−) | 1998 02 21 | 113 | 0.1−  | 0.1+  |
| 1990 04 16 | 809 | (4.2+ | 5.8+) | 1998 02 15 | 611 | 0.8+  | 0.4+  | 1998 02 21 | 113 | 0.0   | 0.1+  |
| 1990 04 16 | 809 | (3.5+ | 6.5+) | 1998 02 15 | 611 | 0.3+  | 0.4+  | 1998 02 21 | 113 | (2.2− | 1.1+) |
| 1990 04 16 | 809 | (4.3+ | 8.3+) | 1998 02 15 | 611 | 0.4−  | 0.9−  | 1998 02 23 | 611 | 0.3−  | 0.8−  |
| 1990 04 17 | 809 | (2.6+ | 7.2+) | 1998 02 15 | 611 | 0.2+  | 0.5−  | 1998 02 23 | 611 | 0.7−  | 0.6−  |
| 1990 04 17 | 809 | (1.4+ | 6.7+) | 1998 02 15 | 611 | 0.5+  | 0.3−  | 1998 02 23 | 611 | 0.5+  | 0.8−  |
| 1998 02 07 | 611 | 0.4−  | 0.7+  | 1998 02 18 | 611 | 0.5+  | 0.6−  | 1998 02 26 | 611 | 0.1−  | 1.7+  |
| 1998 02 07 | 611 | (3.0+ | 1.2+) | 1998 02 18 | 611 | 0.2+  | 0.2−  | 1998 02 26 | 611 | 0.7+  | 0.5+  |

1998 MAR. 13

M.P.C. 31405

**1998 CF<sub>2</sub> = 1996 TS<sub>56</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i>                    |     | 116.73556  |          | (2000.0)   |     | <b>P</b>    |      | <b>Q</b>    |     | Williams |      |
|-----------------------------|-----|------------|----------|------------|-----|-------------|------|-------------|-----|----------|------|
| <i>n</i>                    |     | 0.28019387 | $\omega$ | 64.76083   |     | +0.98163771 |      | -0.16779662 |     |          |      |
| <i>a</i>                    |     | 2.3129361  | $\Omega$ | 304.77437  |     | +0.10934552 |      | +0.88470634 |     |          |      |
| <i>e</i>                    |     | 0.0840178  | <i>i</i> | 6.34158    |     | +0.15630406 |      | +0.43490113 |     |          |      |
| <i>P</i>                    |     | 3.52       | <i>H</i> | 15.5       |     | <i>G</i>    | 0.15 | <i>U</i>    | 4   |          |      |
| Residuals in seconds of arc |     |            |          |            |     |             |      |             |     |          |      |
| 1996 10 02                  | 809 | 0.4+       | 0.6-     | 1998 02 13 | 104 | 0.2-        | 0.2+ | 1998 02 26  | 566 | 0.2+     | 0.6+ |
| 1996 10 02                  | 809 | 0.5+       | 0.0      | 1998 02 13 | 104 | 1.0-        | 0.3+ | 1998 02 26  | 566 | 0.0      | 0.1- |
| 1996 10 02                  | 809 | 0.4+       | 0.4-     | 1998 02 14 | 104 | 0.1-        | 0.2- | 1998 02 26  | 566 | 0.5+     | 0.0  |
| 1996 10 03                  | 809 | 0.3+       | 1.0+     | 1998 02 14 | 104 | 0.0         | 0.2- | 1998 02 26  | 104 | 0.0      | 0.1- |
| 1996 10 03                  | 809 | 1.1-       | 0.2-     | 1998 02 14 | 104 | 0.3-        | 0.3- | 1998 02 26  | 104 | 0.2+     | 0.1- |
| 1996 10 03                  | 809 | 0.5-       | 0.1+     | 1998 02 15 | 104 | 0.7+        | 0.5+ | 1998 02 26  | 104 | 0.1+     | 0.1- |
| 1998 02 06                  | 104 | 0.1-       | 0.3+     | 1998 02 15 | 104 | 0.7-        | 0.7+ | 1998 02 27  | 566 | 0.1+     | 0.1- |
| 1998 02 06                  | 104 | 0.6+       | 0.0      | 1998 02 15 | 104 | 1.2-        | 0.8+ | 1998 02 27  | 566 | 0.2-     | 0.3- |
| 1998 02 06                  | 104 | 0.2+       | 0.3-     | 1998 02 17 | 104 | 0.6+        | 0.3- | 1998 02 27  | 566 | 0.4-     | 0.2- |
| 1998 02 06                  | 104 | 0.6+       | 1.0-     | 1998 02 17 | 104 | 0.3+        | 0.2- |             |     |          |      |
| 1998 02 13                  | 104 | 0.1-       | 0.2+     | 1998 02 17 | 104 | 0.4+        | 0.3- |             |     |          |      |

**1998 CH<sub>2</sub> = 1990 GG = 1994 CZ<sub>10</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i>                    |     | 355.14218  |          | (2000.0)   |     | <b>P</b>    |      | <b>Q</b>    |     | Williams |      |
|-----------------------------|-----|------------|----------|------------|-----|-------------|------|-------------|-----|----------|------|
| <i>n</i>                    |     | 0.24175619 | $\omega$ | 141.51437  |     | -0.64509095 |      | -0.76366631 |     |          |      |
| <i>a</i>                    |     | 2.5520214  | $\Omega$ | 348.57872  |     | +0.66466864 |      | -0.54409090 |     |          |      |
| <i>e</i>                    |     | 0.1762878  | <i>i</i> | 7.51895    |     | +0.37692608 |      | -0.34753252 |     |          |      |
| <i>P</i>                    |     | 4.08       | <i>H</i> | 16.0       |     | <i>G</i>    | 0.15 | <i>U</i>    | 4   |          |      |
| Residuals in seconds of arc |     |            |          |            |     |             |      |             |     |          |      |
| 1990 04 15                  | 809 | 2.0+       | 0.4-     | 1994 02 12 | 809 | 0.7+        | 0.6- | 1998 02 18  | 118 | 0.1-     | 0.3- |
| 1990 04 16                  | 809 | 0.1+       | 0.7-     | 1994 02 12 | 809 | 1.5-        | 0.6- | 1998 02 18  | 118 | 0.1-     | 0.3- |
| 1990 04 16                  | 809 | 0.7+       | 0.5-     | 1994 02 12 | 809 | 0.4-        | 0.3- | 1998 02 19  | 118 | 0.2-     | 0.8- |
| 1990 04 16                  | 809 | 0.2-       | 0.7+     | 1994 02 15 | 675 | 0.4-        | 0.8- | 1998 02 19  | 118 | 0.1-     | 0.6- |
| 1990 04 17                  | 809 | 1.4-       | 0.7+     | 1994 02 15 | 675 | 0.2-        | 0.9- | 1998 02 24  | 118 | 0.2-     | 0.3- |
| 1990 04 17                  | 809 | 1.3-       | 0.3+     | 1998 02 08 | 118 | 0.4+        | 0.3- | 1998 02 24  | 118 | 0.2-     | 0.4- |
| 1994 02 07                  | 809 | 0.3+       | 1.3+     | 1998 02 08 | 118 | 0.5+        | 1.0- | 1998 02 24  | 118 | 0.0      | 0.5- |
| 1994 02 07                  | 809 | 0.5-       | 0.8+     | 1998 02 08 | 118 | 0.4+        | 0.8- | 1998 02 26  | 566 | 0.8-     | 0.1+ |
| 1994 02 07                  | 809 | 0.9-       | 0.4+     | 1998 02 17 | 118 | 0.2+        | 1.8+ | 1998 02 26  | 566 | 0.8-     | 0.1+ |
| 1994 02 09                  | 809 | 1.8+       | 1.6+     | 1998 02 17 | 118 | 0.2+        | 1.3+ | 1998 02 26  | 566 | 0.5-     | 0.3+ |
| 1994 02 09                  | 809 | 1.1+       | 0.5+     | 1998 02 17 | 118 | 0.5+        | 1.1+ |             |     |          |      |
| 1994 02 09                  | 809 | 0.7+       | 0.2-     | 1998 02 18 | 118 | 0.0         | 0.3- |             |     |          |      |

**1998 CR<sub>2</sub> = 1995 QO<sub>10</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i>                    |     | 150.76172  |          | (2000.0)   |     | <b>P</b>    |      | <b>Q</b>    |     | Williams |      |
|-----------------------------|-----|------------|----------|------------|-----|-------------|------|-------------|-----|----------|------|
| <i>n</i>                    |     | 0.18443136 | $\omega$ | 186.20796  |     | +0.98966620 |      | +0.13657166 |     |          |      |
| <i>a</i>                    |     | 3.0566535  | $\Omega$ | 165.71823  |     | -0.12276090 |      | +0.96445207 |     |          |      |
| <i>e</i>                    |     | 0.0965624  | <i>i</i> | 10.20164   |     | -0.07409846 |      | +0.22623082 |     |          |      |
| <i>P</i>                    |     | 5.34       | <i>H</i> | 12.5       |     | <i>G</i>    | 0.15 | <i>U</i>    | 4   |          |      |
| Residuals in seconds of arc |     |            |          |            |     |             |      |             |     |          |      |
| 1995 08 19                  | 809 | 0.4+       | 0.6+     | 1995 09 29 | 809 | 0.8-        | 0.5- | 1998 02 25  | 566 | 0.1+     | 0.4- |
| 1995 08 20                  | 809 | 0.1-       | 0.2+     | 1998 02 06 | 327 | 0.1+        | 0.4+ | 1998 02 25  | 566 | 0.3-     | 0.5- |
| 1995 08 22                  | 809 | 0.2+       | 0.3+     | 1998 02 06 | 327 | 0.3+        | 0.2+ | 1998 02 25  | 566 | 0.3-     | 0.4- |
| 1995 08 24                  | 809 | 0.4-       | 0.4-     | 1998 02 06 | 327 | 0.6+        | 0.2- | 1998 03 02  | 327 | 0.0      | 0.4- |
| 1995 08 26                  | 809 | 0.5+       | 0.7-     | 1998 02 17 | 327 | 0.5-        | 0.2+ | 1998 03 02  | 327 | 0.1+     | 0.4- |
| 1995 08 27                  | 809 | 0.8-       | 0.4-     | 1998 02 17 | 327 | 0.5-        | 0.2+ | 1998 03 02  | 327 | 0.0      | 0.2- |
| 1995 09 17                  | 809 | 0.7-       | 0.7-     | 1998 02 17 | 327 | 0.3-        | 0.0  | 1998 03 08  | 327 | 0.2+     | 0.5+ |
| 1995 09 18                  | 809 | 0.6+       | 0.5-     | 1998 02 23 | 327 | 0.2+        | 0.1- | 1998 03 08  | 327 | 0.4+     | 0.5+ |
| 1995 09 18                  | 809 | 1.1+       | 2.0+     | 1998 02 23 | 327 | 0.0         | 0.0  | 1998 03 08  | 327 | 0.1+     | 0.4+ |
| 1995 09 19                  | 809 | (2.8+      | 2.4+)    | 1998 02 23 | 327 | 0.1+        | 0.1+ |             |     |          |      |

**1998 CC<sub>3</sub> = 1993 TB<sub>12</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i>                    |     | 158.12356  |          | (2000.0)   |     | <b>P</b>    |      | <b>Q</b>    |     | Williams |      |
|-----------------------------|-----|------------|----------|------------|-----|-------------|------|-------------|-----|----------|------|
| <i>n</i>                    |     | 0.31269296 | $\omega$ | 0.40649    |     | +0.91204773 |      | +0.40921734 |     |          |      |
| <i>a</i>                    |     | 2.1497633  | $\Omega$ | 335.38424  |     | -0.37642507 |      | +0.80963716 |     |          |      |
| <i>e</i>                    |     | 0.0662509  | <i>i</i> | 3.66801    |     | -0.16270554 |      | +0.42074795 |     |          |      |
| <i>P</i>                    |     | 3.15       | <i>H</i> | 14.5       |     | <i>G</i>    | 0.15 | <i>U</i>    | 5   |          |      |
| Residuals in seconds of arc |     |            |          |            |     |             |      |             |     |          |      |
| 1993 10 14                  | 675 | 0.0        | 0.6-     | 1998 02 06 | 809 | 0.2-        | 0.5- | 1998 02 22  | 566 | 0.0      | 0.4- |
| 1993 10 14                  | 675 | 0.3-       | 0.9+     | 1998 02 07 | 809 | 0.2+        | 0.9+ | 1998 02 22  | 566 | 0.1-     | 0.1- |
| 1993 10 15                  | 675 | 0.2+       | 0.4-     | 1998 02 07 | 809 | 0.0         | 0.6- | 1998 02 23  | 566 | 0.1-     | 0.3+ |
| 1998 02 06                  | 809 | 0.3-       | 0.7+     | 1998 02 07 | 809 | 0.2+        | 0.6- | 1998 02 23  | 566 | 0.2+     | 0.2+ |
| 1998 02 06                  | 809 | 0.0        | 0.1+     | 1998 02 22 | 566 | 0.0         | 0.3- | 1998 02 23  | 566 | 0.0      | 0.3+ |

**1998 CJ<sub>4</sub> = 1996 RV<sub>23</sub>**

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Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i>                    |     | 31.77311   |          | (2000.0)   |     | <b>P</b>    |      | <b>Q</b>    |     | Williams |      |
|-----------------------------|-----|------------|----------|------------|-----|-------------|------|-------------|-----|----------|------|
| <i>n</i>                    |     | 0.23266311 | $\omega$ | 119.18760  |     | +0.07888644 |      | -0.99078690 |     |          |      |
| <i>a</i>                    |     | 2.6180887  | $\Omega$ | 325.74226  |     | +0.83319831 |      | +0.12615798 |     |          |      |
| <i>e</i>                    |     | 0.1984136  | <i>i</i> | 11.27733   |     | +0.54731847 |      | -0.04924914 |     |          |      |
| <i>P</i>                    |     | 4.24       | <i>H</i> | 13.0       |     | <i>G</i>    | 0.15 | <i>U</i>    | 5   |          |      |
| Residuals in seconds of arc |     |            |          |            |     |             |      |             |     |          |      |
| 1996 09 05                  | 693 | 0.7+       | 1.2-     | 1998 02 06 | 809 | 0.6+        | 0.5+ | 1998 02 19  | 399 | 0.5-     | 1.2- |
| 1996 09 05                  | 693 | 0.7-       | 0.3-     | 1998 02 07 | 809 | 0.5-        | 0.0  | 1998 02 19  | 399 | 0.2-     | 0.9+ |
| 1996 09 06                  | 693 | 0.0        | 1.0+     | 1998 02 07 | 809 | 0.1+        | 0.3- | 1998 02 22  | 399 | 0.6-     | 0.8+ |
| 1996 09 06                  | 693 | 0.0        | 0.6+     | 1998 02 07 | 809 | 0.3+        | 0.7- | 1998 02 22  | 399 | 1.6+     | 0.5+ |
| 1998 02 06                  | 809 | 0.2-       | 0.5+     | 1998 02 18 | 399 | 0.3-        | 0.1+ |             |     |          |      |
| 1998 02 06                  | 809 | 0.0        | 0.4+     | 1998 02 18 | 399 | 0.4-        | 1.4- |             |     |          |      |

**1998 DA = 1987 UO**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i>                    |     | 218.20018  |          | (2000.0)   |     | <b>P</b>    |      | <b>Q</b>    |     | Williams |      |
|-----------------------------|-----|------------|----------|------------|-----|-------------|------|-------------|-----|----------|------|
| <i>n</i>                    |     | 0.22300961 | $\omega$ | 179.16224  |     | +0.11416912 |      | +0.98743211 |     |          |      |
| <i>a</i>                    |     | 2.6931073  | $\Omega$ | 97.38838   |     | -0.91212267 |      | +0.14777898 |     |          |      |
| <i>e</i>                    |     | 0.0531453  | <i>i</i> | 6.32685    |     | -0.39369740 |      | -0.05602857 |     |          |      |
| <i>P</i>                    |     | 4.42       | <i>H</i> | 13.5       |     | <i>G</i>    | 0.15 | <i>U</i>    | 5   |          |      |
| Residuals in seconds of arc |     |            |          |            |     |             |      |             |     |          |      |
| 1987 10 27                  | 054 | 0.5+       | 0.2-     | 1998 02 18 | 470 | 0.1+        | 0.7- | 1998 02 24  | 470 | 0.6+     | 0.6- |
| 1987 10 27                  | 054 | 0.4-       | 0.3-     | 1998 02 18 | 470 | 0.3-        | 0.1- | 1998 02 26  | 566 | 0.1-     | 0.3- |
| 1987 10 30                  | 054 | 0.1-       | 0.5+     | 1998 02 18 | 470 | 0.6-        | 0.0  | 1998 02 26  | 566 | 0.3+     | 0.9- |
| 1998 01 25                  | 566 | 0.3-       | 0.0      | 1998 02 19 | 470 | 0.2-        | 1.1+ | 1998 02 26  | 566 | 0.1+     | 0.6- |
| 1998 01 25                  | 566 | 0.4-       | 0.0      | 1998 02 19 | 470 | 0.2-        | 0.1+ | 1998 02 27  | 470 | 0.4-     | 0.4+ |
| 1998 01 25                  | 566 | 0.3-       | 0.3+     | 1998 02 19 | 470 | 0.1+        | 1.0- | 1998 02 27  | 470 | 0.8-     | 0.2+ |
| 1998 02 16                  | 470 | 1.4+       | 0.9-     | 1998 02 21 | 721 | 0.1+        | 0.1+ | 1998 03 01  | 470 | 0.2-     | 0.4+ |
| 1998 02 16                  | 470 | (2.3+      | 1.0-)    | 1998 02 21 | 721 | 0.1-        | 0.0  | 1998 03 01  | 470 | 0.1-     | 0.6+ |
| 1998 02 17                  | 470 | 0.5-       | 0.7+     | 1998 02 24 | 470 | 0.4+        | 0.1- | 1998 03 01  | 470 | 0.0      | 0.7+ |
| 1998 02 17                  | 470 | 0.8+       | 0.8+     | 1998 02 24 | 470 | 0.3+        | 0.2- |             |     |          |      |

**1998 DF = 1996 RO<sub>3</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|                             |            |          |           |            |     |             |      |             |     |      |      |
|-----------------------------|------------|----------|-----------|------------|-----|-------------|------|-------------|-----|------|------|
| $M$                         | 44.33476   | (2000.0) |           |            |     | <b>P</b>    |      | <b>Q</b>    |     |      |      |
| $n$                         | 0.28010342 | $\omega$ | 301.51223 |            |     | +0.27520472 |      | -0.95948619 |     |      |      |
| $a$                         | 2.3134340  | $\Omega$ | 132.38781 |            |     | +0.90746496 |      | +0.23851027 |     |      |      |
| $e$                         | 0.1151722  | $i$      | 4.69098   |            |     | +0.31744244 |      | +0.14999699 |     |      |      |
| $P$                         | 3.52       | $H$      | 14.5      |            | $G$ | 0.15        |      | $U$         | 4   |      |      |
| Residuals in seconds of arc |            |          |           |            |     |             |      |             |     |      |      |
| 1996 09 13                  | 566        | 0.0      | 0.2+      | 1998 02 17 | 132 | 0.6+        | 0.5+ | 1998 02 25  | 122 | 0.5- | 0.4- |
| 1996 09 13                  | 566        | 0.1-     | 0.1+      | 1998 02 17 | 132 | 1.0+        | 0.8+ | 1998 02 25  | 122 | 0.6- | 0.3- |
| 1996 09 13                  | 566        | 0.1-     | 0.4+      | 1998 02 17 | 132 | 0.1-        | 0.9+ | 1998 02 25  | 122 | 0.7- | 0.3- |

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|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1996 09 16 | 566 | 0.3+ | 0.4- | 1998 02 18 | 132 | 1.0+ | 0.0  | 1998 02 25 | 132 | 1.0- | 0.0  |
| 1996 09 16 | 566 | 0.2- | 0.5- | 1998 02 18 | 132 | 0.1+ | 0.3+ | 1998 02 25 | 132 | 0.7- | 1.0- |
| 1996 09 16 | 566 | 0.1+ | 0.1- | 1998 02 18 | 132 | 0.7+ | 0.5+ | 1998 02 25 | 132 | 0.1+ | 1.1+ |
| 1998 01 22 | 691 | 0.7- | 0.3- | 1998 02 20 | 958 | 0.8+ | 0.3- | 1998 02 26 | 566 | 1.0- | 0.3- |
| 1998 01 22 | 691 | 0.7- | 0.2+ | 1998 02 20 | 958 | 1.6+ | 0.4- | 1998 02 26 | 566 | 0.6- | 0.3- |
| 1998 01 22 | 691 | 0.6- | 0.2+ | 1998 02 20 | 958 | 1.9+ | 0.7- | 1998 02 26 | 566 | 0.9- | 0.4- |

**1998 DZ = 1996 TF<sub>20</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            |          |           | Marsden     |      |             |   |
|----------|------------|----------|-----------|-------------|------|-------------|---|
| <i>M</i> | 226.58099  |          | (2000.0)  | <b>P</b>    |      | <b>Q</b>    |   |
| <i>n</i> | 0.24001494 | $\omega$ | 280.25087 | -0.22589191 |      | +0.97394340 |   |
| <i>a</i> | 2.5643494  | $\Omega$ | 336.66404 | -0.87264575 |      | -0.21151626 |   |
| <i>e</i> | 0.0554513  | <i>i</i> | 2.91967   | -0.43296909 |      | -0.08182380 |   |
| <i>P</i> | 4.11       | <i>H</i> | 15.0      | <i>G</i>    | 0.15 | <i>U</i>    | 5 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1996 10 05 | 691 | 0.4- | 0.1+ | 1998 02 18 | 046 | 0.1+ | 0.3+ | 1998 02 20 | 046 | 0.3+ | 0.2- |
| 1996 10 05 | 691 | 0.4- | 0.4+ | 1998 02 18 | 046 | 0.0  | 0.0  | 1998 02 21 | 046 | 0.1- | 0.5- |
| 1996 10 05 | 691 | 0.5- | 0.3- | 1998 02 18 | 046 | 0.0  | 0.0  | 1998 02 21 | 046 | 0.2+ | 0.0  |
| 1996 10 08 | 691 | 0.5+ | 0.2+ | 1998 02 20 | 046 | 0.2+ | 0.3- | 1998 02 21 | 046 | 0.1- | 0.4+ |
| 1996 10 08 | 691 | 0.6+ | 0.3- | 1998 02 20 | 046 | 0.3- | 0.1- | 1998 02 26 | 046 | 0.0  | 0.3+ |
| 1996 10 08 | 691 | 0.3+ | 0.1- | 1998 02 20 | 046 | 0.0  | 0.1+ | 1998 02 26 | 046 | 0.3- | 0.0  |
| 1998 02 18 | 046 | 0.1+ | 0.1- | 1998 02 20 | 046 | 0.2+ | 0.2+ | 1998 02 26 | 046 | 0.2- | 0.0  |

**1998 DP<sub>1</sub> = 1992 OH<sub>3</sub> = 1995 HF<sub>5</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            |          |           | Williams    |      |             |   |
|----------|------------|----------|-----------|-------------|------|-------------|---|
| <i>M</i> | 356.58743  |          | (2000.0)  | <b>P</b>    |      | <b>Q</b>    |   |
| <i>n</i> | 0.25595503 | $\omega$ | 344.19961 | -0.29777635 |      | -0.94878528 |   |
| <i>a</i> | 2.4567461  | $\Omega$ | 123.01557 | +0.88892715 |      | -0.31588260 |   |
| <i>e</i> | 0.0909795  | <i>i</i> | 7.22971   | +0.34804852 |      | -0.00496827 |   |
| <i>P</i> | 3.85       | <i>H</i> | 14.0      | <i>G</i>    | 0.15 | <i>U</i>    | 3 |

Residuals in seconds of arc

|            |     |       |       |            |     |       |       |            |     |      |      |
|------------|-----|-------|-------|------------|-----|-------|-------|------------|-----|------|------|
| 1992 07 24 | 809 | 1.4+  | 0.8-  | 1992 07 30 | 809 | (3.5- | 0.2+) | 1997 12 27 | 566 | 1.2+ | 1.2- |
| 1992 07 24 | 809 | 0.3-  | 1.7-  | 1995 04 26 | 691 | 0.2-  | 0.0   | 1997 12 27 | 566 | 1.0+ | 1.3- |
| 1992 07 24 | 809 | (2.5- | 2.8-) | 1995 04 26 | 691 | 0.3-  | 0.4-  | 1998 02 20 | 557 | 0.3- | 0.1- |
| 1992 07 26 | 809 | 0.1-  | 1.0-  | 1995 04 26 | 691 | 0.1-  | 0.1-  | 1998 02 20 | 557 | 0.6- | 0.0  |
| 1992 07 26 | 809 | 0.5+  | 0.5-  | 1995 05 04 | 691 | 0.0   | 0.2-  | 1998 02 21 | 557 | 0.8- | 0.7- |
| 1992 07 26 | 809 | 0.5-  | 1.3-  | 1995 05 04 | 691 | 0.1-  | 0.6-  | 1998 02 21 | 557 | 0.9- | 0.6- |
| 1992 07 30 | 809 | (0.1- | 2.6+) | 1995 05 04 | 691 | 0.2+  | 0.8-  | 1998 02 21 | 557 | 0.8- | 0.4- |
| 1992 07 30 | 809 | (2.0- | 2.3+) | 1997 12 27 | 566 | 1.2+  | 1.1-  | 1998 02 21 | 557 | 0.9- | 0.5- |

**1998 DZ<sub>1</sub> = 1982 FQ<sub>1</sub> = 1990 DO<sub>4</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            |          |           | Williams    |      |             |   |
|----------|------------|----------|-----------|-------------|------|-------------|---|
| <i>M</i> | 264.62939  |          | (2000.0)  | <b>P</b>    |      | <b>Q</b>    |   |
| <i>n</i> | 0.23922730 | $\omega$ | 250.48704 | -0.72006365 |      | +0.68688101 |   |
| <i>a</i> | 2.5699750  | $\Omega$ | 332.61631 | -0.52881863 |      | -0.63510585 |   |
| <i>e</i> | 0.1631093  | <i>i</i> | 12.36633  | -0.44928744 |      | -0.35332002 |   |
| <i>P</i> | 4.12       | <i>H</i> | 15.0      | <i>G</i>    | 0.15 | <i>U</i>    | 3 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1982 03 25 | 046 | 0.1+ | 0.1- | 1998 01 26 | 566 | 0.4+ | 0.2- | 1998 02 20 | 426 | 0.7- | 0.6+ |
| 1982 03 26 | 046 | 0.0  | 0.3+ | 1998 01 26 | 566 | 0.4+ | 0.1- | 1998 02 20 | 426 | 0.8- | 0.9+ |
| 1990 02 28 | 809 | 0.4- | 0.4- | 1998 01 26 | 566 | 0.3+ | 0.1- | 1998 02 25 | 426 | 0.1- | 0.2+ |
| 1990 02 28 | 809 | 0.3- | 0.4- | 1998 02 18 | 426 | 0.1- | 0.6- | 1998 02 25 | 426 | 0.0  | 0.4- |
| 1990 02 28 | 809 | 0.0  | 0.4- | 1998 02 18 | 426 | 0.1- | 0.2+ | 1998 02 25 | 426 | 0.7+ | 0.6+ |
| 1990 03 01 | 809 | 0.3- | 0.2+ | 1998 02 18 | 426 | 0.2+ | 0.1- | 1998 02 28 | 426 | 0.7+ | 0.1- |
| 1990 03 01 | 809 | 0.1+ | 0.2+ | 1998 02 18 | 426 | 0.1- | 0.2+ | 1998 02 28 | 426 | 0.1- | 0.8- |
| 1990 03 01 | 809 | 0.5+ | 0.3+ | 1998 02 20 | 426 | 0.7- | 0.0  |            |     |      |      |

## 1998 MAR. 13

**1998 DR<sub>2</sub> = 1990 RV<sub>6</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            |          |           | Williams    |      |             |   |
|----------|------------|----------|-----------|-------------|------|-------------|---|
| <i>M</i> | 24.83963   |          | (2000.0)  | <b>P</b>    |      | <b>Q</b>    |   |
| <i>n</i> | 0.18988106 | $\omega$ | 120.62141 | -0.31313915 |      | -0.94906854 |   |
| <i>a</i> | 2.9978849  | $\Omega$ | 347.48098 | +0.80706207 |      | -0.24659845 |   |
| <i>e</i> | 0.0493389  | <i>i</i> | 9.24515   | +0.50059434 |      | -0.19610742 |   |
| <i>P</i> | 5.19       | <i>H</i> | 12.0      | <i>G</i>    | 0.15 | <i>U</i>    | 4 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1990 09 13 | 809 | 0.6- | 0.1+ | 1998 01 28 | 566 | 0.1- | 0.1+ | 1998 02 24 | 566 | 0.1+ | 0.9- |
| 1990 09 13 | 809 | 0.2- | 0.2+ | 1998 01 28 | 566 | 0.1+ | 0.1- | 1998 02 24 | 566 | 0.4+ | 1.4- |
| 1990 09 13 | 809 | 0.1+ | 0.3+ | 1998 02 21 | 411 | 0.1+ | 0.0  | 1998 03 01 | 411 | 0.9- | 0.1- |
| 1990 09 14 | 809 | 0.1+ | 0.2- | 1998 02 21 | 411 | 0.1- | 0.7+ | 1998 03 01 | 411 | 0.1- | 0.0  |
| 1990 09 14 | 809 | 0.1+ | 0.3- | 1998 02 23 | 411 | 0.3- | 0.6+ | 1998 03 04 | 411 | 0.3- | 0.7+ |
| 1990 09 14 | 809 | 0.5+ | 0.1- | 1998 02 23 | 411 | 0.4- | 0.3+ | 1998 03 04 | 411 | 0.3+ | 0.3+ |
| 1998 01 28 | 566 | 0.2+ | 0.2+ | 1998 02 24 | 566 | 0.3+ | 0.9- | 1998 03 04 | 411 | 0.7+ | 0.5+ |

**1998 DW<sub>2</sub> = 1990 HG<sub>6</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            |          |           | Williams    |      |             |   |
|----------|------------|----------|-----------|-------------|------|-------------|---|
| <i>M</i> | 110.20447  |          | (2000.0)  | <b>P</b>    |      | <b>Q</b>    |   |
| <i>n</i> | 0.21061247 | $\omega$ | 135.16536 | +0.87874664 |      | -0.47397528 |   |
| <i>a</i> | 2.7977785  | $\Omega$ | 253.20334 | +0.41981065 |      | +0.82351848 |   |
| <i>e</i> | 0.0814300  | <i>i</i> | 3.36191   | +0.22707568 |      | +0.31171260 |   |
| <i>P</i> | 4.68       | <i>H</i> | 13.0      | <i>G</i>    | 0.15 | <i>U</i>    | 5 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1990 04 29 | 413 | 0.0  | 0.0  | 1998 02 23 | 327 | 0.3- | 0.1- | 1998 03 02 | 327 | 0.2+ | 0.0  |
| 1990 05 01 | 413 | 0.0  | 0.0  | 1998 02 23 | 327 | 0.3- | 0.2- | 1998 03 02 | 327 | 0.2- | 0.1+ |
| 1990 05 02 | 413 | 0.0  | 0.1- | 1998 02 23 | 327 | 0.4- | 0.4- | 1998 03 02 | 327 | 0.1- | 0.4+ |
| 1998 02 17 | 327 | 0.4- | 0.5- | 1998 02 26 | 566 | 0.2+ | 0.4- | 1998 03 05 | 327 | 0.4- | 0.7+ |
| 1998 02 17 | 327 | 0.1+ | 0.1- | 1998 02 26 | 566 | 0.5+ | 0.3- | 1998 03 05 | 327 | 0.0  | 0.3+ |
| 1998 02 17 | 327 | 0.4- | 0.5+ | 1998 02 26 | 566 | 0.5+ | 0.4- | 1998 03 05 | 327 | 0.1- | 0.5+ |
| 1998 02 21 | 327 | 0.1- | 0.3- | 1998 03 01 | 327 | 0.5+ | 0.2+ | 1998 03 08 | 327 | 0.2+ | 0.2+ |
| 1998 02 21 | 327 | 0.3- | 0.3- | 1998 03 01 | 327 | 0.3+ | 0.1- | 1998 03 08 | 327 | 0.2- | 0.1+ |
| 1998 02 21 | 327 | 0.1- | 0.4- | 1998 03 01 | 327 | 0.5+ | 0.0  | 1998 03 08 | 327 | 0.0  | 0.4+ |

**1998 DN<sub>3</sub> = 1980 BW = 1980 DV<sub>1</sub> = 1987 SE<sub>27</sub> = 1991 RV<sub>34</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            |          |           | Williams    |      |             |   |
|----------|------------|----------|-----------|-------------|------|-------------|---|
| <i>M</i> | 344.11195  |          | (2000.0)  | <b>P</b>    |      | <b>Q</b>    |   |
| <i>n</i> | 0.21831960 | $\omega$ | 148.77025 | -0.74884724 |      | -0.66221009 |   |
| <i>a</i> | 2.7315400  | $\Omega$ | 349.63209 | +0.57354683 |      | -0.62745940 |   |
| <i>e</i> | 0.1145569  | <i>i</i> | 8.48787   | +0.33207205 |      | -0.40960042 |   |
| <i>P</i> | 4.51       | <i>H</i> | 13.0      | <i>G</i>    | 0.15 | <i>U</i>    | 2 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1980 01 23 | 095 | 0.3- | 0.7+ | 1998 01 24 | 566 | 0.6- | 0.7+ | 1998 02 23 | 566 | 0.3- | 0.0  |
| 1980 02 20 | 095 | 0.8- | 3.0- | 1998 01 24 | 566 | 0.3- | 0.9+ | 1998 02 23 | 566 | 0.2+ | 0.1- |
| 1987 09 26 | 095 | 0.6+ | 0.8- | 1998 02 22 | 566 | 0.3+ | 0.5+ | 1998 02 25 | 122 | 0.6+ | 0.1- |
| 1991 09 12 | 675 | 0.2- | 0.4+ | 1998 02 22 | 566 | 0.1+ | 0.1+ | 1998 02 25 | 122 | 0.5+ | 0.0  |
| 1991 09 12 | 675 | 0.2- | 0.1+ | 1998 02 22 | 566 | 0.0  | 0.0  | 1998 02 26 | 122 | 0.7+ | 0.1- |
| 1998 01 24 | 566 | 0.5- | 0.9+ | 1998 02 23 | 566 | 0.1- | 0.2- | 1998 02 26 | 122 | 0.6+ | 0.0  |

**1998 DQ<sub>3</sub> = 1993 QR**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            |          |           | Williams    |      |             |   |
|----------|------------|----------|-----------|-------------|------|-------------|---|
| <i>M</i> | 10.28897   |          | (2000.0)  | <b>P</b>    |      | <b>Q</b>    |   |
| <i>n</i> | 0.28382635 | $\omega$ | 287.90953 | +0.04830286 |      | -0.99019023 |   |
| <i>a</i> | 2.2931594  | $\Omega$ | 158.02619 | +0.99647270 |      | +0.03875361 |   |
| <i>e</i> | 0.3407972  | <i>i</i> | 20.51138  | +0.06862209 |      | +0.13424406 |   |
| <i>P</i> | 3.47       | <i>H</i> | 14.5      | <i>G</i>    | 0.15 | <i>U</i>    | 4 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1993 08 19 | 675 | 0.2+ | 0.3- | 1998 02 24 | 566 | 0.5- | 0.9- | 1998 02 24 | 327 | 0.3+ | 0.1+ |
| 1993 08 19 | 675 | 0.1- | 0.4+ | 1998 02 24 | 566 | 0.1+ | 0.3+ | 1998 02 24 | 104 | 0.0  | 0.1- |
| 1993 08 22 | 675 | 0.1- | 0.2- | 1998 02 24 | 566 | 0.3- | 0.9- | 1998 02 24 | 104 | 0.2+ | 0.6- |

1998 MAR. 13

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|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1993 08 22 | 675 | 0.0  | 0.1+ | 1998 02 24 | 566 | 0.0  | 0.3+ | 1998 02 24 | 104 | 0.0  | 0.4- |
| 1998 02 22 | 566 | 0.4- | 0.4+ | 1998 02 24 | 566 | 0.4- | 1.0- | 1998 02 24 | 104 | 0.1+ | 0.3- |
| 1998 02 22 | 566 | 0.4- | 0.5+ | 1998 02 24 | 566 | 0.3+ | 0.4+ | 1998 02 24 | 104 | 0.2+ | 0.1+ |
| 1998 02 22 | 566 | 0.6- | 0.1+ | 1998 02 24 | 566 | 0.4- | 0.6- | 1998 02 24 | 104 | 0.2+ | 0.1- |
| 1998 02 23 | 566 | 0.3- | 0.5+ | 1998 02 24 | 566 | 0.1- | 0.8- | 1998 02 24 | 120 | 0.4- | 0.2- |
| 1998 02 23 | 566 | 0.1- | 0.4+ | 1998 02 24 | 566 | 0.0  | 0.5- | 1998 02 24 | 120 | 0.6+ | 0.1+ |
| 1998 02 23 | 566 | 0.2- | 0.5+ | 1998 02 24 | 422 | 0.1+ | 0.0  | 1998 02 24 | 120 | 0.9+ | 0.3- |
| 1998 02 23 | 566 | 0.3- | 0.1+ | 1998 02 24 | 422 | 0.1+ | 0.2+ | 1998 02 24 | 120 | 0.1+ | 0.2+ |
| 1998 02 23 | 566 | 0.1- | 0.0  | 1998 02 24 | 422 | 0.1+ | 0.1+ | 1998 02 24 | 120 | 1.2+ | 0.0  |
| 1998 02 23 | 566 | 0.4- | 0.2+ | 1998 02 24 | 422 | 0.3+ | 0.2+ | 1998 02 24 | 120 | 0.0  | 0.2- |
| 1998 02 23 | 557 | 0.0  | 0.2+ | 1998 02 24 | 426 | 0.2+ | 0.1- | 1998 03 02 | 691 | 0.2- | 0.2+ |
| 1998 02 23 | 557 | 0.1+ | 0.2+ | 1998 02 24 | 426 | 0.0  | 0.3- | 1998 03 02 | 691 | 0.3- | 0.1+ |
| 1998 02 23 | 557 | 0.0  | 0.1+ | 1998 02 24 | 426 | 0.0  | 0.0  | 1998 03 02 | 691 | 0.4- | 0.2+ |
| 1998 02 23 | 046 | 0.0  | 0.0  | 1998 02 24 | 426 | 0.0  | 0.1- | 1998 03 03 | 691 | 0.0  | 0.3+ |
| 1998 02 23 | 046 | 0.1+ | 0.3- | 1998 02 24 | 327 | 0.0  | 0.3+ | 1998 03 03 | 691 | 0.1+ | 0.0  |
| 1998 02 23 | 046 | 0.2+ | 0.5+ | 1998 02 24 | 327 | 0.1+ | 0.4+ | 1998 03 03 | 691 | 0.2- | 0.1+ |
| 1998 02 23 | 046 | 0.0  | 0.4+ | 1998 02 24 | 327 | 0.2+ | 0.2+ |            |     |      |      |

1998 DS<sub>3</sub> = 1988 EV<sub>1</sub>

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            |                    | Williams      |             |  |
|----------|------------|--------------------|---------------|-------------|--|
| <i>M</i> | 20.29149   | (2000.0)           | <b>P</b>      | <b>Q</b>    |  |
| <i>n</i> | 0.18806547 | $\omega$ 312.15199 | -0.20016036   | -0.97509902 |  |
| <i>a</i> | 3.0171484  | $\Omega$ 149.00742 | +0.94470718   | -0.21791660 |  |
| <i>e</i> | 0.0772564  | <i>i</i> 10.68665  | +0.25973868   | +0.04116140 |  |
| <i>P</i> | 5.24       | <i>H</i> 13.0      | <i>G</i> 0.15 | <i>U</i> 5  |  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1988 03 13 | 054 | 1.3+ | 0.2- | 1998 02 15 | 292 | 1.1- | 0.1- | 1998 02 22 | 566 | 0.1+ | 0.4+ |
| 1988 03 13 | 054 | 0.4- | 0.4+ | 1998 02 16 | 292 | 0.1+ | 0.8- | 1998 02 22 | 566 | 0.6+ | 0.3- |
| 1988 03 14 | 054 | 0.9- | 0.2- | 1998 02 16 | 292 | 0.4+ | 1.1- | 1998 02 23 | 566 | 0.6+ | 0.2- |
| 1998 01 26 | 566 | 0.5- | 0.3+ | 1998 02 16 | 292 | 0.1+ | 0.7- | 1998 02 23 | 566 | 0.6+ | 0.0  |
| 1998 01 26 | 566 | 0.5- | 0.2+ | 1998 02 22 | 292 | 0.0  | 0.0  | 1998 02 23 | 566 | 1.4+ | 0.5- |
| 1998 01 26 | 566 | 0.5- | 0.3+ | 1998 02 22 | 292 | 0.2- | 0.1+ | 1998 02 26 | 292 | 0.3- | 0.3+ |
| 1998 02 15 | 292 | 0.3+ | 0.7+ | 1998 02 22 | 292 | 1.1- | 0.0  | 1998 02 26 | 292 | 0.5+ | 0.7+ |
| 1998 02 15 | 292 | 0.4- | 0.2+ | 1998 02 22 | 566 | 0.6+ | 0.4- | 1998 02 26 | 292 | 0.6- | 1.0+ |

1998 DV<sub>3</sub> = 1993 FT<sub>58</sub>

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            |                    | Williams      |             |  |
|----------|------------|--------------------|---------------|-------------|--|
| <i>M</i> | 11.85210   | (2000.0)           | <b>P</b>      | <b>Q</b>    |  |
| <i>n</i> | 0.18081692 | $\omega$ 286.18409 | -0.29813886   | -0.95452242 |  |
| <i>a</i> | 3.0972529  | $\Omega$ 181.16200 | +0.88337424   | -0.27575176 |  |
| <i>e</i> | 0.1593356  | <i>i</i> 1.17023   | +0.36161190   | -0.11334866 |  |
| <i>P</i> | 5.45       | <i>H</i> 13.5      | <i>G</i> 0.15 | <i>U</i> 6  |  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1993 03 19 | 809 | 0.4- | 0.3- | 1998 02 23 | 566 | 0.0  | 0.1- | 1998 03 01 | 552 | 0.4+ | 0.5+ |
| 1993 03 20 | 809 | 0.4+ | 0.3+ | 1998 02 27 | 552 | 0.5+ | 0.2+ | 1998 03 01 | 552 | 0.4+ | 1.6+ |
| 1998 02 22 | 566 | 0.3- | 0.1- | 1998 02 27 | 552 | 0.4+ | 0.1- | 1998 03 04 | 691 | 0.0  | 0.7- |
| 1998 02 22 | 566 | 0.2+ | 0.0  | 1998 02 27 | 552 | 0.6+ | 0.4+ | 1998 03 04 | 691 | 0.3- | 0.4- |
| 1998 02 22 | 566 | 0.1- | 0.1+ | 1998 03 01 | 691 | 0.7- | 0.0  | 1998 03 04 | 691 | 0.1+ | 0.5- |
| 1998 02 23 | 566 | 0.2- | 0.3- | 1998 03 01 | 691 | 0.6- | 0.2- |            |     |      |      |
| 1998 02 23 | 566 | 0.2+ | 0.4- | 1998 03 01 | 691 | 0.5- | 0.1- |            |     |      |      |

1998 DN<sub>5</sub> = 1989 YD<sub>6</sub>

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            |                    | Williams      |             |  |
|----------|------------|--------------------|---------------|-------------|--|
| <i>M</i> | 334.48680  | (2000.0)           | <b>P</b>      | <b>Q</b>    |  |
| <i>n</i> | 0.25385199 | $\omega$ 282.40724 | -0.96679202   | -0.23359891 |  |
| <i>a</i> | 2.4702960  | $\Omega$ 244.15953 | +0.25528635   | -0.90165252 |  |
| <i>e</i> | 0.1717792  | <i>i</i> 6.61360   | -0.01191950   | -0.36394268 |  |
| <i>P</i> | 3.88       | <i>H</i> 13.5      | <i>G</i> 0.15 | <i>U</i> 4  |  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1989 12 29 | 511 | 0.5- | 0.7+ | 1990 01 04 | 511 | 0.5- | 0.6+ | 1998 02 23 | 566 | 0.1+ | 0.1- |
| 1989 12 29 | 511 | 0.4- | 0.1+ | 1998 01 26 | 566 | 0.1+ | 0.4+ | 1998 02 23 | 566 | 0.0  | 0.1- |
| 1989 12 31 | 511 | 0.6+ | 1.4+ | 1998 01 26 | 566 | 0.5+ | 0.2+ | 1998 02 23 | 566 | 0.0  | 0.1- |

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1989 12 31 | 511 | 0.5- | 1.7- | 1998 01 26 | 566 | 0.1+ | 0.5+ | 1998 02 27 | 566 | 0.0  | 0.1- |
| 1990 01 02 | 511 | 0.7+ | 1.5- | 1998 02 22 | 566 | 0.1- | 0.0  | 1998 02 27 | 566 | 0.1+ | 0.3- |
| 1990 01 02 | 511 | 1.2+ | 0.6+ | 1998 02 22 | 566 | 0.2- | 0.0  | 1998 02 27 | 566 | 0.2- | 0.1- |
| 1990 01 04 | 511 | 0.7- | 0.5- | 1998 02 22 | 566 | 0.4- | 0.1+ |            |     |      |      |

1998 DR<sub>5</sub> = 1995 QP<sub>7</sub>

Id. S. Nakano

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            |                    | Williams      |             |  |
|----------|------------|--------------------|---------------|-------------|--|
| <i>M</i> | 249.77041  | (2000.0)           | <b>P</b>      | <b>Q</b>    |  |
| <i>n</i> | 0.23174476 | $\omega$ 318.69548 | +0.00055617   | +0.98110313 |  |
| <i>a</i> | 2.6250007  | $\Omega$ 310.39141 | -0.83779197   | -0.10518346 |  |
| <i>e</i> | 0.1759544  | <i>i</i> 14.71662  | -0.54598929   | +0.16239790 |  |
| <i>P</i> | 4.25       | <i>H</i> 13.0      | <i>G</i> 0.15 | <i>U</i> 4  |  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1995 08 25 | 691 | 0.3- | 0.0  | 1998 01 26 | 566 | 0.0  | 0.6- | 1998 02 23 | 566 | 0.6+ | 0.1+ |
| 1995 08 25 | 691 | 0.2- | 0.1+ | 1998 02 17 | 905 | 0.2+ | 1.3+ | 1998 02 27 | 566 | 0.5- | 0.2- |
| 1995 08 25 | 691 | 0.1- | 0.3- | 1998 02 17 | 905 | 0.3- | 0.2+ | 1998 02 27 | 566 | 0.2- | 0.2- |
| 1995 08 31 | 691 | 0.2+ | 0.1+ | 1998 02 22 | 566 | 0.2+ | 0.7+ | 1998 02 27 | 566 | 0.3- | 0.2- |
| 1995 08 31 | 691 | 0.4+ | 0.0  | 1998 02 22 | 566 | 0.4+ | 0.8+ | 1998 03 01 | 888 | 0.0  | 0.6- |
| 1995 08 31 | 691 | 0.1+ | 0.0  | 1998 02 22 | 566 | 0.2+ | 0.6+ | 1998 03 01 | 888 | 0.4- | 0.9- |
| 1998 01 26 | 566 | 0.1- | 0.3- | 1998 02 23 | 566 | 0.2+ | 0.1+ | 1998 03 01 | 888 | 0.3- | 0.9- |
| 1998 01 26 | 566 | 0.0  | 0.3- | 1998 02 23 | 566 | 0.3+ | 0.3+ |            |     |      |      |

1998 DW<sub>5</sub> = 1994 PD<sub>9</sub>

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            |                    | Marsden       |             |  |
|----------|------------|--------------------|---------------|-------------|--|
| <i>M</i> | 289.17846  | (2000.0)           | <b>P</b>      | <b>Q</b>    |  |
| <i>n</i> | 0.17745444 | $\omega$ 268.53814 | -0.50302522   | +0.84195887 |  |
| <i>a</i> | 3.1362558  | $\Omega$ 328.70650 | -0.56481945   | -0.49112976 |  |
| <i>e</i> | 0.2083355  | <i>i</i> 22.06410  | -0.65417476   | -0.22337594 |  |
| <i>P</i> | 5.55       | <i>H</i> 14.5      | <i>G</i> 0.15 | <i>U</i> 5  |  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1994 08 10 | 809 | 0.1+ | 0.4+ | 1998 02 06 | 809 | 0.5+ | 1.8+ | 1998 02 22 | 566 | 0.1+ | 0.2+ |
| 1994 08 10 | 809 | 0.4+ | 0.7+ | 1998 02 06 | 809 | 0.3- | 0.1+ | 1998 02 22 | 566 | 0.0  | 0.4- |
| 1994 08 10 | 809 | 0.9- | 0.4- | 1998 02 06 | 809 | 1.1- | 1.3- | 1998 02 22 | 566 | 0.5+ | 0.3+ |
| 1994 08 11 | 809 | 0.5- | 0.3- | 1998 02 07 | 809 | 0.8+ | 0.7+ | 1998 02 23 | 566 | 0.2- | 0.4- |
| 1994 08 11 | 809 | 0.5+ | 0.1- | 1998 02 07 | 809 | 0.0  | 1.2- | 1998 02 23 | 566 | 0.4+ | 0.1- |
| 1994 08 11 | 809 | 0.5+ | 0.4- | 1998 02 07 | 809 | 0.2- | 0.1+ | 1998 02 23 | 566 | 0.7- | 0.2+ |

1998 DZ<sub>5</sub> = 1990 FT<sub>4</sub> = 1994 EN<sub>7</sub>

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|          |            |                    | Williams      |             |  |
|----------|------------|--------------------|---------------|-------------|--|
| <i>M</i> | 344.17617  | (2000.0)           | <b>P</b>      | <b>Q</b>    |  |
| <i>n</i> | 0.24161144 | $\omega$ 348.65219 | -0.89769277   | -0.44015804 |  |
| <i>a</i> | 2.5530406  | $\Omega$ 165.18378 | +0.41019753   | -0.85157923 |  |
| <i>e</i> | 0.1745150  | <i>i</i> 4.53369   | +0.16089024   | -0.28473446 |  |
| <i>P</i> | 4.08       | <i>H</i> 14.0      | <i>G</i> 0.15 | <i>U</i> 4  |  |

Residuals in seconds of arc

|            |     |      |      |            |     |       |       |            |     |      |      |
|------------|-----|------|------|------------|-----|-------|-------|------------|-----|------|------|
| 1990 03 27 | 675 | 0.0  | 0.6- | 1998 02 06 | 809 | 0.1+  | 1.2-  | 1998 02 22 | 399 | 0.3+ | 0.5- |
| 1990 03 27 | 675 | 0.4- | 1.7- | 1998 02 18 | 399 | 1.3-  | 0.3-  | 1998 02 22 | 399 | 0.2+ | 1.1+ |
| 1994 03 06 | 675 | 1.0- | 0.5+ | 1998 02 18 | 399 | (2.4- | 0.3-) | 1998 02 23 | 566 | 0.1+ | 0.1+ |
| 1994 03 06 | 675 | 1.3+ | 0.4+ | 1998 02 19 | 399 | 1.2-  | 0.2-  | 1998 02 23 | 566 | 0.0  | 0.0  |
| 1994 03 09 | 675 | 1.4- | 1.3+ | 1998 02 19 | 399 | (2.2- | 1.7+) | 1998 02 23 | 566 | 0.2+ | 0.0  |
| 1994 03 09 | 675 | 1.4+ | 1.1+ | 1998 02 22 | 566 | 0.0   | 0.0   | 1998 02 27 | 566 | 0.1+ | 0.6+ |
| 1998 02 06 | 809 | 1.2+ | 1.3- | 1998 02 22 | 566 | 0.2-  | 0.2-  | 1998 02 27 | 566 | 0.2+ | 0.7+ |
| 1998 02 06 | 809 | 0.4+ | 1.0- | 1998 02 22 | 566 | 0.1-  | 0.1+  | 1998 02 27 | 566 | 0.1+ | 0.5+ |

**1998 DA<sub>6</sub> = 1994 AE<sub>6</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Marsden

|          |            |          |           |             |             |          |   |
|----------|------------|----------|-----------|-------------|-------------|----------|---|
| <i>M</i> | 22.86903   |          | (2000.0)  | <b>P</b>    |             | <b>Q</b> |   |
| <i>n</i> | 0.26150257 | $\omega$ | 184.80751 | -0.20309204 | -0.97893203 |          |   |
| <i>a</i> | 2.4218770  | $\Omega$ | 276.91143 | +0.89906888 | -0.17789626 |          |   |
| <i>e</i> | 0.1453718  | <i>i</i> | 1.21855   | +0.38785148 | -0.10022474 |          |   |
| <i>P</i> | 3.77       | <i>H</i> | 15.0      | <i>G</i>    | 0.15        | <i>U</i> | 6 |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1994 01 07 | 691 | 0.7- | 0.4- | 1998 02 06 | 809 | 1.3+ | 1.7+ | 1998 02 22 | 566 | 0.5- | 1.0- |
| 1994 01 07 | 691 | 0.6+ | 0.0  | 1998 02 06 | 809 | 0.4+ | 1.7+ | 1998 02 22 | 566 | 0.5- | 1.0- |
| 1994 01 07 | 691 | 1.4+ | 0.0  | 1998 02 06 | 809 | 1.1+ | 1.5+ | 1998 02 22 | 566 | 0.7- | 1.1- |
| 1994 01 11 | 691 | 1.1- | 0.1+ | 1998 02 07 | 809 | 0.7+ | 1.3+ | 1998 02 23 | 566 | 0.5- | 1.2- |
| 1994 01 11 | 691 | 0.0  | 0.0  | 1998 02 07 | 809 | 0.0  | 0.3+ | 1998 02 23 | 566 | 0.5- | 1.1- |
| 1994 01 11 | 691 | 0.5- | 0.7- | 1998 02 07 | 809 | 0.0  | 0.8+ | 1998 02 23 | 566 | 0.5- | 1.0- |

**1998 DL<sub>8</sub> = 1994 JA<sub>5</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

|          |            |          |           |             |      |             |   |  |  |  |
|----------|------------|----------|-----------|-------------|------|-------------|---|--|--|--|
| <i>M</i> | 203.04522  |          | (2000.0)  | <b>P</b>    |      | <b>Q</b>    |   |  |  |  |
| <i>n</i> | 0.20852936 | $\omega$ | 94.47323  | +0.58984021 |      | +0.80661820 |   |  |  |  |
| <i>a</i> | 2.8163800  | $\Omega$ | 211.77041 | -0.76665032 |      | +0.54452198 |   |  |  |  |
| <i>e</i> | 0.0543225  | <i>i</i> | 4.15540   | -0.25364506 |      | +0.22991933 |   |  |  |  |
| <i>P</i> | 4.73       | <i>H</i> | 14.5      | <i>G</i>    | 0.15 | <i>U</i>    | 5 |  |  |  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1994 05 04 | 691 | 0.2- | 0.0  | 1994 05 11 | 691 | 0.1+ | 0.1+ | 1998 02 23 | 327 | 0.4- | 0.3+ |
| 1994 05 04 | 691 | 0.0  | 0.3- | 1994 05 11 | 691 | 0.1- | 0.4+ | 1998 02 23 | 327 | 0.2+ | 0.2- |
| 1994 05 04 | 691 | 0.5- | 0.1- | 1994 05 11 | 691 | 0.2+ | 0.2+ | 1998 02 23 | 327 | 0.1- | 0.2+ |
| 1994 05 11 | 691 | 0.3- | 0.3- | 1998 02 21 | 327 | 0.3- | 0.5- | 1998 03 01 | 327 | 0.6+ | 0.1- |
| 1994 05 11 | 691 | 0.8+ | 0.3+ | 1998 02 21 | 327 | 0.4- | 0.2+ | 1998 03 01 | 327 | 0.3- | 0.3- |
| 1994 05 11 | 691 | 0.0  | 0.3- | 1998 02 21 | 327 | 0.5+ | 0.5- | 1998 03 01 | 327 | 0.2+ | 0.9+ |

**1998 DR<sub>8</sub> = 1966 PE = 1966 RC = 1973 UW<sub>2</sub> = 1990 SQ<sub>15</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| $M$ | 40.28428   |          | (2000.0)  | <b>P</b>    |             | <b>Q</b> |   |
|-----|------------|----------|-----------|-------------|-------------|----------|---|
| $n$ | 0.28867088 | $\omega$ | 114.77405 | +0.99606969 | -0.01920248 |          |   |
| $a$ | 2.2674309  | $\Omega$ | 246.42440 | -0.01339739 | +0.93232072 |          |   |
| $e$ | 0.2010519  | $i$      | 5.41338   | +0.08755391 | +0.36112233 |          |   |
| $P$ | 3.41       | $H$      | 13.5      | $G$         | 0.15        | $U$      | 2 |

Residuals in seconds of arc

|            |     |             |            |     |             |            |     |           |
|------------|-----|-------------|------------|-----|-------------|------------|-----|-----------|
| 1966 08 13 | 095 | (1.2- 7.7+) | 1997 10 29 | 704 | 0.4- 0.9-   | 1997 11 06 | 704 | 1.1+ 0.7- |
| 1966 09 13 | 095 | 0.7+ 0.7-   | 1997 10 29 | 704 | 0.7- 0.7-   | 1997 11 06 | 704 | 1.2+ 0.2- |
| 1966 09 14 | 095 | (4.4- 6.2+) | 1997 10 29 | 704 | 0.3+ 0.0    | 1997 11 06 | 704 | 1.1+ 0.6+ |
| 1973 10 27 | 095 | 0.1- 0.4-   | 1997 10 29 | 704 | 0.5- 0.4-   | 1997 11 08 | 910 | 0.4+ 0.5+ |
| 1990 09 17 | 675 | 1.2- 0.1-   | 1997 10 29 | 566 | 0.2- 0.1+   | 1997 11 08 | 910 | 0.2+ 0.6+ |
| 1990 09 17 | 675 | 1.1- 0.3-   | 1997 10 29 | 566 | 0.1- 0.0    | 1997 11 08 | 910 | 0.3+ 0.5+ |
| 1990 09 18 | 675 | 0.5+ 0.7+   | 1997 10 29 | 566 | 0.4- 0.2+   | 1997 12 29 | 566 | 0.5- 0.4- |
| 1990 09 18 | 675 | 1.7+ 0.7+   | 1997 10 30 | 704 | (3.1+ 2.5+) | 1997 12 29 | 566 | 0.2- 0.6- |
| 1990 09 19 | 675 | 0.0 0.3-    | 1997 10 30 | 704 | 0.4+ 0.0    | 1997 12 29 | 566 | 0.4- 0.6- |
| 1990 09 19 | 675 | 0.8- 0.2-   | 1997 10 30 | 704 | (3.6+ 2.0+) | 1998 02 22 | 327 | 0.0 0.4+  |
| 1997 10 22 | 704 | 1.0- 1.0+   | 1997 10 30 | 704 | 0.6+ 0.8+   | 1998 02 22 | 327 | 0.3- 0.2+ |
| 1997 10 22 | 704 | 1.3- 1.3+   | 1997 10 30 | 704 | (3.0+ 2.2+) | 1998 02 22 | 327 | 0.4- 0.3+ |
| 1997 10 22 | 704 | 1.3- 1.3+   | 1997 10 30 | 704 | 0.3+ 0.9+   | 1998 02 22 | 327 | 0.0 0.0   |
| 1997 10 22 | 704 | (2.4- 2.1+) | 1997 10 30 | 704 | (3.3+ 0.8+) | 1998 02 23 | 327 | 0.2- 0.5+ |
| 1997 10 22 | 704 | (3.3- 0.9+) | 1997 10 30 | 704 | 0.5+ 1.1+   | 1998 02 23 | 327 | 0.1- 0.0  |
| 1997 10 27 | 127 | 1.0- 1.0-   | 1997 10 30 | 704 | (3.5+ 1.0+) | 1998 02 23 | 327 | 0.0 0.1-  |
| 1997 10 27 | 127 | 1.1- 1.1-   | 1997 10 30 | 704 | 0.4+ 0.4+   | 1998 03 01 | 327 | 0.1+ 0.5- |
| 1997 10 27 | 127 | 0.6- 1.1-   | 1997 11 06 | 704 | 1.0+ 0.4-   | 1998 03 01 | 327 | 0.2- 0.1- |
| 1997 10 29 | 704 | 1.2+ 1.8-   | 1997 11 06 | 704 | 1.5+ 0.3+   | 1998 03 01 | 327 | 0.3- 0.1+ |

**1998 DT<sub>10</sub> = 1971 DQ<sub>1</sub> = 1991 NA<sub>6</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 309.20729  |          | (2000.0)  | <b>P</b>    |      |          | <b>Q</b>    |  |  |
|----------|------------|----------|-----------|-------------|------|----------|-------------|--|--|
| <i>n</i> | 0.25521546 | $\omega$ | 307.31361 | −0.89635562 |      |          | +0.44174388 |  |  |
| <i>a</i> | 2.4614899  | $\Omega$ | 258.92940 | −0.39369382 |      |          | −0.83205845 |  |  |
| <i>e</i> | 0.1790860  | <i>i</i> | 2.19196   | −0.20384253 |      |          | −0.33547142 |  |  |
| <i>P</i> | 3.86       | <i>H</i> | 14.0      | <i>G</i>    | 0.15 | <i>U</i> | 4           |  |  |

Residuals in seconds of arc

|            |     |      |      |            |     |       |       |            |     |      |      |
|------------|-----|------|------|------------|-----|-------|-------|------------|-----|------|------|
| 1971 02 18 | 095 | 0.3+ | 0.6+ | 1991 07 16 | 809 | 0.8−  | 1.3+  | 1998 02 27 | 758 | 0.2− | 0.1− |
| 1991 07 10 | 809 | 0.3+ | 0.5+ | 1991 07 16 | 809 | 0.5−  | 1.4+  | 1998 02 27 | 758 | 0.1+ | 0.5− |
| 1991 07 10 | 809 | 0.6+ | 0.4+ | 1998 02 25 | 758 | 0.9+  | 0.8+  | 1998 02 28 | 758 | 0.4+ | 0.1− |
| 1991 07 10 | 809 | 1.0+ | 0.2+ | 1998 02 25 | 758 | 1.0−  | 0.4+  | 1998 02 28 | 758 | 0.1+ | 0.2− |
| 1991 07 11 | 809 | 0.4− | 0.5− | 1998 02 26 | 758 | 0.5−  | 0.1−  | 1998 02 28 | 758 | 0.7+ | 0.2− |
| 1991 07 11 | 809 | 0.0  | 0.6− | 1998 02 26 | 758 | 0.2−  | 0.5−  | 1998 03 01 | 758 | 0.5− | 0.4− |
| 1991 07 11 | 809 | 0.4+ | 0.3− | 1998 02 26 | 758 | 0.5−  | 0.0   | 1998 03 01 | 758 | 1.8− | 0.1+ |
| 1991 07 11 | 809 | 0.9+ | 0.4− | 1998 02 26 | 699 | 0.0   | 0.5+  | 1998 03 01 | 758 | 0.9+ | 0.1− |
| 1991 07 11 | 809 | 1.3+ | 0.2− | 1998 02 26 | 699 | 0.3+  | 0.2−  | 1998 03 02 | 758 | 1.0+ | 0.2− |
| 1991 07 11 | 809 | 1.5+ | 0.3− | 1998 02 26 | 699 | 0.0   | 0.4+  | 1998 03 02 | 758 | 1.3+ | 0.6− |
| 1991 07 12 | 809 | 0.8− | 0.4− | 1998 02 26 | 566 | 0.3+  | 0.3+  | 1998 03 02 | 758 | 0.5− | 0.6− |
| 1991 07 12 | 809 | 0.6− | 0.4− | 1998 02 26 | 566 | (0.9− | 2.3−) | 1998 03 03 | 758 | 0.3− | 0.7+ |
| 1991 07 12 | 809 | 0.5− | 0.4− | 1998 02 26 | 566 | 0.4+  | 0.1+  | 1998 03 03 | 758 | 0.2− | 0.5+ |
| 1991 07 15 | 809 | 0.9− | 0.5− | 1998 02 26 | 566 | (0.6− | 2.4−) | 1998 03 04 | 758 | 0.5− | 0.4− |
| 1991 07 15 | 809 | 0.5− | 0.4− | 1998 02 26 | 566 | 0.5+  | 0.3+  | 1998 03 04 | 758 | 0.1+ | 0.7− |
| 1991 07 15 | 809 | 0.3− | 0.2− | 1998 02 26 | 566 | (1.0− | 2.7−) | 1998 03 05 | 758 | 0.7− | 0.5+ |
| 1991 07 16 | 809 | 1.0− | 1.1+ | 1998 02 27 | 758 | 0.1+  | 0.2+  | 1998 03 05 | 758 | 0.2− | 0.2− |

**1998 DJ<sub>14</sub> = 1994 CZ<sub>16</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

|          |            |          |           |             |             |          |          |  |  |
|----------|------------|----------|-----------|-------------|-------------|----------|----------|--|--|
| <i>M</i> | 71.65363   |          | (2000.0)  | <b>P</b>    |             |          | <b>Q</b> |  |  |
| <i>n</i> | 0.22918774 | $\omega$ | 259.29925 | +0.77046023 | −0.61599254 |          |          |  |  |
| <i>a</i> | 2.6444892  | $\Omega$ | 138.44673 | +0.63738772 | +0.73979523 |          |          |  |  |
| <i>e</i> | 0.1036785  | <i>i</i> | 14.32751  | +0.01131074 | +0.27065884 |          |          |  |  |
| <i>P</i> | 4.30       | <i>H</i> | 14.0      | <i>G</i>    | 0.15        | <i>U</i> | 5        |  |  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1994 02 08 | 809 | 0.6+ | 0.9+ | 1998 01 29 | 566 | 0.9− | 0.1− | 1998 02 25 | 595 | 0.7+ | 0.6+ |
| 1994 02 08 | 809 | 0.1− | 0.6+ | 1998 01 29 | 566 | 0.4− | 0.1+ | 1998 02 25 | 595 | 0.0  | 0.0  |
| 1994 02 08 | 809 | 1.0− | 0.3+ | 1998 01 29 | 566 | 0.4− | 0.5+ | 1998 02 25 | 595 | 0.3+ | 0.2− |
| 1994 02 10 | 809 | 0.2− | 0.1− | 1998 02 05 | 327 | 0.4+ | 0.1− | 1998 02 26 | 595 | 0.1− | 0.6+ |
| 1994 02 10 | 809 | 0.6+ | 0.6− | 1998 02 05 | 327 | 0.2+ | 0.2− | 1998 02 26 | 595 | 0.2+ | 0.4+ |
| 1994 02 10 | 809 | 0.1+ | 0.3− | 1998 02 05 | 327 | 0.2+ | 0.4− | 1998 03 02 | 910 | 0.2+ | 0.1− |
| 1994 02 13 | 809 | 0.4+ | 0.1− | 1998 02 23 | 595 | 0.0  | 0.5− | 1998 03 02 | 910 | 0.2+ | 0.1+ |
| 1994 02 13 | 809 | 0.5+ | 0.7− | 1998 02 23 | 595 | 0.2− | 0.3− | 1998 03 02 | 910 | 0.1− | 0.0  |
| 1994 02 13 | 809 | 0.8− | 0.0  | 1998 02 23 | 595 | 0.3− | 0.5− |            |     |      |      |

**1998 DC<sub>24</sub> = 1983 RR<sub>9</sub> = 1994 GV<sub>8</sub> = 1996 RT<sub>23</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Nakano

|     |            |          |           |             |             |          |   |  |  |
|-----|------------|----------|-----------|-------------|-------------|----------|---|--|--|
| $M$ | 26.39389   |          | (2000.0)  | <b>P</b>    |             | <b>Q</b> |   |  |  |
| $n$ | 0.22510960 | $\omega$ | 268.04771 | -0.01432118 | -0.99982812 |          |   |  |  |
| $a$ | 2.6763323  | $\Omega$ | 182.85374 | +0.98540712 | -0.01211521 |          |   |  |  |
| $e$ | 0.2437244  | $i$      | 13.67977  | +0.16961045 | -0.01403396 |          |   |  |  |
| $P$ | 4.38       | $H$      | 12.6      | $G$         | 0.15        | $U$      | 2 |  |  |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1983 09 13 | 095 | 0.5+ | 2.5- | 1996 09 05 | 693 | 0.6- | 0.3+ | 1998 03 01 | 905 | 0.3- | 0.4- |
| 1994 04 11 | 675 | 1.3- | 1.9- | 1996 09 05 | 693 | 0.0  | 0.0  | 1998 03 01 | 905 | 0.9- | 0.9+ |
| 1994 04 11 | 675 | 0.3+ | 1.4+ | 1996 09 06 | 693 | 0.5+ | 0.0  | 1998 03 03 | 385 | 0.1+ | 0.2- |
| 1994 04 13 | 675 | 0.8+ | 0.3- | 1998 02 17 | 905 | 0.2+ | 1.0- | 1998 03 03 | 385 | 0.6+ | 0.0  |
| 1994 04 13 | 675 | 0.1- | 0.6- | 1998 02 17 | 905 | 0.2+ | 0.4- |            |     |      |      |

**1998 DW<sub>25</sub> = 1996 VH<sub>13</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|                             |            |          |           |            |          |             |      |             |     |      |      |
|-----------------------------|------------|----------|-----------|------------|----------|-------------|------|-------------|-----|------|------|
| <i>M</i>                    | 278.82284  |          | (2000.0)  |            |          | <b>P</b>    |      | <b>Q</b>    |     |      |      |
| <i>n</i>                    | 0.26903807 | $\omega$ | 185.49316 |            |          | −0.56823763 |      | +0.82244985 |     |      |      |
| <i>a</i>                    | 2.3764402  | $\Omega$ | 49.88239  |            |          | −0.75365687 |      | −0.50744119 |     |      |      |
| <i>e</i>                    | 0.1459304  | <i>i</i> | 1.95738   |            |          | −0.33031397 |      | −0.25705970 |     |      |      |
| <i>P</i>                    | 3.66       | <i>H</i> | 17.5      |            | <i>G</i> | 0.15        |      | <i>U</i>    | 6   |      |      |
| Residuals in seconds of arc |            |          |           |            |          |             |      |             |     |      |      |
| 1996 11 05                  | 691        | 0.1+     | 0.3+      | 1996 11 10 | 691      | 0.3−        | 0.3+ | 1998 03 02  | 691 | 0.6− | 0.0  |
| 1996 11 05                  | 691        | 0.1+     | 0.1−      | 1998 02 23 | 691      | 0.1+        | 0.1− | 1998 03 02  | 691 | 0.4− | 0.1− |
| 1996 11 05                  | 691        | 0.2−     | 0.1−      | 1998 02 23 | 691      | 0.0         | 0.1− | 1998 03 04  | 691 | 0.5+ | 0.2+ |
| 1996 11 10                  | 691        | 0.1−     | 0.3−      | 1998 02 23 | 691      | 0.2+        | 0.1− | 1998 03 04  | 691 | 0.5+ | 0.0  |
| 1996 11 10                  | 691        | 0.4+     | 0.1−      | 1998 03 02 | 691      | 0.6−        | 0.0  | 1998 03 04  | 691 | 0.3+ | 0.2+ |

**1998 EF = 1991 JD<sub>2</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|                             |            |          |           |            |          |             |      |             |     |      |      |
|-----------------------------|------------|----------|-----------|------------|----------|-------------|------|-------------|-----|------|------|
| <i>M</i>                    | 309.04156  |          | (2000.0)  |            |          | <b>P</b>    |      | <b>Q</b>    |     |      |      |
| <i>n</i>                    | 0.26862463 | $\omega$ | 81.77398  |            |          | −0.87541356 |      | +0.46189212 |     |      |      |
| <i>a</i>                    | 2.3788779  | $\Omega$ | 125.61901 |            |          | −0.48294890 |      | −0.82339938 |     |      |      |
| <i>e</i>                    | 0.0512300  | <i>i</i> | 10.09605  |            |          | −0.02028456 |      | −0.32965001 |     |      |      |
| <i>P</i>                    | 3.67       | <i>H</i> | 14.6      |            | <i>G</i> | 0.15        |      | <i>U</i>    | 5   |      |      |
| Residuals in seconds of arc |            |          |           |            |          |             |      |             |     |      |      |
| 1991 05 08                  | 413        | 0.2−     | 1.3+      | 1998 03 01 | 411      | 0.4−        | 0.0  | 1998 03 07  | 411 | 0.1− | 0.4+ |
| 1991 05 08                  | 413        | 1.4+     | 0.2−      | 1998 03 01 | 411      | 0.3+        | 0.1− | 1998 03 07  | 411 | 1.1− | 0.1− |
| 1991 05 18                  | 413        | 1.6−     | 0.3−      | 1998 03 02 | 411      | 0.7+        | 0.1− |             |     |      |      |
| 1991 05 18                  | 413        | 0.4+     | 0.7−      | 1998 03 02 | 411      | 0.7+        | 0.2− |             |     |      |      |

**1998 ED<sub>6</sub> = 1992 CS<sub>3</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|                             |            |          |           |            |             |          |             |            |     |      |      |
|-----------------------------|------------|----------|-----------|------------|-------------|----------|-------------|------------|-----|------|------|
| <i>M</i>                    | 146.78088  |          | (2000.0)  |            | <b>P</b>    |          | <b>Q</b>    |            |     |      |      |
| <i>n</i>                    | 0.17975502 | $\omega$ | 53.36525  |            | +0.95424563 |          | +0.20987782 |            |     |      |      |
| <i>a</i>                    | 3.1094390  | $\Omega$ | 293.64020 |            | −0.28860974 |          | +0.83278321 |            |     |      |      |
| <i>e</i>                    | 0.2029065  | <i>i</i> | 13.44465  |            | +0.07822855 |          | +0.51227281 |            |     |      |      |
| <i>P</i>                    | 5.48       | <i>H</i> | 11.5      | <i>G</i>   | 0.15        | <i>U</i> | 6           |            |     |      |      |
| Residuals in seconds of arc |            |          |           |            |             |          |             |            |     |      |      |
| 1992 02 07                  | 809        | 0.2+     | 0.6+      | 1992 02 12 | 809         | 0.2−     | 0.1+        | 1998 03 03 | 905 | 0.1+ | 2.1+ |
| 1992 02 07                  | 809        | 0.3+     | 0.0       | 1992 02 12 | 809         | 0.7−     | 0.0         | 1998 03 03 | 905 | 0.1− | 1.0− |
| 1992 02 07                  | 809        | 0.3−     | 0.8−      | 1998 03 02 | 905         | 0.1−     | 0.3−        | 1998 03 06 | 385 | 0.3+ | 0.9− |
| 1992 02 12                  | 809        | 0.7+     | 0.1+      | 1998 03 02 | 905         | 0.1−     | 0.1+        |            |     |      |      |

**1998 EE<sub>6</sub> = 1996 TB<sub>58</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|                             |            |          |           |            |          |             |      |             |     |           |
|-----------------------------|------------|----------|-----------|------------|----------|-------------|------|-------------|-----|-----------|
| <i>M</i>                    | 30.42743   |          | (2000.0)  |            |          | <b>P</b>    |      | <b>Q</b>    |     |           |
| <i>n</i>                    | 0.21897468 | $\omega$ | 208.52010 |            |          | +0.02904885 |      | −0.99617543 |     |           |
| <i>a</i>                    | 2.7260895  | $\Omega$ | 239.92292 |            |          | +0.93423179 |      | +0.05637579 |     |           |
| <i>e</i>                    | 0.1940330  | <i>i</i> | 5.46443   |            |          | +0.35548155 |      | −0.06675536 |     |           |
| <i>P</i>                    | 4.50       | <i>H</i> | 14.1      |            | <i>G</i> | 0.15        |      | <i>U</i>    | 6   |           |
| Residuals in seconds of arc |            |          |           |            |          |             |      |             |     |           |
| 1996 10 02                  | 809        | 0.6+     | 0.6+      | 1996 10 03 | 809      | 0.1−        | 0.4− | 1998 03 03  | 905 | 0.2− 0.3+ |
| 1996 10 02                  | 809        | 0.1+     | 0.2−      | 1996 10 03 | 809      | 0.3−        | 0.3+ | 1998 03 03  | 905 | 0.7− 0.5− |
| 1996 10 02                  | 809        | 0.3−     | 0.3+      | 1998 03 02 | 905      | 0.0         | 0.7+ | 1998 03 06  | 385 | 0.4+ 0.1+ |
| 1996 10 03                  | 809        | 0.0      | 0.7−      | 1998 03 02 | 905      | 0.6+        | 0.5− |             |     |           |

**2727 P-L = 1998 DS<sub>13</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|                             |            |          |           |            |     |             |      |             |     |      |      |
|-----------------------------|------------|----------|-----------|------------|-----|-------------|------|-------------|-----|------|------|
| $M$                         | 314.05481  |          | (2000.0)  |            |     | <b>P</b>    |      | <b>Q</b>    |     |      |      |
| $n$                         | 0.27657875 | $\omega$ | 189.18048 |            |     | −0.86346256 |      | +0.50345731 |     |      |      |
| $a$                         | 2.3330471  | $\Omega$ | 21.13615  |            |     | −0.45715621 |      | −0.75508396 |     |      |      |
| $e$                         | 0.1459979  | $i$      | 4.93737   |            |     | −0.21316800 |      | −0.41997493 |     |      |      |
| $P$                         | 3.56       | $H$      | 15.0      |            |     | $G$         | 0.15 | $U$         | 6   |      |      |
| Residuals in seconds of arc |            |          |           |            |     |             |      |             |     |      |      |
| 1960 09 24                  | 675        | 0.4+     | 1.3−      | 1960 10 22 | 675 | 0.8−        | 0.0  | 1998 02 28  | 122 | 0.4+ | 0.1− |
| 1960 09 26                  | 675        | 0.5−     | 0.1−      | 1960 10 26 | 675 | 0.6−        | 1.1− | 1998 02 28  | 122 | 0.1− | 0.1+ |
| 1960 09 28                  | 675        | 0.5+     | 0.3+      | 1998 02 27 | 122 | 0.1−        | 0.1+ | 1998 02 28  | 122 | 0.1− | 0.1− |
| 1960 09 29                  | 675        | 0.6+     | 1.6+      | 1998 02 27 | 122 | 0.1−        | 0.0  | 1998 02 28  | 122 | 0.1+ | 0.2+ |
| 1960 10 17                  | 675        | 0.2+     | 0.6+      | 1998 02 28 | 122 | 0.1−        | 0.2− |             |     |      |      |

**4044 P-L = 1998 BZ<sub>43</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|                             |            |          |           |            |             |      |             |            |     |       |       |
|-----------------------------|------------|----------|-----------|------------|-------------|------|-------------|------------|-----|-------|-------|
| <i>M</i>                    | 71.29198   |          | (2000.0)  |            | <b>P</b>    |      | <b>Q</b>    |            |     |       |       |
| <i>n</i>                    | 0.19235931 | $\omega$ | 37.68180  |            | +0.79705157 |      | −0.60390933 |            |     |       |       |
| <i>a</i>                    | 2.9720806  | $\Omega$ | 359.46158 |            | +0.50732323 |      | +0.67093516 |            |     |       |       |
| <i>e</i>                    | 0.0741960  | <i>i</i> | 9.29955   |            | +0.32761553 |      | +0.43027843 |            |     |       |       |
| <i>P</i>                    | 5.12       | <i>H</i> | 13.5      |            | <i>G</i>    | 0.15 | <i>U</i>    | 5          |     |       |       |
| Residuals in seconds of arc |            |          |           |            |             |      |             |            |     |       |       |
| 1960 09 24                  | 675        | 0.1−     | 0.4−      | 1960 10 22 | 675         | 0.7− | 0.5−        | 1998 01 25 | 098 | 1.4+  | 0.4+  |
| 1960 09 25                  | 675        | 0.1+     | 0.0       | 1960 10 24 | 675         | 0.2+ | 0.5+        | 1998 01 25 | 098 | (4.5− | 1.0−) |
| 1960 09 26                  | 675        | 0.5+     | 0.5+      | 1960 10 26 | 675         | 0.8− | 1.3−        | 1998 01 26 | 098 | 0.9−  | 0.5+  |
| 1960 09 28                  | 675        | 0.1+     | 0.4−      | 1997 12 29 | 566         | 0.1− | 0.2−        | 1998 01 26 | 098 | 0.4−  | 0.4−  |
| 1960 10 17                  | 675        | 0.6−     | 0.7+      | 1997 12 29 | 566         | 0.1+ | 0.3−        |            |     |       |       |
| 1960 10 17                  | 675        | 1.2+     | 1.0+      | 1997 12 29 | 566         | 0.1− | 0.1+        |            |     |       |       |

**9056 P-L = 1998 DO<sub>25</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|                             |            |          |           |            |     |             |      |             |     |      |      |
|-----------------------------|------------|----------|-----------|------------|-----|-------------|------|-------------|-----|------|------|
| $M$                         | 189.70254  |          | (2000.0)  |            |     | <b>P</b>    |      | <b>Q</b>    |     |      |      |
| $n$                         | 0.30253860 | $\omega$ | 320.24112 |            |     | +0.68723380 |      | +0.72633369 |     |      |      |
| $a$                         | 2.1976011  | $\Omega$ | 353.13887 |            |     | −0.63778823 |      | +0.59523847 |     |      |      |
| $e$                         | 0.1543531  | $i$      | 5.86602   |            |     | −0.34775835 |      | +0.34370123 |     |      |      |
| $P$                         | 3.26       | $H$      | 16.5      |            |     | $G$         | 0.15 | $U$         | 5   |      |      |
| Residuals in seconds of arc |            |          |           |            |     |             |      |             |     |      |      |
| 1960 10 17                  | 675        | 0.2+     | 0.5+      | 1998 02 23 | 691 | 0.1−        | 0.0  | 1998 03 02  | 691 | 0.1+ | 0.0  |
| 1960 10 22                  | 675        | 0.4−     | 1.1−      | 1998 02 23 | 691 | 0.0         | 0.0  | 1998 03 02  | 691 | 0.0  | 0.1+ |
| 1960 10 24                  | 675        | 0.1+     | 0.6+      | 1998 02 23 | 691 | 0.1−        | 0.1− |             |     |      |      |
| 1960 10 26                  | 675        | 0.2+     | 0.0       | 1998 03 02 | 691 | 0.2+        | 0.0  |             |     |      |      |

**1277 T-2 = 1997 AN<sub>18</sub>**Id. B. G. Marsden (*MPC* 28880)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

|                             |            |          |           |            |             |      |             |            |     |      |      |
|-----------------------------|------------|----------|-----------|------------|-------------|------|-------------|------------|-----|------|------|
| <i>M</i>                    | 137.98387  |          | (2000.0)  |            | <b>P</b>    |      | <b>Q</b>    |            |     |      |      |
| <i>n</i>                    | 0.17855648 | $\omega$ | 204.01308 |            | +0.99371156 |      | −0.11166451 |            |     |      |      |
| <i>a</i>                    | 3.1233379  | $\Omega$ | 162.39224 |            | +0.10664720 |      | +0.92138821 |            |     |      |      |
| <i>e</i>                    | 0.1942702  | <i>i</i> | 1.56634   |            | +0.03411318 |      | +0.37225636 |            |     |      |      |
| <i>P</i>                    | 5.52       | <i>H</i> | 14.0      |            | <i>G</i>    | 0.15 | <i>U</i>    | 4          |     |      |      |
| Residuals in seconds of arc |            |          |           |            |             |      |             |            |     |      |      |
| 1973 09 19                  | 675        | 0.9+     | 0.3−      | 1973 10 04 | 675         | 0.6− | 0.4+        | 1995 09 23 | 809 | 0.2+ | 0.4+ |
| 1973 09 19                  | 675        | 0.0      | 1.6+      | 1973 10 05 | 675         | 0.9+ | 0.8−        | 1995 09 24 | 809 | 0.6− | 0.0  |
| 1973 09 19                  | 675        | 0.3−     | 0.0       | 1973 10 05 | 675         | 0.9+ | 1.2−        | 1997 01 15 | 046 | 0.2− | 0.1+ |
| 1973 09 19                  | 675        | (1.2−    | 3.5+)     | 1995 08 24 | 809         | 0.6+ | 1.0+        | 1997 01 15 | 046 | 0.3− | 0.5+ |
| 1973 09 20                  | 675        | 0.1−     | 0.5−      | 1995 08 25 | 809         | 0.3+ | 1.0+        | 1997 01 16 | 046 | 0.5− | 0.3+ |
| 1973 09 24                  | 675        | 0.2+     | 0.7−      | 1995 08 25 | 809         | 0.1− | 0.2+        | 1997 01 16 | 046 | 0.6− | 0.3+ |
| 1973 09 24                  | 675        | 0.4−     | 1.0+      | 1995 08 26 | 809         | 0.6+ | 0.2+        | 1997 01 16 | 046 | 0.1− | 0.5+ |
| 1973 09 24                  | 675        | 0.9−     | 0.9−      | 1995 09 01 | 809         | 0.5− | 0.3+        | 1997 01 16 | 046 | 0.3+ | 0.3+ |
| 1973 09 24                  | 675        | 0.6+     | 0.7+      | 1995 09 18 | 809         | 0.4− | 0.2−        | 1997 01 16 | 046 | 0.4− | 0.1− |

## M.P.C. 31410

|            |     |      |      |            |     |       |       |            |     |      |      |
|------------|-----|------|------|------------|-----|-------|-------|------------|-----|------|------|
| 1973 09 25 | 675 | 1.8− | 0.9+ | 1995 09 19 | 809 | 0.2−  | 0.3−  | 1997 01 16 | 046 | 0.2+ | 0.0  |
| 1973 09 29 | 675 | 1.4+ | 0.7− | 1995 09 19 | 809 | 0.1−  | 0.3−  | 1997 01 17 | 046 | 0.5+ | 0.4+ |
| 1973 09 29 | 675 | 1.5+ | 1.1− | 1995 09 20 | 809 | 0.7−  | 0.6−  | 1997 01 17 | 046 | 0.9+ | 0.4− |
| 1973 09 30 | 675 | 1.4− | 0.3− | 1995 09 20 | 809 | (5.1− | 1.8−) | 1997 01 17 | 046 | 0.2+ | 1.0− |
| 1973 09 30 | 675 | 1.2− | 1.0+ | 1995 09 22 | 809 | (3.1− | 0.8−) |            |     |      |      |
| 1973 10 04 | 675 | 0.7+ | 0.3− | 1995 09 22 | 809 | 0.4+  | 0.0   |            |     |      |      |

**2024 T-2 = 1998 BE<sub>25</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| Williams |            |          |           |
|----------|------------|----------|-----------|
| <i>M</i> | 46.10800   | (2000.0) |           |
| <i>n</i> | 0.21432669 | <i>ω</i> | 77.38135  |
| <i>a</i> | 2.7653613  | <i>Ω</i> | 353.77300 |
| <i>e</i> | 0.1461230  | <i>i</i> | 8.61253   |
| <i>P</i> | 4.60       | <i>H</i> | 13.5      |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1973 09 19 | 675 | 0.9− | 0.7+ | 1973 09 30 | 675 | 0.7+ | 0.1+ | 1998 02 22 | 566 | 0.4− | 0.1− |
| 1973 09 19 | 675 | 0.2− | 0.5+ | 1973 10 04 | 675 | 0.0  | 0.3+ | 1998 02 22 | 566 | 0.4− | 0.5− |
| 1973 09 20 | 675 | 0.4− | 1.5− | 1973 10 04 | 675 | 0.6+ | 0.0  | 1998 02 23 | 566 | 0.4− | 0.3− |
| 1973 09 24 | 675 | 0.2− | 0.2− | 1998 01 28 | 411 | 0.4− | 0.3+ | 1998 02 23 | 566 | 0.5− | 0.4− |
| 1973 09 24 | 675 | 0.8+ | 0.4− | 1998 01 28 | 411 | 0.1+ | 0.1+ | 1998 02 23 | 566 | 0.5− | 0.5− |
| 1973 09 25 | 675 | 1.8− | 0.1− | 1998 01 29 | 411 | 0.1+ | 0.1+ | 1998 02 26 | 699 | 0.4+ | 1.2+ |
| 1973 09 25 | 675 | 2.1− | 0.1+ | 1998 01 29 | 411 | 0.5+ | 0.4− | 1998 02 26 | 699 | 0.5+ | 0.6+ |
| 1973 09 29 | 675 | 1.4+ | 0.6+ | 1998 02 02 | 411 | 0.3+ | 0.2− | 1998 02 26 | 699 | 0.4+ | 0.4+ |
| 1973 09 29 | 675 | 1.2+ | 1.0+ | 1998 02 02 | 411 | 0.5+ | 0.0  |            |     |      |      |
| 1973 09 30 | 675 | 0.9+ | 1.2− | 1998 02 22 | 566 | 0.2− | 0.3− |            |     |      |      |

**2202 T-2 = 1970 EB<sub>3</sub> = 1976 GW<sub>1</sub> = 1995 SS<sub>54</sub> = 1998 CF<sub>3</sub>**

Id. B. G. Marsden

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| Williams |            |          |           |
|----------|------------|----------|-----------|
| <i>M</i> | 10.54528   | (2000.0) |           |
| <i>n</i> | 0.17590222 | <i>ω</i> | 190.83618 |
| <i>a</i> | 3.1546790  | <i>Ω</i> | 295.90889 |
| <i>e</i> | 0.1410008  | <i>i</i> | 0.55214   |
| <i>P</i> | 5.60       | <i>H</i> | 13.5      |

Residuals in seconds of arc

|            |     |       |       |            |     |       |       |            |     |      |      |
|------------|-----|-------|-------|------------|-----|-------|-------|------------|-----|------|------|
| 1970 03 10 | 805 | 0.8+  | 0.5−  | 1973 09 30 | 675 | 0.0   | 1.0+  | 1995 09 28 | 327 | 0.2+ | 0.4+ |
| 1970 03 10 | 805 | 0.2+  | 0.4+  | 1973 09 30 | 675 | 1.0−  | 0.3+  | 1998 02 06 | 809 | 0.6+ | 0.9+ |
| 1970 03 10 | 805 | 0.9−  | 0.2+  | 1973 10 04 | 675 | 1.6+  | 2.0−  | 1998 02 06 | 809 | 0.6+ | 1.0+ |
| 1973 09 19 | 675 | 0.4+  | 2.4+  | 1973 10 04 | 675 | 1.0+  | 1.5−  | 1998 02 06 | 809 | 0.8− | 1.0+ |
| 1973 09 19 | 675 | 0.4+  | 0.8+  | 1973 10 05 | 675 | 0.6+  | 2.0−  | 1998 02 07 | 809 | 0.3+ | 0.1− |
| 1973 09 20 | 675 | 1.1−  | 0.6−  | 1973 10 05 | 675 | 1.6+  | 1.3−  | 1998 02 07 | 809 | 0.8+ | 0.8− |
| 1973 09 24 | 675 | 2.1−  | 1.7+  | 1976 04 01 | 095 | (4.7− | 5.7−) | 1998 02 07 | 809 | 0.0  | 1.0− |
| 1973 09 24 | 675 | (2.8− | 0.0 ) | 1995 09 17 | 327 | 0.4+  | 0.1+  | 1998 02 24 | 566 | 0.7− | 0.2− |
| 1973 09 25 | 675 | 1.7−  | 0.1−  | 1995 09 17 | 327 | 0.1−  | 0.2−  | 1998 02 24 | 566 | 0.3− | 0.3− |
| 1973 09 25 | 675 | 1.2−  | 0.4−  | 1995 09 17 | 327 | 0.7−  | 0.8−  | 1998 02 24 | 566 | 0.2− | 0.0  |
| 1973 09 29 | 675 | 1.6+  | 1.9+  | 1995 09 28 | 327 | 0.0   | 0.5+  |            |     |      |      |
| 1973 09 29 | 675 | (0.0  | 3.1+) | 1995 09 28 | 327 | 0.0   | 0.5+  |            |     |      |      |

**3237 T-2 = 1996 VP<sub>3</sub>**

Id. A. Gnädig

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| Williams |            |          |          |
|----------|------------|----------|----------|
| <i>M</i> | 32.95705   | (2000.0) |          |
| <i>n</i> | 0.17689460 | <i>ω</i> | 92.77231 |
| <i>a</i> | 3.1428693  | <i>Ω</i> | 21.86801 |
| <i>e</i> | 0.2019439  | <i>i</i> | 9.85728  |
| <i>P</i> | 5.57       | <i>H</i> | 14.5     |

Residuals in seconds of arc

|            |     |       |       |            |     |       |       |            |     |      |      |
|------------|-----|-------|-------|------------|-----|-------|-------|------------|-----|------|------|
| 1973 09 19 | 675 | (0.2+ | 3.5+) | 1973 09 25 | 675 | 1.8+  | 2.2+  | 1996 11 01 | 327 | 0.0  | 0.1− |
| 1973 09 19 | 675 | 1.2+  | 1.8+  | 1973 09 29 | 675 | 0.8−  | 0.7+  | 1996 11 09 | 327 | 0.4+ | 0.3+ |
| 1973 09 19 | 675 | 0.4+  | 0.5+  | 1973 09 29 | 675 | 0.3−  | 1.6−  | 1996 11 09 | 327 | 0.2− | 0.0  |
| 1973 09 20 | 675 | 1.2+  | 0.5+  | 1973 09 30 | 675 | 2.2−  | 2.1−  | 1996 11 09 | 327 | 0.0  | 0.2+ |
| 1973 09 20 | 675 | 0.3+  | 0.1+  | 1973 09 30 | 675 | (2.5− | 2.7−) | 1996 11 18 | 327 | 0.2− | 0.4− |

## 1998 MAR. 13

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1973 09 24 | 675 | 1.1− | 1.4+ | 1973 10 04 | 675 | 0.9+ | 0.9+ | 1996 11 18 | 327 | 0.1− | 0.2+ |
| 1973 09 24 | 675 | 2.0+ | 0.2− | 1973 10 04 | 675 | 0.1− | 0.7− | 1996 11 18 | 327 | 0.1+ | 0.2− |
| 1973 09 24 | 675 | 2.1− | 0.3+ | 1973 10 05 | 675 | 0.4+ | 0.3+ | 1996 11 28 | 327 | 0.2− | 0.4− |
| 1973 09 24 | 675 | 1.1+ | 0.3+ | 1973 10 05 | 675 | 1.3− | 0.7− | 1996 11 28 | 327 | 0.4+ | 0.0  |
| 1973 09 25 | 675 | 1.3− | 1.7− | 1996 11 01 | 327 | 0.1− | 0.3− | 1996 11 28 | 327 | 0.0  | 0.0  |
| 1973 09 25 | 675 | 1.7+ | 0.4− | 1996 11 01 | 327 | 0.7+ | 0.2+ |            |     |      |      |
| 1973 09 25 | 675 | 1.7− | 1.5− | 1996 11 01 | 327 | 0.9− | 0.5+ |            |     |      |      |

**4188 T-2 = 1989 EB<sub>11</sub> = 1998 DW<sub>21</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| Williams |            |          |           |
|----------|------------|----------|-----------|
| <i>M</i> | 40.12594   | (2000.0) |           |
| <i>n</i> | 0.21796053 | <i>ω</i> | 333.76828 |
| <i>a</i> | 2.7345391  | <i>Ω</i> | 125.03681 |
| <i>e</i> | 0.0313576  | <i>i</i> | 3.15212   |
| <i>P</i> | 4.52       | <i>H</i> | 15.0      |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1973 09 19 | 675 | 0.4+ | 1.0− | 1973 09 29 | 675 | 0.2+ | 0.3− | 1989 03 05 | 033 | 0.1− | 0.4+ |
| 1973 09 19 | 675 | 1.4+ | 0.4+ | 1973 09 30 | 675 | 0.9+ | 0.3− | 1998 02 22 | 691 | 0.5+ | 0.1+ |
| 1973 09 20 | 675 | 2.0− | 0.3+ | 1973 09 30 | 675 | 0.6− | 0.0  | 1998 02 22 | 691 | 0.2+ | 0.1+ |
| 1973 09 24 | 675 | 1.2+ | 0.3+ | 1973 10 04 | 675 | 0.3− | 0.4+ | 1998 02 22 | 691 | 0.1+ | 0.1+ |
| 1973 09 24 | 675 | 0.3− | 0.9− | 1973 10 04 | 675 | 0.4+ | 1.0− | 1998 03 01 | 691 | 0.4− | 0.3− |
| 1973 09 25 | 675 | 0.8− | 0.1+ | 1973 10 05 | 675 | 0.9− | 1.3+ | 1998 03 01 | 691 | 0.2− | 0.3− |
| 1973 09 25 | 675 | 0.2+ | 1.1− | 1973 10 05 | 675 | 0.5+ | 1.0+ | 1998 03 01 | 691 | 0.3− | 0.2− |
| 1973 09 29 | 675 | 0.2− | 0.6+ | 1989 03 05 | 033 | 0.2+ | 0.0  |            |     |      |      |

**4223 T-2 = 1998 EV<sub>6</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| Williams |            |          |           |
|----------|------------|----------|-----------|
| <i>M</i> | 326.42450  | (2000.0) |           |
| <i>n</i> | 0.26030174 | <i>ω</i> | 13.10731  |
| <i>a</i> | 2.4293197  | <i>Ω</i> | 171.85386 |
| <i>e</i> | 0.1256807  | <i>i</i> | 11.31988  |
| <i>P</i> | 3.79       | <i>H</i> | 16.0      |

Residuals in seconds of arc

|            |     |      |      |            |     |      |      |            |     |      |      |
|------------|-----|------|------|------------|-----|------|------|------------|-----|------|------|
| 1973 09 24 | 675 | 0.8− | 1.1− | 1973 10 04 | 675 | 0.4+ | 0.1− | 1998 03 02 | 910 | 0.1− | 0.3+ |
| 1973 09 24 | 675 | 0.3+ | 1.0+ | 1973 10 04 | 675 | 1.0+ | 0.0  | 1998 03 05 | 910 | 0.1+ | 0.2− |
| 1973 09 29 | 675 | 2.1− | 1.4− | 1973 10 05 | 675 | 1.2+ | 1.2+ | 1998 03 06 | 910 | 0.0  | 0.2− |
| 1973 09 29 | 675 | 0.6− | 0.1+ | 1973 10 05 | 675 | 1.6− | 0.3− | 1998 03 06 | 910 | 0.1+ | 0.4− |
| 1973 09 30 | 675 | 2.6+ | 2.1+ | 1998 03 02 | 910 | 0.3− | 0.2+ |            |     |      |      |
| 1973 09 30 | 675 | 0.5− | 1.6− | 1998 03 02 | 910 | 0.0  | 0.3+ |            |     |      |      |

**5185 T-2 = 1998 AP<sub>6</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| Williams |            |          |           |
|----------|------------|----------|-----------|
| <i>M</i> | 252.31876  | (2000.0) |           |
| <i>n</i> | 0.21678292 | <i>ω</i> | 266.79695 |
| <i>a</i> | 2.7444332  | <i>Ω</i> | 323.13853 |
| <i>e</i> | 0.0579364  | <i>i</i> | 8.18247   |
| <i>P</i> | 4.55       | <i>H</i> | 13.5      |

Residuals in seconds of arc

|            |     |       |       |            |     |      |      |            |     |      |      |
|------------|-----|-------|-------|------------|-----|------|------|------------|-----|------|------|
| 1973 09 24 | 675 | (3.1+ | 0.3+) | 1997 12 29 | 566 | 0.3− | 0.2+ | 1998 01 25 | 566 | 0.1− | 1.4− |
| 1973 09 24 | 675 | 1.5+  | 0.2−  | 1997 12 29 | 566 | 0.1+ | 0.5+ | 1998 01 25 | 566 | 0.1+ | 1.6− |
| 1973 09 25 | 675 | 1.1+  | 0.1+  | 1997 12 29 | 566 | 0.1− | 0.1+ | 1998 01 25 | 566 | 0.2+ | 1.1− |
| 1973 09 25 | 675 | 0.9+  | 0.9+  | 1998 01 04 | 327 | 0.7+ | 0.2− | 1998 02 01 | 327 | 0.2+ | 0.1+ |
| 1973 09 29 | 675 | 0.7+  | 0.7+  | 1998 01 04 | 327 | 0.3+ | 0.1+ | 1998 02 01 | 327 | 0.4+ | 0.2+ |
| 1973 09 29 | 675 | 0.7+  | 0.0   | 1998 01 04 | 327 | 0.3+ | 0.3+ | 1998 02 01 | 327 | 0.7− | 0.5+ |
| 1973 09 30 | 675 | 0.7−  | 0.7−  | 1998 01 04 | 327 | 1.1+ | 0.0  | 1998 02 13 | 327 | 0.2− | 0.4+ |
| 1973 09 30 | 675 | 0.2+  | 1.8−  | 1998 01 07 | 327 | 0.4+ | 0.1− | 1998 02 13 | 327 | 0.8− | 0.3− |
| 1973 10 04 | 675 | 0.2−  | 0.2+  | 1998 01 07 | 327 | 0.2+ | 0.2− | 1998 02 13 | 327 | 0.8− | 0.5+ |
| 1973 10 04 | 675 | 2.1−  | 1.1+  | 1998 01 07 | 327 | 1.3− | 0.1+ | 1998 03 01 | 327 | 0.3+ | 0.2+ |
| 1973 10 05 | 675 | 1.2−  | 0.1+  | 1998 01 08 | 688 | 0.1+ | 0.7+ | 1998 03 01 | 327 | 0.1+ | 0.3+ |
| 1973 10 05 | 675 | 0.8−  | 0.5−  | 1998 01 08 | 688 | 0.3− | 0.4+ | 1998 03 01 | 327 | 0.2+ | 0.0  |

**1084 T-3 = 1997 LH<sub>6</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i>                    | 333.08138  |          | (2000.0)  | <b>P</b>    |             |          | <b>Q</b> |            |               |
|-----------------------------|------------|----------|-----------|-------------|-------------|----------|----------|------------|---------------|
| <i>n</i>                    | 0.19088814 | $\omega$ | 125.60820 | +0.96082701 | −0.24166050 |          |          |            |               |
| <i>a</i>                    | 2.9873315  | $\Omega$ | 248.71809 | +0.18281751 | +0.92060954 |          |          |            |               |
| <i>e</i>                    | 0.0998737  | <i>i</i> | 8.37318   | +0.20830078 | +0.30672181 |          |          |            |               |
| <i>P</i>                    | 5.16       | <i>H</i> | 13.9      | <i>G</i>    | 0.15        | <i>U</i> |          |            |               |
| Residuals in seconds of arc |            |          |           |             |             |          |          |            |               |
| 1977 10 07                  | 675        | 1.7+     | 1.6−      | 1977 10 16  | 675         | 0.0      | 1.1+     | 1997 06 05 | 691 0.6+ 0.7− |
| 1977 10 11                  | 675        | 0.8+     | 1.1+      | 1977 10 17  | 675         | 0.2+     | 1.0+     | 1997 06 05 | 691 0.3+ 0.6− |
| 1977 10 11                  | 675        | 0.7−     | 1.3+      | 1977 10 17  | 675         | 0.2−     | 1.0+     | 1997 06 15 | 691 0.3− 0.3+ |
| 1977 10 12                  | 675        | 1.0+     | 0.7+      | 1977 10 22  | 675         | 0.3−     | 1.1−     | 1997 06 15 | 691 0.3− 0.4+ |
| 1977 10 12                  | 675        | 0.9+     | 0.5−      | 1977 10 22  | 675         | 2.5−     | 2.7−     | 1997 06 15 | 691 0.3− 0.3+ |
| 1977 10 16                  | 675        | 0.8−     | 0.5−      | 1997 06 05  | 691         | 0.2+     | 0.2+     |            |               |

**2029 T-3 = 1995 UV<sub>50</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i>                    | 65.83050   |          | (2000.0)  | <b>P</b>    |             |          | <b>Q</b> |            |               |
|-----------------------------|------------|----------|-----------|-------------|-------------|----------|----------|------------|---------------|
| <i>n</i>                    | 0.21733474 | $\omega$ | 137.08496 | −0.68457836 | −0.72885814 |          |          |            |               |
| <i>a</i>                    | 2.7397858  | $\Omega$ | 356.07102 | +0.61840798 | −0.57281049 |          |          |            |               |
| <i>e</i>                    | 0.1524248  | <i>i</i> | 9.13256   | +0.38590677 | −0.37503860 |          |          |            |               |
| <i>P</i>                    | 4.54       | <i>H</i> | 13.9      | <i>G</i>    | 0.15        | <i>U</i> |          |            |               |
| Residuals in seconds of arc |            |          |           |             |             |          |          |            |               |
| 1977 10 07                  | 675        | 1.5+     | 0.0       | 1977 10 17  | 675         | 0.2+     | 1.5+     | 1995 10 18 | 691 0.6+ 0.3+ |
| 1977 10 11                  | 675        | 0.4+     | 0.1+      | 1977 10 17  | 675         | 1.6−     | 1.5+     | 1995 10 18 | 691 0.5− 0.4− |
| 1977 10 11                  | 675        | 1.6−     | 0.0       | 1977 10 21  | 675         | 1.3+     | 0.3−     | 1995 10 28 | 691 0.8+ 1.0− |
| 1977 10 12                  | 675        | 0.8−     | 0.3−      | 1977 10 21  | 675         | 1.3+     | 0.8−     | 1995 10 28 | 691 0.6− 0.6+ |
| 1977 10 12                  | 675        | 0.1−     | 0.0       | 1977 10 22  | 675         | 0.1−     | 0.1+     | 1995 10 28 | 691 0.4− 0.2+ |
| 1977 10 16                  | 675        | 1.1+     | 1.3−      | 1977 10 22  | 675         | 0.9−     | 0.5+     |            |               |
| 1977 10 16                  | 675        | 0.6−     | 1.0−      | 1995 10 18  | 691         | 0.1+     | 0.3+     |            |               |

**2282 T-3 = 1998 DB<sub>10</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i>                    | 15.97549   |             | (2000.0)  | <b>P</b>    |             |          | <b>Q</b> |            |               |
|-----------------------------|------------|-------------|-----------|-------------|-------------|----------|----------|------------|---------------|
| <i>n</i>                    | 0.25702873 | $\omega$    | 268.41770 | −0.42687981 | −0.90239796 |          |          |            |               |
| <i>a</i>                    | 2.4498995  | $\Omega$    | 207.09325 | +0.87250067 | −0.39391596 |          |          |            |               |
| <i>e</i>                    | 0.1558754  | <i>i</i>    | 7.41156   | +0.23773137 | −0.17466577 |          |          |            |               |
| <i>P</i>                    | 3.83       | <i>H</i>    | 15.0      | <i>G</i>    | 0.15        | <i>U</i> | 6        |            |               |
| Residuals in seconds of arc |            |             |           |             |             |          |          |            |               |
| 1977 10 07                  | 675        | 0.3+        | 0.1−      | 1977 10 16  | 675         | 0.1−     | 0.5−     | 1998 02 22 | 566 0.4− 0.5+ |
| 1977 10 11                  | 675        | 0.6+        | 2.1+      | 1977 10 16  | 675         | 1.0+     | 2.4−     | 1998 02 22 | 566 0.8− 0.4+ |
| 1977 10 11                  | 675        | (0.1− 3.0+) |           | 1977 10 16  | 675         | 0.2−     | 0.9−     | 1998 02 24 | 566 0.0 0.3+  |
| 1977 10 11                  | 675        | 0.2−        | 1.2+      | 1977 10 17  | 675         | 0.6+     | 1.2−     | 1998 02 24 | 566 0.2+ 0.6+ |
| 1977 10 11                  | 675        | 1.2−        | 0.9+      | 1977 10 17  | 675         | 0.5+     | 0.1−     | 1998 02 24 | 566 0.2− 0.3+ |
| 1977 10 12                  | 675        | 0.9−        | 0.2+      | 1977 10 21  | 675         | 0.6−     | 0.7+     | 1998 02 27 | 566 0.9+ 0.8− |
| 1977 10 12                  | 675        | 1.0+        | 0.5+      | 1977 10 21  | 675         | 1.6−     | 0.7+     | 1998 02 27 | 566 0.5+ 1.0− |
| 1977 10 12                  | 675        | 1.0−        | 1.3−      | 1977 10 22  | 675         | 0.2+     | 0.4−     | 1998 02 27 | 566 0.4+ 0.8− |
| 1977 10 12                  | 675        | 0.1+        | 1.2+      | 1977 10 22  | 675         | 0.5−     | 1.2+     |            |               |
| 1977 10 16                  | 675        | 2.1+        | 1.8−      | 1998 02 22  | 566         | 0.5−     | 0.5+     |            |               |

**2293 T-3 = 1997 ET<sub>31</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i>                    | 186.08455  |          | (2000.0) | <b>P</b>    |             |          | <b>Q</b> |            |               |
|-----------------------------|------------|----------|----------|-------------|-------------|----------|----------|------------|---------------|
| <i>n</i>                    | 0.17431062 | $\omega$ | 36.07486 | +0.76206129 | −0.64731629 |          |          |            |               |
| <i>a</i>                    | 3.1738531  | $\Omega$ | 4.36334  | +0.53550666 | +0.61649732 |          |          |            |               |
| <i>e</i>                    | 0.0669376  | <i>i</i> | 11.85312 | +0.36399892 | +0.44823283 |          |          |            |               |
| <i>P</i>                    | 5.65       | <i>H</i> | 14.2     | <i>G</i>    | 0.15        | <i>U</i> |          |            |               |
| Residuals in seconds of arc |            |          |          |             |             |          |          |            |               |
| 1977 10 07                  | 675        | 0.8+     | 0.2+     | 1977 10 17  | 675         | 0.1+     | 0.9−     | 1997 03 10 | 691 0.1− 0.3+ |
| 1977 10 11                  | 675        | 0.5−     | 1.5+     | 1977 10 17  | 675         | 1.0−     | 1.4+     | 1997 03 10 | 691 0.1− 0.1+ |

|            |     |      |      |            |     |      |      |            |               |
|------------|-----|------|------|------------|-----|------|------|------------|---------------|
| 1977 10 11 | 675 | 0.5− | 1.0+ | 1977 10 21 | 675 | 0.7− | 0.2− | 1997 03 15 | 691 0.1+ 0.3− |
| 1977 10 12 | 675 | 0.2+ | 0.1+ | 1977 10 21 | 675 | 0.3− | 0.2+ | 1997 03 15 | 691 0.1+ 0.3− |
| 1977 10 12 | 675 | 0.9− | 1.6− | 1977 10 22 | 675 | 1.4+ | 0.5+ | 1997 03 15 | 691 0.2+ 0.2− |
| 1977 10 16 | 675 | 0.9+ | 1.9− | 1977 10 22 | 675 | 0.2+ | 1.7+ |            |               |
| 1977 10 16 | 675 | 0.1+ | 2.3− | 1997 03 10 | 691 | 0.2− | 0.3+ |            |               |

**2332 T-3 = 1991 FA<sub>6</sub> = 1995 HN<sub>5</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i>                    | 255.26776  |          | (2000.0)  | <b>P</b>    |             |          | <b>Q</b> |            |               |
|-----------------------------|------------|----------|-----------|-------------|-------------|----------|----------|------------|---------------|
| <i>n</i>                    | 0.25528969 | $\omega$ | 349.84541 | −0.89908507 | +0.43407321 |          |          |            |               |
| <i>a</i>                    | 2.4610128  | $\Omega$ | 216.05305 | −0.39457766 | −0.85972015 |          |          |            |               |
| <i>e</i>                    | 0.0815976  | <i>i</i> | 5.53850   | −0.18961671 | −0.26918713 |          |          |            |               |
| <i>P</i>                    | 3.86       | <i>H</i> | 14.2      | <i>G</i>    | 0.15        | <i>U</i> |          |            |               |
| Residuals in seconds of arc |            |          |           |             |             |          |          |            |               |
| 1977 10 07                  | 675        | 0.2+     | 0.3−      | 1977 10 17  | 675         | 1.4−     | 0.4+     | 1991 03 25 | 809 0.1− 0.1+ |
| 1977 10 11                  | 675        | 0.6+     | 0.4−      | 1977 10 21  | 675         | 0.5+     | 0.0      | 1991 03 25 | 809 0.1− 0.2− |
| 1977 10 11                  | 675        | 0.1+     | 0.4+      | 1977 10 21  | 675         | 1.7−     | 1.7+     | 1995 04 21 | 114 2.5− 0.5− |
| 1977 10 12                  | 675        | 0.4−     | 0.1+      | 1977 10 21  | 675         | 0.2+     | 1.7−     | 1995 04 22 | 114 2.1− 0.8+ |
| 1977 10 12                  | 675        | 0.3+     | 0.6−      | 1977 10 22  | 675         | 0.4+     | 1.7+     | 1995 04 22 | 114 0.5+ 0.9+ |
| 1977 10 16                  | 675        | 0.8+     | 0.9−      | 1977 10 22  | 675         | 1.2+     | 0.2−     | 1995 04 23 | 114 1.9+ 0.5− |
| 1977 10 16                  | 675        | 0.4+     | 1.3−      | 1977 10 22  | 675         | 1.9−     | 0.2−     | 1995 04 26 | 114 1.8+ 0.2− |
| 1977 10 17                  | 675        | 0.6−     | 0.8+      | 1977 10 22  | 675         | 1.1+     | 0.2+     | 1995 04 27 | 114 0.5+ 0.1− |
| 1977 10 17                  | 675        | 0.3−     | 1.3+      | 1991 03 25  | 809         | 0.3+     | 0.4+     |            |               |

**3224 T-3 = 1993 TE<sub>15</sub>**Id. G. V. Williams (*MPC* 22967)

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i>                    | 79.17765   |             | (2000.0)  | <b>P</b>    |             |             | <b>Q</b> |            |               |
|-----------------------------|------------|-------------|-----------|-------------|-------------|-------------|----------|------------|---------------|
| <i>n</i>                    | 0.30759024 | $\omega$    | 245.30542 | +0.63827398 | −0.76965896 |             |          |            |               |
| <i>a</i>                    | 2.1734735  | $\Omega$    | 165.00108 | +0.72582713 | +0.59510577 |             |          |            |               |
| <i>e</i>                    | 0.0290871  | <i>i</i>    | 3.36969   | +0.25647867 | +0.23124488 |             |          |            |               |
| <i>P</i>                    | 3.20       | <i>H</i>    | 16.0      | <i>G</i>    | 0.15        | <i>U</i>    | 2        |            |               |
| Residuals in seconds of arc |            |             |           |             |             |             |          |            |               |
| 1977 10 07                  | 675        | 0.3+        | 0.5−      | 1977 10 21  | 675         | (2.7+ 3.9−) |          | 1996 08 15 | 824 0.2+ 0.2− |
| 1977 10 11                  | 675        | 2.1−        | 0.8+      | 1977 10 21  | 675         | 0.6+        | 1.4+     | 1996 08 15 | 824 0.4− 0.0  |
| 1977 10 11                  | 675        | 0.5−        | 0.6+      | 1977 10 22  | 675         | 0.6−        | 2.1−     | 1996 08 15 | 824 0.3− 0.0  |
| 1977 10 12                  | 675        | 0.5−        | 0.2+      | 1977 10 22  | 675         | (3.2+ 1.6−) |          | 1996 08 15 | 824 0.4− 0.3+ |
| 1977 10 12                  | 675        | 1.7−        | 0.2−      | 1977 10 22  | 675         | (2.9+ 3.0−) |          | 1996 08 15 | 816 0.0 0.7+  |
| 1977 10 16                  | 675        | 1.3+        | 2.1−      | 1977 10 22  | 675         | 2.3+        | 1.2−     | 1996 08 15 | 816 0.0 0.6+  |
| 1977 10 16                  | 675        | 0.5−        | 0.5+      | 1993 10 09  | 809         | (0.9− 3.2+) |          | 1996 08 15 | 816 0.0 0.7+  |
| 1977 10 16                  | 675        | 1.0+        | 0.8−      | 1993 10 09  | 809         | (1.2− 2.7+) |          | 1996 08 15 | 816 0.0 0.8+  |
| 1977 10 16                  | 675        | 0.2−        | 0.7+      | 1993 10 09  | 809         | (1.5− 2.9+) |          | 1998 02 06 | 809 1.1+ 0.7+ |
| 1977 10 17                  | 675        | 0.5+        | 0.3−      | 1993 10 11  | 809         | (0.2+ 2.1+) |          | 1998 02 06 | 809 0.3+ 0.5+ |
| 1977 10 17                  | 675        | 0.0         | 0.8+      | 1993 10 11  | 809         | (1.1− 2.7+) |          | 1998 02 06 | 809 0.0 0.2−  |
| 1977 10 17                  | 675        | 0.0         | 0.5−      | 1993 10 11  | 809         | (1.4− 2.3+) |          | 1998 02 07 | 809 0.4+ 0.7+ |
| 1977 10 17                  | 675        | 0.1−        | 0.2−      | 1993 10 20  | 809         | (1.4− 2.4+) |          | 1998 02 07 | 809 0.2+ 0.4+ |
| 1977 10 21                  | 675        | (1.6+ 3.6−) |           | 1993 10 20  | 809         | 0.8− 1.7+   |          | 1998 02 07 | 809 1.2− 0.7+ |
| 1977 10 21                  | 675        | 0.9+        | 0.8+      | 1993 10 20  | 809         | (0.6− 2.1+) |          |            |               |

**4138 T-3 = 1997 HS<sub>16</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

| <i>M</i>                    | 203.58734  |          | (2000.0) | <b>P</b>    |             |          | <b>Q</b> |            |               |
|-----------------------------|------------|----------|----------|-------------|-------------|----------|----------|------------|---------------|
| <i>n</i>                    | 0.17703102 | $\omega$ | 11.09701 | +0.69836534 | −0.69038623 |          |          |            |               |
| <i>a</i>                    | 3.1412546  | $\Omega$ | 35.09629 | +0.62897108 | +0.46605853 |          |          |            |               |
| <i>e</i>                    | 0.1763133  | <i>i</i> | 19.17221 | +0.34158634 | +0.55331392 |          |          |            |               |
| <i>P</i>                    | 5.57       | <i>H</i> | 13.1     | <i>G</i>    | 0.15        | <i>U</i> |          |            |               |
| Residuals in seconds of arc |            |          |          |             |             |          |          |            |               |
| 1977 10 07                  | 675        | 0.6−     | 0.0      | 1977 10 17  | 675         | 0.4+     | 0.7−     | 1997 04 30 | 691 0.2− 0.4− |
| 1977 10 11                  | 675        | 0.1+     | 0.9−     | 1977 10 17  | 675         | 0.1+     | 0.6−     | 1997 04 30 | 691 0.2− 0.4− |
| 1977 10 11                  | 675        | 0.5−     | 0.2−     | 1977 10 21  | 675         | 0.8+     | 0.1−     | 1997 05 08 | 691 0.2+ 0.1+ |
| 1977 10 12                  | 675        | 0.9−     | 0.4−     | 1977 10 21  | 675         | 0.8+     | 0.1+     | 1997 05 08 | 691 0.2+ 0.4+ |
| 1977 10 12                  | 675        | 0.1+     | 0.7−     | 1977 10 22  | 675         | 0.3+     | 0.9+     | 1997 05 08 | 691 0.2+ 0.4+ |

1977 10 16 675 0.6– 1.8+ 1977 10 22 675 0.5+ 1.1–  
 1977 10 16 675 0.0 1.9+ 1977 04 30 691 0.3– 0.3–

**4251 T-3 = 1998 DC<sub>8</sub>**

Epoch 1997 Dec. 18.0 TT = JDT 2450800.5

Williams

| <i>M</i> | 85.55402   |          | (2000.0)  | <b>P</b>      | <b>Q</b>    |
|----------|------------|----------|-----------|---------------|-------------|
| <i>n</i> | 0.20829265 | $\omega$ | 316.62704 | +0.83098496   | −0.55214165 |
| <i>a</i> | 2.8185133  | $\Omega$ | 77.00526  | +0.52752306   | +0.74340608 |
| <i>e</i> | 0.0898168  | <i>i</i> | 3.99291   | +0.17658825   | +0.37747451 |
| <i>P</i> | 4.73       | <i>H</i> | 14.0      | <i>G</i> 0.15 | <i>U</i> 6  |

Residuals in seconds of arc

|                          |                          |                          |
|--------------------------|--------------------------|--------------------------|
| 1977 10 11 675 2.0+ 0.5– | 1977 10 17 675 0.5– 0.1– | 1998 02 21 327 0.2+ 0.1+ |
| 1977 10 11 675 1.5+ 0.0  | 1977 10 21 675 1.0– 0.3+ | 1998 02 23 327 0.2– 0.7+ |
| 1977 10 12 675 0.9– 1.0– | 1977 10 21 675 1.3+ 0.4– | 1998 02 23 327 0.3– 0.1– |
| 1977 10 12 675 1.0– 0.5– | 1977 10 22 675 1.6– 0.8– | 1998 02 23 327 0.2– 0.6+ |
| 1977 10 16 675 1.0– 2.0+ | 1977 10 22 675 1.5+ 0.5– | 1998 03 02 327 0.1+ 0.5– |
| 1977 10 16 675 0.1– 2.2+ | 1998 02 21 327 0.2+ 0.3– | 1998 03 02 327 0.6+ 0.4– |
| 1977 10 17 675 0.3– 0.8– | 1998 02 21 327 0.1– 0.0  | 1998 03 02 327 0.3– 0.2– |

| Object | <i>H</i> | <i>G</i> | Epoch    | <i>M</i>  | $\omega$  | $\Omega$  | <i>i</i> | <i>e</i>  | <i>a</i>  | Obs. | Opp. & Arc   | rms Perts <i>U</i> | Computer | <i>MPC</i> | Object |
|--------|----------|----------|----------|-----------|-----------|-----------|----------|-----------|-----------|------|--------------|--------------------|----------|------------|--------|
| (153)  | 7.48     | 0.15     | 19971218 | 281.45141 | 42.90763  | 228.43639 | 7.83361  | 0.1435099 | 3.9790840 | 327  | 63 1875–1998 | 0.56 M-v 0         | Goffin   | 31134      | (153)  |
| (496)  | 11.61    | 0.15     | 19971218 | 11.69217  | 258.67837 | 207.81045 | 3.78718  | 0.0793657 | 2.1989760 | 104  | 25 1902–1998 | 1.14 M-v 1         | Williams | 29608      | (496)  |
| (664)  | 9.97     | 0.15     | 19971218 | 310.66158 | 90.90360  | 175.03668 | 8.57768  | 0.2208016 | 3.1993534 | 48   | 21 1908–1998 | 1.06 M-v 1         | Williams | 26916      | (664)  |
| (1168) | 12.53    | 0.15     | 19971218 | 179.83008 | 123.16351 | 218.85767 | 12.74480 | 0.2164756 | 2.5535389 | 48   | 15 1930–1998 | 0.90 M-v 1         | Williams | 27909      | (1168) |
| (1417) | 10.8     | 0.15     | 19971218 | 261.66849 | 160.87054 | 96.47992  | 8.26953  | 0.0746342 | 2.9745011 | 36   | 15 1937–1998 | 1.04 M-v 1         | Bowell   | 20630      | (1417) |
| (1521) | 11.5     | 0.15     | 19971218 | 87.76231  | 49.24007  | 12.81593  | 15.05327 | 0.1392065 | 2.8506147 | 33   | 9 1938–1998  | 0.87 M-v 1         | Williams | 21969      | (1521) |
| (1888) | 11.7     | 0.15     | 19971218 | 5.87066   | 232.94434 | 245.01367 | 5.86352  | 0.1651256 | 2.5486886 | 53   | 14 1931–1998 | 0.95 M-v 1         | Williams | 22969      | (1888) |
| (1962) | 11.9     | 0.15     | 19971218 | 99.17389  | 8.86543   | 15.73110  | 1.56726  | 0.2224331 | 3.2008977 | 51   | 13 1927–1998 | 0.88 M-v 1         | Bowell   | 30686      | (1962) |
| (2010) | 11.62    | 0.15     | 19971218 | 50.09392  | 31.68300  | 8.92175   | 2.40544  | 0.1784170 | 3.0995275 | 148  | 17 1931–1998 | 0.53 M-v 0         | Goffin   | 31136      | (2010) |
| (2249) | 11.0     | 0.15     | 19971218 | 240.59782 | 109.71702 | 148.17523 | 4.08968  | 0.0944599 | 3.1850371 | 81   | 18 1942–1998 | 1.04 M-v 1         | Williams | 26924      | (2249) |
| (2430) | 12.24    | 0.15     | 19971218 | 228.32864 | 309.33673 | 46.08852  | 23.42250 | 0.2145291 | 2.3626673 | 25   | 7 1977–1998  | 0.90 M-v 2         | Williams | 30686      | (2430) |
| (2576) | 11.3     | 0.15     | 19971218 | 124.59726 | 0.88475   | 311.61608 | 12.20027 | 0.1335318 | 3.0851923 | 37   | 7 1950–1998  | 0.78 M-v 2         | Williams | 25649      | (2576) |
| (2782) | 13.6     | 0.15     | 19971218 | 201.79781 | 310.63150 | 10.94082  | 3.77917  | 0.2187756 | 2.6828990 | 24   | 6 1960–1998  | 0.93 M-v 2         | Williams | 25649      | (2782) |
| (2941) | 13.9     | 0.15     | 19971218 | 89.29434  | 64.91831  | 10.51479  | 3.24487  | 0.0896854 | 2.1516570 | 80   | 9 1930–1998  | 0.79 M-v 1         | Williams | 25064      | (2941) |
| (3252) | 12.0     | 0.15     | 19971218 | 352.31216 | 157.06332 | 327.05918 | 12.72086 | 0.1136415 | 2.6642664 | 54   | 9 1981–1998  | 0.78 M-v 1         | Forti    | 29660      | (3252) |
| (3344) | 12.9     | 0.15     | 19971218 | 8.21164   | 206.56282 | 78.14824  | 9.44684  | 0.1191708 | 2.4159042 | 51   | 6 1955–1997  | 1.09 M-v 1         | Williams | 30290      | (3344) |
| (3758) | 12.7     | 0.15     | 19971218 | 48.51421  | 57.37154  | 81.06968  | 14.13662 | 0.1142080 | 2.6291797 | 30   | 5 1977–1998  | 0.90 M-v 1         | Williams | 29616      | (3758) |
| (3798) | 13.6     | 0.15     | 19971218 | 298.78017 | 244.25213 | 314.70166 | 2.43279  | 0.0776116 | 2.1681706 | 33   | 7 1950–1998  | 0.83 M-v 1         | Bowell   | 29136      | (3798) |
| (3813) | 13.3     | 0.15     | 19971218 | 185.26415 | 349.04851 | 320.08440 | 4.15822  | 0.1752326 | 2.1915287 | 34   | 10 1954–1998 | 0.82 M-v 2         | Williams | 27730      | (3813) |
| (4071) | 12.1     | 0.15     | 19971218 | 275.29290 | 128.20342 | 267.91666 | 11.03094 | 0.1727072 | 3.1901340 | 24   | 6 1976–1993  | 1.15 M-v 2         | Sumzina  | 31276      | (4071) |
| (4080) | 13.3     | 0.15     | 19971218 | 150.53629 | 95.71253  | 222.32614 | 3.79572  | 0.2101971 | 2.1937792 | 38   | 11 1941–1996 | 1.15 M-v 2         | Sumzina  | 22700      | (4080) |
| (4095) | 14.0     | 0.15     | 19971218 | 127.78681 | 89.25653  | 256.21755 | 2.51193  | 0.1178072 | 2.1203912 | 40   | 12 1950–1993 | 1.21 M-v 2         | Sumzina  | 30688      | (4095) |
| (4119) | 11.9     | 0.15     | 19971218 | 311.09115 | 75.16880  | 115.83971 | 13.03729 | 0.1301906 | 2.8838586 | 43   | 10 1951–1998 | 0.89 M-v 1         | Williams | 25340      | (4119) |
| (4124) | 12.5     | 0.15     | 19971218 | 66.12376  | 118.52042 | 331.24838 | 3.59741  | 0.0325007 | 2.7870647 | 43   | 9 1956–1995  | 1.22 M-v 1         | Sumzina  | 29662      | (4124) |
| (4159) | 10.8     | 0.15     | 19971218 | 208.65313 | 313.09197 | 91.57069  | 15.17230 | 0.0740955 | 2.5490655 | 48   | 11 1940–1997 | 1.13 M-v 2         | Sumzina  | 30782      | (4159) |
| (4163) | 11.4     | 0.15     | 19971218 | 340.41166 | 11.55283  | 129.28535 | 11.09384 | 0.0517439 | 3.0221577 | 54   | 12 1941–1996 | 1.05 M-v 1         | Sumzina  | 23981      | (4163) |
| (4211) | 12.1     | 0.15     | 19971218 | 285.86648 | 319.23354 | 24.49572  | 0.59435  | 0.1999628 | 3.1946845 | 102  | 9 1954–1996  | 1.03 M-v 1         | Sumzina  | 31139      | (4211) |
| (4215) | 12.4     | 0.15     | 19971218 | 119.98213 | 276.90983 | 247.22038 | 5.74968  | 0.0610264 | 2.4173328 | 47   | 6 1982–1995  | 1.18 M-v 1         | Sumzina  | 30471      | (4215) |
| (4216) | 14.3     | 0.15     | 19971218 | 153.11197 | 48.37704  | 202.88562 | 4.46227  | 0.1716950 | 2.3555475 | 65   | 7 1974–1993  | 0.61 M-v 1         | Sumzina  | 30898      | (4216) |
| (4227) | 13.4     | 0.15     | 19971218 | 16.51087  | 19.87430  | 133.20120 | 2.70871  | 0.1555872 | 2.3945106 | 24   | 6 1942–1997  | 1.01 M-v 2         | Sumzina  | 30899      | (4227) |
| (4228) | 13.8     | 0.15     | 19971218 | 122.99261 | 112.85181 | 223.40904 | 5.26234  | 0.1364926 | 2.3042973 | 28   | 8 1968–1996  | 0.90 M-v 2         | Sumzina  | 31007      | (4228) |
| (4235) | 12.2     | 0.15     | 19971218 | 357.58106 | 311.07042 | 332.28300 | 1.23229  | 0.0319427 | 2.9829150 | 73   | 10 1963–1996 | 0.97 M-v 1         | Sumzina  | 30275      | (4235) |
| (4242) | 12.8     | 0.15     | 19971218 | 335.70480 | 203.00001 | 30.55546  | 0.32258  | 0.1484056 | 3.1141219 | 109  | 11 1951–1997 | 0.88 M-v 1         | Sumzina  | 28888      | (4242) |
| (4248) | 14.3     | 0.15     | 19971218 | 116.13856 | 118.66501 | 305.94476 | 5.83262  | 0.1038414 | 2.3041126 | 24   | 5 1978–1996  | 0.91 M-v 2         | Sumzina  | 30899      | (4248) |
| (4252) | 12.7     | 0.15     | 19971218 | 44.75046  | 56.83029  | 164.45743 | 13.52690 | 0.1376331 | 2.6530274 | 49   | 5 1984–1992  | 1.17 M-v 1         | Sumzina  | 30452      | (4252) |
| (4256) | 13.4     | 0.15     | 19971218 | 113.76589 | 226.06445 | 72.60160  | 3.04658  | 0.0696810 | 2.3506331 | 38   | 7 1982–1995  | 1.09 M-v 2         | Sumzina  | 31276      | (4256) |
| (4286) | 11.6     | 0.15     | 19971218 | 268.62759 | 252.56980 | 134.93622 | 2.90150  | 0.0806000 | 2.9163383 | 60   | 15 1951–1996 | 1.17 M-v 1         | Sumzina  | 27715      | (4286) |
| (4313) | 11.9     | 0.15     | 19971218 | 142.30400 | 161.34104 | 44.37080  | 9.26038  | 0.0120197 | 2.6546753 | 52   | 9 1933–1996  | 1.08 M-v 2         | Sumzina  | 23784      | (4313) |
| (4325) | 12.6     | 0.15     | 19971218 | 187.74266 | 109.65919 | 60.22768  | 5.76213  | 0.0965327 | 2.7512538 | 56   | 8 1975–1993  | 1.28 M-v 2         | Sumzina  | 29944      | (4325) |
| (4344) | 12.6     | 0.15     | 19971218 | 212.71420 | 96.17647  | 114.63623 | 2.39283  | 0.1235707 | 3.1054247 | 52   | 10 1954–1996 | 1.17 M-v 1         | Sumzina  | 31236      | (4344) |
| (4400) | 13.8     | 0.15     | 19971218 | 97.12258  | 26.49351  | 352.39658 | 4.39108  | 0.1382483 | 2.3686770 | 62   | 7 1955–1998  | 0.72 M-v 1         | Bowell   | 31008      | (4400) |

|        |      |      |          |           |           |           |          |           |           |    |    |           |      |     |   |          |       |        |
|--------|------|------|----------|-----------|-----------|-----------|----------|-----------|-----------|----|----|-----------|------|-----|---|----------|-------|--------|
| (4461) | 11.6 | 0.15 | 19971218 | 123.52947 | 149.16356 | 133.60675 | 16.01224 | 0.1298866 | 2.8509295 | 29 | 8  | 1942-1994 | 0.78 | M-v | 1 | Sumzina  | 25218 | (4461) |
| (4463) | 12.8 | 0.15 | 19971218 | 196.67333 | 254.49948 | 158.07148 | 1.83498  | 0.1824248 | 3.1828292 | 36 | 7  | 1954-1996 | 0.99 | M-v | 1 | Sumzina  | 23864 | (4463) |
| (4466) | 12.2 | 0.15 | 19971218 | 78.48110  | 198.50180 | 170.91641 | 2.09666  | 0.0283184 | 2.9411880 | 53 | 10 | 1954-1996 | 0.92 | M-v | 1 | Sumzina  | 30453 | (4466) |
| (4488) | 13.9 | 0.15 | 19971218 | 48.88571  | 184.05708 | 218.58104 | 4.34775  | 0.1436354 | 2.1810338 | 40 | 9  | 1932-1997 | 0.93 | M-v | 2 | Sicoli   | 26191 | (4488) |
| (4508) | 13.5 | 0.15 | 19971218 | 92.98068  | 147.56346 | 92.99672  | 1.98160  | 0.0845547 | 2.1963361 | 36 | 8  | 1951-1993 | 1.02 | M-v | 2 | Sumzina  | 24112 | (4508) |
| (4521) | 11.5 | 0.15 | 19971218 | 89.54906  | 217.65182 | 48.23319  | 14.38734 | 0.0888195 | 3.1170827 | 26 | 6  | 1979-1992 | 0.79 | M-v | 1 | Sumzina  | 29944 | (4521) |
| (4540) | 12.1 | 0.15 | 19971218 | 313.16440 | 259.65404 | 247.10257 | 6.36451  | 0.1735279 | 2.6688833 | 37 | 8  | 1962-1998 | 0.86 | M-v | 1 | Sicoli   | 30092 | (4540) |
| (4542) | 11.0 | 0.15 | 19971218 | 137.86977 | 147.74840 | 104.59403 | 11.30511 | 0.0592812 | 3.0086206 | 45 | 7  | 1972-1996 | 1.09 | M-v | 1 | Sumzina  | 31276 | (4542) |
| (4558) | 12.2 | 0.15 | 19971218 | 308.44091 | 93.99929  | 255.17555 | 22.18612 | 0.3624367 | 2.1975524 | 52 | 6  | 1975-1995 | 1.16 | M-v | 2 | Sumzina  | 29663 | (4558) |
| (4560) | 11.9 | 0.15 | 19971218 | 105.94911 | 65.04499  | 286.00795 | 9.05138  | 0.0505832 | 2.9976873 | 62 | 7  | 1954-1998 | 0.54 | M-v | 1 | Sicoli   | 26422 | (4560) |
| (4566) | 12.3 | 0.15 | 19971218 | 153.62141 | 120.86838 | 252.92057 | 10.77009 | 0.2127551 | 2.8363113 | 32 | 6  | 1981-1992 | 0.86 | M-v | 1 | Sumzina  | 30291 | (4566) |
| (4601) | 12.4 | 0.15 | 19971218 | 284.96216 | 359.34912 | 177.88414 | 13.26486 | 0.0989388 | 2.6759336 | 27 | 6  | 1933-1996 | 0.97 | M-v | 2 | Sumzina  | 24748 | (4601) |
| (4607) | 12.5 | 0.15 | 19971218 | 299.76768 | 222.34966 | 250.78638 | 2.24821  | 0.0193492 | 2.2635164 | 75 | 4  | 1987-1992 | 1.00 | M-v | 1 | Sumzina  | 24748 | (4607) |
| (4641) | 13.7 | 0.15 | 19971218 | 60.67271  | 283.74515 | 102.00265 | 1.65227  | 0.1708867 | 2.1889993 | 78 | 9  | 1961-1998 | 0.77 | M-v | 1 | Sicoli   | 29945 | (4641) |
| (4643) | 13.5 | 0.15 | 19971218 | 35.74621  | 187.44868 | 106.87839 | 1.77532  | 0.2008339 | 2.3632761 | 54 | 9  | 1968-1994 | 0.96 | M-v | 1 | Sumzina  | 27448 | (4643) |
| (4654) | 13.7 | 0.15 | 19971218 | 151.30790 | 245.00806 | 24.11887  | 5.53647  | 0.1648046 | 2.2043483 | 65 | 8  | 1951-1996 | 0.98 | M-v | 1 | Sumzina  | 26905 | (4654) |
| (4673) | 11.8 | 0.15 | 19971218 | 244.63218 | 342.95759 | 104.70442 | 16.22893 | 0.0571473 | 2.5517244 | 31 | 7  | 1959-1994 | 1.14 | M-v | 2 | Sumzina  | 29620 | (4673) |
| (4689) | 13.5 | 0.15 | 19971218 | 292.88449 | 32.20408  | 105.88406 | 5.15930  | 0.0722684 | 2.2865978 | 50 | 8  | 1964-1997 | 1.22 | M-v | 2 | Sumzina  | 30760 | (4689) |
| (4697) | 13.8 | 0.15 | 19971218 | 359.85427 | 52.24770  | 263.39646 | 1.74102  | 0.1755985 | 2.4332132 | 46 | 5  | 1971-1996 | 1.19 | M-v | 2 | Sumzina  | 29138 | (4697) |
| (4705) | 13.4 | 0.15 | 19971218 | 325.50916 | 120.16498 | 328.90610 | 8.64063  | 0.1260080 | 2.3300392 | 30 | 5  | 1972-1995 | 1.00 | M-v | 2 | Sumzina  | 27327 | (4705) |
| (4706) | 13.3 | 0.15 | 19971218 | 345.77324 | 283.84310 | 178.55052 | 8.25999  | 0.1747422 | 2.2676877 | 37 | 7  | 1971-1998 | 1.05 | M-v | 2 | Sicoli   | 30689 | (4706) |
| (4711) | 12.2 | 0.15 | 19971218 | 36.61666  | 242.88675 | 114.01737 | 10.22531 | 0.2564720 | 2.3821252 | 52 | 8  | 1975-1998 | 0.79 | M-v | 1 | Sicoli   | 29945 | (4711) |
| (4735) | 12.7 | 0.15 | 19971218 | 27.06508  | 351.44587 | 88.53166  | 7.23797  | 0.1177482 | 2.4059762 | 31 | 6  | 1950-1998 | 0.84 | M-v | 1 | Forti    | 29922 | (4735) |
| (4774) | 12.8 | 0.15 | 19971218 | 20.27862  | 236.41453 | 286.11922 | 3.63025  | 0.0859044 | 2.2372539 | 30 | 8  | 1964-1994 | 0.89 | M-v | 2 | Sumzina  | 25084 | (4774) |
| (4778) | 12.8 | 0.15 | 19971218 | 124.72905 | 41.83551  | 35.38013  | 1.58705  | 0.1773671 | 3.1567309 | 46 | 7  | 1978-1995 | 1.23 | M-v | 1 | Sumzina  | 30689 | (4778) |
| (4785) | 13.2 | 0.15 | 19971218 | 14.81390  | 114.82996 | 301.89400 | 2.68523  | 0.0610359 | 2.6639532 | 33 | 6  | 1978-1997 | 0.96 | M-v | 2 | Sicoli   | 27731 | (4785) |
| (4812) | 14.4 | 0.15 | 19971218 | 309.54869 | 72.60947  | 4.02897   | 4.68008  | 0.2069347 | 2.3686831 | 29 | 7  | 1950-1992 | 1.06 | M-v | 2 | Sumzina  | 30472 | (4812) |
| (4822) | 13.7 | 0.15 | 19971218 | 92.17616  | 264.32561 | 141.52640 | 4.04913  | 0.1850728 | 2.2529809 | 41 | 6  | 1971-1995 | 1.21 | M-v | 2 | Sumzina  | 30982 | (4822) |
| (4825) | 14.1 | 0.15 | 19971218 | 67.16718  | 65.03468  | 306.34754 | 3.96301  | 0.1658147 | 2.2513950 | 34 | 6  | 1973-1995 | 1.25 | M-v | 2 | Sumzina  | 27559 | (4825) |
| (4830) | 12.9 | 0.15 | 19971218 | 308.19506 | 81.88203  | 119.86004 | 6.41277  | 0.0694299 | 2.3927465 | 66 | 7  | 1976-1994 | 1.13 | M-v | 1 | Sumzina  | 28591 | (4830) |
| (4838) | 12.7 | 0.15 | 19971218 | 146.40099 | 39.47968  | 218.04306 | 8.88890  | 0.1439175 | 2.3516911 | 28 | 6  | 1967-1996 | 0.95 | M-v | 2 | Sumzina  | 28889 | (4838) |
| (4843) | 11.0 | 0.15 | 19971218 | 270.16441 | 222.73100 | 162.91710 | 11.00247 | 0.1295971 | 3.0832543 | 34 | 5  | 1908-1996 | 1.29 | M-v | 2 | Sumzina  | 24576 | (4843) |
| (4850) | 12.7 | 0.15 | 19971218 | 343.26847 | 193.21694 | 188.58922 | 1.87486  | 0.0738978 | 2.8796914 | 51 | 8  | 1953-1996 | 0.90 | M-v | 1 | Sumzina  | 27314 | (4850) |
| (4868) | 13.9 | 0.15 | 19971218 | 91.73382  | 94.21708  | 187.63846 | 22.10913 | 0.0681808 | 1.9604587 | 34 | 5  | 1983-1994 | 1.04 | M-v | 2 | Sumzina  | 27717 | (4868) |
| (4873) | 11.8 | 0.15 | 19971218 | 47.21870  | 156.00411 | 146.19545 | 10.80582 | 0.0972438 | 3.0222094 | 29 | 6  | 1955-1997 | 0.92 | M-v | 1 | Sumzina  | 31277 | (4873) |
| (4896) | 10.8 | 0.15 | 19971218 | 57.29639  | 93.99053  | 261.84742 | 16.53135 | 0.1735410 | 3.1026463 | 45 | 7  | 1985-1996 | 0.97 | M-v | 1 | Sumzina  | 30783 | (4896) |
| (4906) | 15.2 | 0.15 | 19971218 | 244.38899 | 198.95430 | 120.04998 | 1.65019  | 0.2152948 | 2.1767403 | 33 | 8  | 1954-1997 | 0.91 | M-v | 2 | Sumzina  | 28617 | (4906) |
| (4912) | 13.4 | 0.15 | 19971218 | 236.84605 | 205.68340 | 192.27315 | 3.66414  | 0.1387743 | 2.3015415 | 42 | 8  | 1953-1993 | 1.25 | M-v | 2 | Sumzina  | 31140 | (4912) |
| (4926) | 12.7 | 0.15 | 19971218 | 136.94490 | 327.01227 | 333.59928 | 1.30584  | 0.0515431 | 2.8309074 | 53 | 11 | 1953-1996 | 1.06 | M-v | 1 | Sumzina  | 28889 | (4926) |
| (4932) | 12.0 | 0.15 | 19971218 | 319.97501 | 252.64487 | 141.98957 | 12.91108 | 0.0179706 | 3.1144263 | 39 | 6  | 1955-1996 | 1.14 | M-v | 1 | Sumzina  | 31106 | (4932) |
| (4941) | 12.1 | 0.15 | 19971218 | 354.69525 | 259.78824 | 130.19669 | 1.86520  | 0.1858200 | 3.1764792 | 48 | 5  | 1969-1994 | 1.28 | M-v | 1 | Sumzina  | 31008 | (4941) |
| (4945) | 13.0 | 0.15 | 19971218 | 189.53199 | 137.51740 | 194.21808 | 4.89179  | 0.3132793 | 2.5762607 | 64 | 5  | 1958-1998 | 0.76 | M-v | 1 | Williams | 29106 | (4945) |
| (4949) | 13.6 | 0.15 | 19971218 | 251.53324 | 275.36687 | 108.83082 | 4.81222  | 0.1689760 | 2.2715362 | 35 | 5  | 1978-1993 | 0.80 | M-v | 1 | Sumzina  | 31240 | (4949) |
| (4963) | 12.4 | 0.15 | 19971218 | 240.61258 | 300.53103 | 332.94056 | 11.74304 | 0.1644892 | 2.5996959 | 40 | 8  | 1973-1994 | 1.14 | M-v | 2 | Sumzina  | 30901 | (4963) |
| (4964) | 13.6 | 0.15 | 19971218 | 95.80577  | 204.53777 | 167.60315 | 4.91464  | 0.1234197 | 2.2626906 | 28 | 5  | 1979-1992 | 1.30 | M-v | 2 | Sumzina  | 29138 | (4964) |
| (4983) | 13.2 | 0.15 | 19971218 | 74.10890  | 251.39485 | 306.43697 | 1.90073  | 0.0276999 | 2.3218930 | 61 | 9  | 1977-1995 | 1.03 | M-v | 1 | Sumzina  | 30093 | (4983) |
| (4989) | 13.2 | 0.15 | 19971218 | 156.57255 | 79.96850  | 317.08819 | 12.33297 | 0.1837929 | 2.5734528 | 49 | 5  | 1981-1997 | 0.98 | M-v | 2 | Sumzina  | 25433 | (4989) |
| (5003) | 14.2 | 0.15 | 19971218 | 335.86816 | 280.31089 | 256.10786 | 1.84726  | 0.0920611 | 2.2514547 | 42 | 5  | 1971-1992 | 0.83 | M-v | 2 | Sumzina  | 31277 | (5003) |
| (5044) | 13.3 | 0.15 | 19971218 | 326.44649 | 42.79869  | 344.78063 | 5.84889  | 0.1055552 | 2.2414634 | 36 | 5  | 1977-1994 | 1.07 | M-v | 2 | Sumzina  | 31008 | (5044) |
| (5074) | 11.7 | 0.15 | 19971218 | 66.09365  | 87.91547  | 309.98368 | 8.56683  | 0.0971221 | 2.9951920 | 35 | 9  | 1949-1995 | 1.24 | M-v | 1 | Sumzina  | 25652 | (5074) |
| (5096) | 12.8 | 0.15 | 19971218 | 289.44197 | 108.76911 | 323.67290 | 7.24150  | 0.1487430 | 2.3523638 | 45 | 6  | 1981-1994 | 1.07 | M-v | 1 | Sumzina  | 28889 | (5096) |
| (5104) | 11.6 | 0.15 | 19971218 | 30.24297  | 7.91861   | 198.43697 | 14.35255 | 0.1145091 | 2.6143883 | 30 | 6  | 1982-1993 | 1.12 | M-v | 2 | Sumzina  | 29318 | (5104) |
| (5110) | 12.7 | 0.15 | 19971218 | 253.42194 | 76.87971  | 313.66744 | 3.82015  | 0.1099510 | 2.3866527 | 36 | 7  | 1937-1993 | 0.84 | M-v | 2 | Sumzina  | 28856 | (5110) |

|                       |      |      |          |           |           |           |          |           |           |    |    |           |      |     |   |          |       |                       |
|-----------------------|------|------|----------|-----------|-----------|-----------|----------|-----------|-----------|----|----|-----------|------|-----|---|----------|-------|-----------------------|
| (5117)                | 11.9 | 0.15 | 19971218 | 316.02278 | 150.91183 | 23.29961  | 9.78036  | 0.0752196 | 3.0578289 | 35 | 7  | 1955–1998 | 0.80 | M-v | 1 | Bowell   | 25732 | (5117)                |
| (5142)                | 11.8 | 0.15 | 19971218 | 288.42797 | 192.36592 | 205.59850 | 6.25766  | 0.2731258 | 2.5406772 | 35 | 8  | 1921–1994 | 0.88 | M-v | 2 | Sumzina  | 26582 | (5142)                |
| (5157)                | 11.6 | 0.15 | 19971218 | 93.11320  | 54.50169  | 305.86915 | 0.20983  | 0.1520478 | 3.2097090 | 45 | 6  | 1954–1994 | 1.25 | M-v | 1 | Sumzina  | 29946 | (5157)                |
| (5166)                | 13.0 | 0.15 | 19971218 | 185.40796 | 64.88298  | 134.27948 | 4.21540  | 0.1076221 | 2.3395504 | 39 | 8  | 1974–1996 | 0.97 | M-v | 2 | Sumzina  | 29664 | (5166)                |
| (5169)                | 13.9 | 0.15 | 19971218 | 77.60602  | 62.01621  | 342.32867 | 2.61897  | 0.1480110 | 2.2606064 | 45 | 6  | 1971–1996 | 1.29 | M-v | 2 | Sumzina  | 29664 | (5169)                |
| (5171)                | 13.2 | 0.15 | 19971218 | 243.12830 | 45.19704  | 322.33040 | 7.10758  | 0.1322043 | 2.4237948 | 51 | 5  | 1953–1993 | 0.94 | M-v | 2 | Sumzina  | 29664 | (5171)                |
| (5173)                | 12.9 | 0.15 | 19971218 | 118.12764 | 328.71055 | 176.35192 | 11.76987 | 0.1973369 | 2.6543770 | 39 | 7  | 1986–1995 | 1.29 | M-v | 2 | Sumzina  | 29318 | (5173)                |
| (5214)                | 13.5 | 0.15 | 19971218 | 210.79698 | 262.06066 | 7.83350   | 6.07637  | 0.1036058 | 2.1883617 | 42 | 10 | 1953–1998 | 0.80 | M-v | 1 | Forti    | 29624 | (5214)                |
| (5379)                | 12.8 | 0.15 | 19971218 | 254.94823 | 211.21750 | 34.17630  | 3.81060  | 0.0543218 | 2.3963786 | 30 | 7  | 1981–1998 | 0.71 | M-v | 1 | Bowell   | 29946 | (5379)                |
| (5395)                | 15.6 | 0.15 | 19971218 | 80.51257  | 220.94946 | 168.79098 | 6.93690  | 0.2721138 | 2.5380281 | 49 | 6  | 1976–1998 | 0.80 | M-v | 2 | Williams | 30784 | (5395)                |
| (5420)                | 13.0 | 0.15 | 19971218 | 114.45209 | 257.72436 | 85.67288  | 8.69629  | 0.2330706 | 2.6808695 | 25 | 7  | 1982–1998 | 0.89 | M-v | 1 | Forti    | 29112 | (5420)                |
| (5817)                | 12.6 | 0.15 | 19971218 | 44.28358  | 82.02481  | 340.94887 | 21.14228 | 0.3379686 | 2.4099554 | 51 | 6  | 1959–1998 | 0.87 | M-v | 1 | Williams | 31278 | (5817)                |
| (6037)                | 18.7 | 0.15 | 19971218 | 348.05818 | 241.51148 | 182.93798 | 3.47948  | 0.4990891 | 1.2692417 | 99 | 5  | 1988–1998 | 0.75 | M-v | 2 | Williams | 29320 | (6037)                |
| (7224)                | 12.8 | 0.15 | 19971218 | 90.19207  | 75.35398  | 320.05303 | 8.87812  | 0.1320411 | 2.7750699 | 23 | 4  | 1982–1998 | 0.86 | M-v | 2 | Marsden  | 31251 | (7224)                |
| 1931 TD <sub>3</sub>  | 13.5 | 0.15 | 19971218 | 276.59333 | 269.72673 | 42.56708  | 8.67096  | 0.2826796 | 2.3244689 | 29 | 5  | 1931–1998 | 0.61 | M-v | 1 | Williams | 29651 | 1931 TD <sub>3</sub>  |
| 1951 SY               | 15.0 | 0.15 | 19971218 | 45.14970  | 199.77104 | 169.69277 | 20.57672 | 0.3013757 | 2.5886162 | 23 | 8  | 1951–1998 | 0.53 | M-v | 1 | Williams | 28610 | 1951 SY               |
| 1964 VZ <sub>2</sub>  | 14.0 | 0.15 | 19971218 | 95.02449  | 8.06089   | 71.43541  | 2.78039  | 0.2537067 | 3.0153684 | 22 | 4  | 1964–1997 | 0.83 | M-v | 1 | Williams | 29652 | 1964 VZ <sub>2</sub>  |
| 1968 OH               | 13.0 | 0.15 | 19971218 | 204.56990 | 56.66845  | 267.45153 | 11.33998 | 0.1687891 | 2.7088050 | 30 | 6  | 1968–1998 | 0.67 | M-v | 2 | Williams | 28610 | 1968 OH               |
| 1968 OL               | 14.0 | 0.15 | 19971218 | 234.60651 | 126.97386 | 117.84769 | 24.02358 | 0.2592032 | 2.2797775 | 23 | 4  | 1968–1998 | 0.60 | M-v | 2 | Williams | 25646 | 1968 OL               |
| 1971 SB               | 14.5 | 0.15 | 19971218 | 48.32179  | 76.49539  | 355.72787 | 22.89445 | 0.0982318 | 1.8628189 | 17 | 4  | 1971–1998 | 0.55 | M-v | 3 | Williams | 25338 | 1971 SB               |
| 1971 UG               | 12.0 | 0.15 | 19971218 | 160.71535 | 170.62130 | 216.97955 | 11.86948 | 0.0474943 | 2.8510559 | 21 | 4  | 1971–1998 | 0.87 | M-v | 2 | Williams | 26417 | 1971 UG               |
| 1971 UT               | 14.0 | 0.15 | 19971218 | 104.12095 | 167.09660 | 227.64162 | 5.28281  | 0.1317844 | 2.3429420 | 15 | 4  | 1971–1998 | 0.89 | M-v | 2 | Williams | 28293 | 1971 UT               |
| 1973 QR <sub>1</sub>  | 14.0 | 0.15 | 19971218 | 197.81939 | 104.77881 | 203.10488 | 2.83313  | 0.1926174 | 2.1929876 | 31 | 4  | 1973–1998 | 0.60 | M-v | 3 | Williams | 27725 | 1973 QR <sub>1</sub>  |
| 1973 QG <sub>2</sub>  | 13.0 | 0.15 | 19971218 | 180.40186 | 329.20632 | 47.51970  | 2.83856  | 0.2016858 | 3.0495639 | 23 | 7  | 1973–1998 | 0.65 | M-v | 1 | Williams | 29131 | 1973 QG <sub>2</sub>  |
| 1973 SF <sub>6</sub>  | 14.0 | 0.15 | 19971218 | 150.87000 | 146.42359 | 180.54659 | 6.19314  | 0.1985148 | 2.2143963 | 48 | 5  | 1973–1998 | 0.80 | M-v | 2 | Williams | 28610 | 1973 SF <sub>6</sub>  |
| 1974 OE               | 14.0 | 0.15 | 19971218 | 236.65000 | 277.68885 | 16.01587  | 7.13749  | 0.1171822 | 2.3119601 | 27 | 6  | 1974–1998 | 0.74 | M-v | 1 | Williams | 27929 | 1974 OE               |
| 1974 QF <sub>1</sub>  | 13.0 | 0.15 | 19971218 | 82.95826  | 5.78093   | 332.26669 | 9.24044  | 0.2526786 | 2.4120981 | 15 | 4  | 1974–1998 | 0.40 | M-v | 2 | Williams | 31134 | 1974 QF <sub>1</sub>  |
| 1975 VV <sub>2</sub>  | 12.5 | 0.15 | 19971218 | 52.38988  | 292.89142 | 40.97203  | 16.78187 | 0.1871887 | 3.1024257 | 25 | 3  | 1975–1998 | 0.83 | M-v | 2 | Williams | 31271 | 1975 VV <sub>2</sub>  |
| 1976 UT <sub>1</sub>  | 14.5 | 0.15 | 19971218 | 38.86328  | 205.06066 | 221.57555 | 4.07514  | 0.0603238 | 2.2666167 | 22 | 4  | 1976–1998 | 0.66 | M-v | 1 | Williams | 31271 | 1976 UT <sub>1</sub>  |
| 1976 YO <sub>2</sub>  | 14.0 | 0.15 | 19971218 | 67.47633  | 352.33667 | 74.75908  | 11.07273 | 0.1347820 | 2.2689760 | 29 | 4  | 1976–1998 | 0.63 | M-v | 2 | Williams | 25438 | 1976 YO <sub>2</sub>  |
| 1977 EL <sub>1</sub>  | 14.5 | 0.15 | 19971218 | 117.82204 | 132.60862 | 358.26371 | 4.75558  | 0.1622558 | 2.2327169 | 36 | 4  | 1977–1997 | 0.60 | M-v | 3 | Williams | 30468 | 1977 EL <sub>1</sub>  |
| 1977 PP <sub>1</sub>  | 13.5 | 0.15 | 19971218 | 141.36133 | 164.08281 | 199.09608 | 5.02607  | 0.1031731 | 2.7499381 | 17 | 3  | 1977–1998 | 0.72 | M-v | 4 | Williams | 30648 | 1977 PP <sub>1</sub>  |
| 1977 QL <sub>1</sub>  | 13.0 | 0.15 | 19971218 | 139.02067 | 34.31004  | 343.20969 | 4.87745  | 0.0870408 | 2.7506741 | 26 | 5  | 1959–1998 | 0.55 | M-v | 1 | Williams | 28881 | 1977 QL <sub>1</sub>  |
| 1977 QH <sub>3</sub>  | 13.5 | 0.15 | 19971218 | 116.94274 | 278.21224 | 127.64577 | 9.13460  | 0.2877599 | 2.4104973 | 28 | 4  | 1977–1998 | 0.63 | M-v | 1 | Williams | 29315 | 1977 QH <sub>3</sub>  |
| 1977 RK               | 14.0 | 0.15 | 19971218 | 318.03104 | 133.90832 | 46.76059  | 21.44533 | 0.0501561 | 1.9516738 | 22 | 5  | 1977–1998 | 0.72 | M-v | 2 | Williams | 27323 | 1977 RK               |
| 1977 RR <sub>6</sub>  | 14.0 | 0.15 | 19971218 | 118.77305 | 12.21076  | 355.63627 | 4.72878  | 0.1727874 | 2.4356830 | 36 | 7  | 1954–1998 | 0.84 | M-v | 2 | Williams | 25077 | 1977 RR <sub>6</sub>  |
| 1978 RX <sub>7</sub>  | 14.0 | 0.15 | 19971218 | 271.78584 | 281.81718 | 321.85178 | 5.85117  | 0.2103192 | 2.6172701 | 18 | 3  | 1978–1998 | 0.65 | M-v | 4 | Williams | 31271 | 1978 RX <sub>7</sub>  |
| 1978 SC <sub>7</sub>  | 13.5 | 0.15 | 19971218 | 139.52217 | 54.72305  | 3.58661   | 12.90278 | 0.1742830 | 2.6400634 | 19 | 5  | 1975–1995 | 0.82 | M-v | 2 | Williams | 22073 | 1978 SC <sub>7</sub>  |
| 1978 SA <sub>8</sub>  | 14.0 | 0.15 | 19971218 | 32.61853  | 163.52698 | 211.98767 | 2.61459  | 0.1895322 | 2.4234085 | 56 | 3  | 1978–1998 | 0.49 | M-v | 1 | Williams | 31134 | 1978 SA <sub>8</sub>  |
| 1978 SB <sub>8</sub>  | 14.5 | 0.15 | 19971218 | 227.98884 | 354.20127 | 14.84665  | 5.35614  | 0.1780665 | 2.2678493 | 27 | 4  | 1977–1997 | 0.67 | M-v | 2 | Williams | 29939 | 1978 SB <sub>8</sub>  |
| 1978 VE <sub>15</sub> | 14.0 | 0.15 | 19971218 | 79.90047  | 320.83502 | 74.14171  | 3.17696  | 0.2063596 | 2.3814446 | 39 | 5  | 1978–1998 | 0.97 | M-v | 2 | Williams | 23347 | 1978 VE <sub>15</sub> |
| 1979 MG <sub>4</sub>  | 13.0 | 0.15 | 19971218 | 179.89121 | 81.85407  | 162.45275 | 1.66398  | 0.1411922 | 3.0934982 | 26 | 3  | 1979–1998 | 0.78 | M-v | 4 | Williams | 31134 | 1979 MG <sub>4</sub>  |
| 1979 MH <sub>6</sub>  | 14.5 | 0.15 | 19971218 | 13.08510  | 3.85616   | 120.31273 | 11.28379 | 0.0486308 | 2.9975616 | 11 | 3  | 1979–1998 | 0.82 | M-v | 4 | Williams | 15701 | 1979 MH <sub>6</sub>  |
| 1979 OA               | 13.5 | 0.15 | 19971218 | 270.48212 | 340.52163 | 298.24415 | 24.91506 | 0.3751472 | 2.9141633 | 17 | 4  | 1979–1998 | 0.90 | M-v | 2 | Williams | 25527 | 1979 OA               |
| 1979 QJ <sub>1</sub>  | 14.0 | 0.15 | 19971218 | 306.70080 | 31.80610  | 148.44874 | 7.71319  | 0.1029647 | 2.2412912 | 23 | 3  | 1979–1998 | 0.75 | M-v | 4 | Williams | 31223 | 1979 QJ <sub>1</sub>  |
| 1979 TH <sub>2</sub>  | 13.5 | 0.15 | 19971218 | 49.24534  | 49.37523  | 25.41329  | 1.14645  | 0.1634099 | 3.1536366 | 48 | 3  | 1979–1998 | 0.67 | M-v | 3 | Williams | 31134 | 1979 TH <sub>2</sub>  |
| 1980 TZ <sub>3</sub>  | 14.0 | 0.15 | 19971218 | 152.31416 | 101.58046 | 239.01961 | 1.55360  | 0.1462661 | 2.1763483 | 20 | 4  | 1980–1998 | 0.54 | M-v | 2 | Williams | 28882 | 1980 TZ <sub>3</sub>  |
| 1980 UL               | 13.0 | 0.15 | 19971218 | 244.21548 | 208.85822 | 151.12509 | 23.05365 | 0.2071956 | 2.3836066 | 27 | 4  | 1980–1997 | 0.50 | M-v | 2 | Williams | 29653 | 1980 UL               |
| 1980 XX               | 14.5 | 0.15 | 19971218 | 61.75723  | 308.07979 | 87.52099  | 5.21115  | 0.1454430 | 2.2351508 | 24 | 4  | 1980–1998 | 0.64 | M-v | 2 | Williams | 31271 | 1980 XX               |
| 1981 DF               | 12.5 | 0.15 | 19971218 | 23.09650  | 151.95649 | 331.62563 | 12.86621 | 0.1041093 | 3.1618236 | 37 | 3  | 1981–1998 | 0.46 | M-v | 4 | Williams | 19857 | 1981 DF               |
| 1981 DV               | 15.0 | 0.15 | 19971218 | 31.85951  | 268.70324 | 209.72716 | 14.09921 | 0.0486685 | 2.6308145 | 21 | 3  | 1977–1998 | 0.75 | M-v | 4 | Williams | 11044 | 1981 DV               |
| 1981 DX               | 13.0 | 0.15 | 19971218 | 85.05090  | 165.05382 | 266.14476 | 7.10875  | 0.0088417 | 3.2010739 | 41 | 8  | 1952–1998 | 0.78 | M-v | 1 | Williams | 28882 | 1981 DX               |
| 1981 DK <sub>2</sub>  | 16.0 | 0.15 | 19971218 | 330.87115 | 223.54399 | 313.62990 | 6.49571  | 0.2672238 | 2.6395156 | 29 | 2  | 1981–1998 | 0.77 | M-v | 3 | Williams | 31096 | 1981 DK <sub>2</sub>  |

|                       |      |      |          |           |           |           |          |           |           |    |   |           |      |     |   |          |       |                       |
|-----------------------|------|------|----------|-----------|-----------|-----------|----------|-----------|-----------|----|---|-----------|------|-----|---|----------|-------|-----------------------|
| 1981 EQ               | 13.0 | 0.15 | 19971218 | 298.41702 | 226.53564 | 12.42004  | 10.77874 | 0.1506633 | 3.1891266 | 36 | 6 | 1954–1998 | 0.64 | M-v | 1 | Williams | 29940 | 1981 EQ               |
| 1981 EG <sub>1</sub>  | 13.5 | 0.15 | 19971218 | 291.40205 | 226.17700 | 22.18452  | 3.63121  | 0.0692179 | 2.6146272 | 56 | 7 | 1981–1998 | 0.80 | M-v | 1 | Williams | 30075 | 1981 EG <sub>1</sub>  |
| 1981 EM <sub>1</sub>  | 13.0 | 0.15 | 19971218 | 40.31055  | 332.56838 | 120.09666 | 2.34172  | 0.1521163 | 3.1743709 | 39 | 4 | 1975–1998 | 0.65 | M-v | 2 | Marsden  | 31271 | 1981 EM <sub>1</sub>  |
| 1981 EF <sub>3</sub>  | 15.5 | 0.15 | 19971218 | 323.73878 | 279.20396 | 244.32039 | 6.51740  | 0.0399617 | 2.2811434 | 26 | 4 | 1979–1998 | 0.88 | M-v | 2 | Williams | 28580 | 1981 EF <sub>3</sub>  |
| 1981 EO <sub>8</sub>  | 13.5 | 0.15 | 19971218 | 44.06861  | 157.85527 | 284.90267 | 3.86557  | 0.1659278 | 2.6359479 | 36 | 5 | 1979–1998 | 0.89 | M-v | 1 | Williams | 28084 | 1981 EO <sub>8</sub>  |
| 1981 EB <sub>9</sub>  | 13.0 | 0.15 | 19971218 | 257.36949 | 307.25813 | 342.74556 | 12.65199 | 0.1655940 | 2.6078943 | 35 | 8 | 1955–1998 | 0.87 | M-v | 2 | Williams | 28611 | 1981 EB <sub>9</sub>  |
| 1981 EY <sub>9</sub>  | 15.0 | 0.15 | 19971218 | 15.68301  | 177.02279 | 298.88925 | 3.69682  | 0.1431849 | 2.2663552 | 36 | 4 | 1981–1998 | 0.75 | M-v | 2 | Williams | 29132 | 1981 EY <sub>9</sub>  |
| 1981 ET <sub>10</sub> | 13.5 | 0.15 | 19971218 | 192.91433 | 310.82014 | 336.77140 | 12.83600 | 0.1703174 | 2.6967595 | 30 | 4 | 1981–1998 | 0.90 | M-v | 2 | Williams | 31271 | 1981 ET <sub>10</sub> |
| 1981 EQ <sub>16</sub> | 14.5 | 0.15 | 19971218 | 74.27380  | 87.01844  | 340.09117 | 13.33976 | 0.1119066 | 3.2052935 | 19 | 3 | 1981–1998 | 0.88 | M-v | 4 | Williams | 31224 | 1981 EQ <sub>16</sub> |
| 1981 ET <sub>17</sub> | 15.0 | 0.15 | 19971218 | 47.25668  | 151.42018 | 278.52789 | 1.18484  | 0.2430622 | 2.6336649 | 16 | 3 | 1981–1998 | 0.94 | M-v | 4 | Williams | 21561 | 1981 ET <sub>17</sub> |
| 1981 EC <sub>18</sub> | 14.5 | 0.15 | 19971218 | 250.78595 | 107.35836 | 176.82681 | 6.15092  | 0.0952382 | 3.1722673 | 25 | 4 | 1981–1998 | 0.98 | M-v | 2 | Williams | 29132 | 1981 EC <sub>18</sub> |
| 1981 EQ <sub>18</sub> | 13.5 | 0.15 | 19971218 | 122.26976 | 255.30163 | 147.64723 | 1.87057  | 0.1805995 | 3.1309405 | 23 | 6 | 1978–1998 | 0.79 | M-v | 1 | Williams | 26187 | 1981 EQ <sub>18</sub> |
| 1981 EC <sub>19</sub> | 14.5 | 0.15 | 19971218 | 94.33583  | 31.97919  | 351.13088 | 5.58864  | 0.1177937 | 2.2826279 | 16 | 2 | 1981–1998 | 0.62 | M-v | 5 | Williams | 31224 | 1981 EC <sub>19</sub> |
| 1981 EJ <sub>19</sub> | 13.5 | 0.15 | 19971218 | 347.87986 | 16.01928  | 142.84204 | 0.66573  | 0.1236222 | 3.1999014 | 26 | 3 | 1978–1998 | 0.95 | M-v | 4 | Williams | 22270 | 1981 EJ <sub>19</sub> |
| 1981 EP <sub>19</sub> | 15.0 | 0.15 | 19971218 | 133.10197 | 220.41877 | 165.86217 | 3.02146  | 0.1088635 | 2.2468198 | 41 | 7 | 1971–1998 | 0.90 | M-v | 2 | Williams | 28611 | 1981 EP <sub>19</sub> |
| 1981 ET <sub>20</sub> | 15.5 | 0.15 | 19971218 | 327.53236 | 191.34845 | 356.87633 | 8.99486  | 0.1445741 | 2.6273735 | 22 | 3 | 1981–1998 | 0.81 | M-v | 4 | Williams | 22429 | 1981 ET <sub>20</sub> |
| 1981 ED <sub>22</sub> | 15.5 | 0.15 | 19971218 | 314.48844 | 41.58779  | 174.81312 | 2.32953  | 0.0683497 | 2.6117092 | 26 | 5 | 1981–1998 | 0.84 | M-v | 2 | Williams | 25972 | 1981 ED <sub>22</sub> |
| 1981 ES <sub>23</sub> | 15.5 | 0.15 | 19971218 | 155.36230 | 242.74961 | 155.55382 | 1.49158  | 0.1003510 | 2.5697808 | 21 | 4 | 1981–1997 | 0.85 | M-v | 2 | Williams | 29132 | 1981 ES <sub>23</sub> |
| 1981 EM <sub>27</sub> | 14.0 | 0.15 | 19971218 | 7.02190   | 355.25262 | 138.07588 | 2.66509  | 0.1708651 | 3.2031548 | 25 | 4 | 1981–1998 | 0.90 | M-v | 1 | Williams | 28581 | 1981 EM <sub>27</sub> |
| 1981 EF <sub>28</sub> | 13.5 | 0.15 | 19971218 | 187.14939 | 318.29183 | 9.99788   | 10.45026 | 0.1545263 | 2.6440822 | 30 | 4 | 1981–1998 | 0.99 | M-v | 2 | Williams | 25536 | 1981 EF <sub>28</sub> |
| 1981 ET <sub>29</sub> | 14.5 | 0.15 | 19971218 | 6.03536   | 278.59548 | 226.39114 | 4.58846  | 0.1015226 | 3.2019209 | 13 | 3 | 1978–1998 | 0.77 | M-v | 4 | Williams | 22271 | 1981 ET <sub>29</sub> |
| 1981 EV <sub>34</sub> | 15.0 | 0.15 | 19971218 | 218.74486 | 179.68032 | 157.11510 | 2.45481  | 0.2200370 | 2.5852718 | 22 | 4 | 1981–1998 | 0.80 | M-v | 2 | Williams | 28882 | 1981 EV <sub>34</sub> |
| 1981 ES <sub>35</sub> | 12.5 | 0.15 | 19971218 | 15.95736  | 123.99131 | 2.11562   | 10.47591 | 0.0520759 | 3.2103339 | 25 | 5 | 1978–1998 | 0.78 | M-v | 2 | Williams | 22271 | 1981 ES <sub>35</sub> |
| 1981 EA <sub>36</sub> | 15.0 | 0.15 | 19971218 | 159.09325 | 76.74212  | 321.13077 | 3.39353  | 0.1209594 | 2.5632452 | 27 | 3 | 1981–1997 | 0.75 | M-v | 4 | Williams | 29094 | 1981 EA <sub>36</sub> |
| 1981 EA <sub>40</sub> | 14.5 | 0.15 | 19971218 | 229.28896 | 174.92836 | 133.21585 | 2.79587  | 0.1773765 | 3.1855768 | 22 | 5 | 1977–1998 | 0.89 | M-v | 2 | Williams | 29132 | 1981 EA <sub>40</sub> |
| 1981 EG <sub>40</sub> | 15.0 | 0.15 | 19971218 | 53.65553  | 277.08039 | 147.23413 | 1.84838  | 0.2002021 | 3.2182947 | 26 | 5 | 1978–1998 | 0.66 | M-v | 1 | Williams | 31135 | 1981 EG <sub>40</sub> |
| 1981 EZ <sub>40</sub> | 15.5 | 0.15 | 19971218 | 109.72297 | 22.03084  | 349.82422 | 5.34930  | 0.1779220 | 2.2837436 | 23 | 3 | 1981–1998 | 0.72 | M-v | 4 | Williams | 28314 | 1981 EZ <sub>40</sub> |
| 1981 EO <sub>44</sub> | 17.0 | 0.15 | 19971218 | 60.81025  | 85.92168  | 328.85908 | 1.76877  | 0.0449871 | 2.2860586 | 16 | 2 | 1981–1998 | 0.74 | M-v | 5 | Williams | 31225 | 1981 EO <sub>44</sub> |
| 1981 GG               | 13.5 | 0.15 | 19971218 | 340.09462 | 128.42051 | 36.50977  | 14.15520 | 0.1805740 | 2.6488169 | 28 | 7 | 1955–1998 | 0.82 | M-v | 1 | Williams | 28882 | 1981 GG               |
| 1981 JE <sub>2</sub>  | 14.0 | 0.15 | 19971218 | 117.20385 | 244.06546 | 62.58819  | 3.01693  | 0.2079917 | 2.3912484 | 26 | 3 | 1981–1998 | 0.68 | M-v | 4 | Williams | 31135 | 1981 JE <sub>2</sub>  |
| 1981 SD <sub>2</sub>  | 13.5 | 0.15 | 19971218 | 131.20695 | 345.63470 | 35.16767  | 6.39810  | 0.1301219 | 2.3853270 | 16 | 3 | 1981–1998 | 0.71 | M-v | 4 | Williams | 31272 | 1981 SD <sub>2</sub>  |
| 1981 SG <sub>3</sub>  | 14.5 | 0.15 | 19971218 | 125.63082 | 74.33662  | 280.26505 | 3.76437  | 0.2320583 | 2.4160479 | 15 | 3 | 1981–1998 | 0.38 | M-v | 3 | Williams | 29094 | 1981 SG <sub>3</sub>  |
| 1981 TZ               | 14.0 | 0.15 | 19971218 | 175.12228 | 350.11675 | 357.65892 | 9.18254  | 0.1598008 | 2.8035576 | 44 | 5 | 1981–1998 | 0.60 | M-v | 1 | Williams | 29132 | 1981 TZ               |
| 1981 UV <sub>23</sub> | 13.0 | 0.15 | 19971218 | 109.11794 | 318.54321 | 58.88307  | 7.11276  | 0.2339333 | 2.4313476 | 15 | 4 | 1977–1998 | 0.41 | M-v | 2 | Williams | 27910 | 1981 UV <sub>23</sub> |
| 1981 UE <sub>26</sub> | 13.0 | 0.15 | 19971218 | 106.18907 | 277.75504 | 100.99381 | 3.13502  | 0.0730618 | 2.9132949 | 25 | 4 | 1981–1998 | 0.50 | M-v | 3 | Williams | 31272 | 1981 UE <sub>26</sub> |
| 1982 JE <sub>1</sub>  | 14.0 | 0.15 | 19971218 | 98.68606  | 291.14436 | 72.99621  | 5.25952  | 0.1826706 | 2.2589872 | 31 | 7 | 1976–1998 | 1.01 | M-v | 2 | Williams | 27931 | 1982 JE <sub>1</sub>  |
| 1982 SM <sub>2</sub>  | 15.0 | 0.15 | 19971218 | 169.94818 | 355.09259 | 348.76488 | 5.41163  | 0.1956211 | 2.2764624 | 15 | 3 | 1982–1998 | 0.76 | M-v | 5 | Williams | 25327 | 1982 SM <sub>2</sub>  |
| 1982 SA <sub>4</sub>  | 13.5 | 0.15 | 19971218 | 189.66484 | 300.17888 | 33.98520  | 4.95933  | 0.1922801 | 2.2714679 | 36 | 8 | 1941–1998 | 0.95 | M-v | 2 | Williams | 29654 | 1982 SA <sub>4</sub>  |
| 1982 UQ <sub>10</sub> | 14.0 | 0.15 | 19971218 | 119.78925 | 60.13225  | 24.98285  | 3.34905  | 0.2783902 | 2.7031931 | 29 | 6 | 1982–1997 | 0.73 | M-v | 1 | Williams | 29654 | 1982 UQ <sub>10</sub> |
| 1983 BD               | 12.0 | 0.15 | 19971218 | 168.74709 | 258.75731 | 115.42346 | 15.18905 | 0.1554877 | 2.7636403 | 18 | 5 | 1974–1998 | 0.81 | M-v | 2 | Williams | 30287 | 1983 BD               |
| 1983 CH               | 13.5 | 0.15 | 19971218 | 242.48174 | 342.92182 | 98.08295  | 5.96957  | 0.0945400 | 2.2062752 | 33 | 4 | 1983–1996 | 0.64 | M-v | 2 | Williams | 27726 | 1983 CH               |
| 1983 CZ <sub>2</sub>  | 14.0 | 0.15 | 19971218 | 352.71501 | 192.87386 | 319.56907 | 6.48761  | 0.1755510 | 2.4101141 | 16 | 3 | 1979–1998 | 0.84 | M-v | 4 | Williams | 8138  | 1983 CZ <sub>2</sub>  |
| 1983 RL               | 15.0 | 0.15 | 19971218 | 112.95177 | 28.92914  | 339.93805 | 19.07219 | 0.1175089 | 1.9194504 | 28 | 3 | 1983–1998 | 0.76 | M-v | 3 | Williams | 21969 | 1983 RL               |
| 1983 WQ               | 12.5 | 0.15 | 19971218 | 142.92095 | 295.24574 | 56.54658  | 9.81294  | 0.1157868 | 2.6370751 | 29 | 4 | 1983–1998 | 0.67 | M-v | 3 | Williams | 31272 | 1983 WQ               |
| 1984 DZ               | 14.5 | 0.15 | 19971218 | 274.30174 | 259.59501 | 345.81918 | 7.78666  | 0.2086541 | 2.3174988 | 53 | 4 | 1953–1998 | 0.74 | M-v | 4 | Williams | 23132 | 1984 DZ               |
| 1984 LK               | 13.0 | 0.15 | 19971218 | 136.87421 | 76.47767  | 238.18755 | 6.55421  | 0.3860317 | 3.1138556 | 41 | 5 | 1968–1998 | 0.82 | M-v | 1 | Williams | 31272 | 1984 LK               |
| 1984 SC <sub>6</sub>  | 14.0 | 0.15 | 19971218 | 238.44649 | 209.59136 | 96.46538  | 3.31655  | 0.2079355 | 2.4017442 | 47 | 4 | 1984–1998 | 0.87 | M-v | 2 | Williams | 30090 | 1984 SC <sub>6</sub>  |
| 1984 YL <sub>1</sub>  | 14.5 | 0.15 | 19971218 | 272.24460 | 41.87836  | 65.35984  | 6.22794  | 0.1361931 | 2.2657084 | 13 | 3 | 1984–1996 | 0.88 | M-v | 4 | Williams | 28084 | 1984 YL <sub>1</sub>  |
| 1985 GA <sub>1</sub>  | 14.0 | 0.15 | 19971218 | 246.47505 | 141.30084 | 132.84181 | 5.90525  | 0.1712787 | 2.2248770 | 38 | 7 | 1955–1998 | 0.63 | M-v | 1 | Williams | 29133 | 1985 GA <sub>1</sub>  |
| 1985 QM <sub>5</sub>  | 13.5 | 0.15 | 19971218 | 167.90129 | 188.61674 | 149.42306 | 2.54188  | 0.1400922 | 2.9420321 | 27 | 4 | 1978–1998 | 0.77 | M-v | 3 | Williams | 18426 | 1985 QM <sub>5</sub>  |
| 1985 RJ <sub>3</sub>  | 12.5 | 0.15 | 19971218 | 156.51575 | 92.88432  | 174.09271 | 1.84133  | 0.1373055 | 3.1080962 | 51 | 4 | 1969–1998 | 0.65 | M-v | 3 | Williams | 31135 | 1985 RJ <sub>3</sub>  |
| 1985 RJ <sub>5</sub>  | 14.5 | 0.15 | 19971218 | 62.15334  | 337.57728 | 52.67851  | 2.83335  | 0.2482640 | 2.4276703 | 19 | 3 | 1985–1998 | 0.74 | M-v | 5 | Williams | 31272 | 1985 RJ <sub>5</sub>  |
| 1985 UH <sub>2</sub>  | 13.5 | 0.15 | 19971218 | 165.14470 | 292.79517 | 65.88106  | 3.18071  | 0.1043132 | 2.3423650 | 29 | 4 | 1985–1998 | 0.57 | M-v | 2 | Williams | 29133 | 1985 UH <sub>2</sub>  |

|                       |      |      |          |           |           |           |          |           |           |    |   |           |      |     |   |          |       |                       |
|-----------------------|------|------|----------|-----------|-----------|-----------|----------|-----------|-----------|----|---|-----------|------|-----|---|----------|-------|-----------------------|
| 1985 UF <sub>5</sub>  | 14.0 | 0.15 | 19971218 | 66.43341  | 224.72767 | 205.26008 | 4.11561  | 0.1986580 | 2.4171638 | 25 | 5 | 1981–1998 | 0.79 | M-v | 3 | Williams | 24759 | 1985 UF <sub>5</sub>  |
| 1986 QC <sub>1</sub>  | 13.5 | 0.15 | 19971218 | 224.85063 | 176.74642 | 103.98548 | 4.27098  | 0.0776275 | 2.7447574 | 54 | 2 | 1986–1998 | 0.71 | M-v | 5 | Williams | 31226 | 1986 QC <sub>1</sub>  |
| 1986 QT <sub>2</sub>  | 15.0 | 0.15 | 19971218 | 213.16942 | 193.84196 | 115.31320 | 2.22219  | 0.1531354 | 2.1677894 | 44 | 5 | 1954–1998 | 0.46 | M-v | 2 | Williams | 25439 | 1986 QT <sub>2</sub>  |
| 1986 QO <sub>4</sub>  | 14.0 | 0.15 | 19971218 | 98.70094  | 1.16963   | 3.14881   | 6.66568  | 0.1845252 | 2.2686358 | 17 | 4 | 1986–1998 | 1.05 | M-v | 3 | Williams | 22810 | 1986 QO <sub>4</sub>  |
| 1986 RE <sub>1</sub>  | 15.0 | 0.15 | 19971218 | 146.27395 | 153.53617 | 199.52802 | 3.20513  | 0.2432806 | 2.2137819 | 62 | 5 | 1986–1998 | 0.71 | M-v | 2 | Williams | 31272 | 1986 RE <sub>1</sub>  |
| 1986 RP <sub>2</sub>  | 13.0 | 0.15 | 19971218 | 248.16968 | 208.69083 | 144.61978 | 12.38180 | 0.2034602 | 2.5898304 | 23 | 5 | 1980–1993 | 0.96 | M-v | 3 | Williams | 31226 | 1986 RP <sub>2</sub>  |
| 1986 RF <sub>7</sub>  | 14.5 | 0.15 | 19971218 | 183.24534 | 170.66078 | 150.09746 | 2.16380  | 0.1608153 | 2.2038200 | 21 | 6 | 1976–1998 | 0.87 | M-v | 2 | Williams | 28612 | 1986 RF <sub>7</sub>  |
| 1986 WB               | 14.0 | 0.15 | 19971218 | 65.44637  | 342.62946 | 63.94971  | 7.39576  | 0.1276071 | 2.3170414 | 40 | 3 | 1986–1998 | 0.88 | M-v | 3 | Williams | 31272 | 1986 WB               |
| 1987 BS <sub>2</sub>  | 14.5 | 0.15 | 19971218 | 353.18688 | 315.48994 | 146.37209 | 2.53908  | 0.1628604 | 2.3942512 | 43 | 5 | 1982–1998 | 0.67 | M-v | 1 | Marsden  | 27727 | 1987 BS <sub>2</sub>  |
| 1987 RD <sub>1</sub>  | 13.5 | 0.15 | 19971218 | 44.96088  | 75.46604  | 10.96065  | 1.89680  | 0.1808794 | 2.6705919 | 44 | 7 | 1979–1998 | 0.81 | M-v | 1 | Williams | 28612 | 1987 RD <sub>1</sub>  |
| 1987 RA <sub>3</sub>  | 13.5 | 0.15 | 19971218 | 203.69084 | 166.80990 | 139.98300 | 4.35647  | 0.2406576 | 2.5715575 | 15 | 3 | 1987–1998 | 0.60 | M-v | 4 | Williams | 22078 | 1987 RA <sub>3</sub>  |
| 1987 RN <sub>3</sub>  | 13.0 | 0.15 | 19971218 | 62.17558  | 114.90325 | 288.46796 | 7.96322  | 0.1363598 | 2.7365037 | 16 | 2 | 1987–1998 | 0.67 | M-v | 4 | Williams | 31227 | 1987 RN <sub>3</sub>  |
| 1987 RO <sub>5</sub>  | 12.0 | 0.15 | 19971218 | 101.48038 | 216.86561 | 158.54926 | 6.81548  | 0.2911168 | 3.9481050 | 27 | 3 | 1987–1998 | 0.54 | M-v | 4 | Williams | 31273 | 1987 RO <sub>5</sub>  |
| 1987 RT <sub>5</sub>  | 14.5 | 0.15 | 19971218 | 136.17305 | 194.79194 | 119.52212 | 3.00467  | 0.1833897 | 2.1311400 | 37 | 6 | 1981–1998 | 0.69 | M-v | 2 | Williams | 31273 | 1987 RT <sub>5</sub>  |
| 1987 SH <sub>4</sub>  | 13.5 | 0.15 | 19971218 | 182.87602 | 313.73811 | 18.20239  | 13.88518 | 0.1950172 | 2.5992134 | 27 | 4 | 1987–1998 | 0.71 | M-v | 4 | Williams | 29941 | 1987 SH <sub>4</sub>  |
| 1988 BL <sub>3</sub>  | 13.5 | 0.15 | 19971218 | 105.94125 | 82.93602  | 264.60542 | 6.05799  | 0.2058541 | 2.2565160 | 32 | 4 | 1959–1998 | 0.51 | M-v | 3 | Williams | 31273 | 1988 BL <sub>3</sub>  |
| 1988 BN <sub>4</sub>  | 12.5 | 0.15 | 19971218 | 301.25070 | 230.31935 | 273.67636 | 8.65121  | 0.0341944 | 3.0155858 | 31 | 3 | 1988–1998 | 0.35 | M-v | 3 | Williams | 31273 | 1988 BN <sub>4</sub>  |
| 1988 CP <sub>1</sub>  | 13.5 | 0.15 | 19971218 | 45.35347  | 290.30259 | 135.42496 | 2.98098  | 0.0806911 | 2.9056957 | 36 | 4 | 1988–1998 | 0.82 | M-v | 2 | Williams | 31136 | 1988 CP <sub>1</sub>  |
| 1988 EA <sub>2</sub>  | 14.0 | 0.15 | 19971218 | 316.61573 | 24.54077  | 156.60798 | 3.69194  | 0.0636773 | 2.2585918 | 31 | 4 | 1971–1998 | 0.72 | M-v | 3 | Marsden  | 31273 | 1988 EA <sub>2</sub>  |
| 1988 FM <sub>1</sub>  | 11.5 | 0.15 | 19971218 | 52.20499  | 83.21993  | 327.45980 | 9.95493  | 0.1012624 | 3.0341854 | 23 | 3 | 1981–1998 | 0.49 | M-v | 4 | Williams | 31227 | 1988 FM <sub>1</sub>  |
| 1988 RN <sub>3</sub>  | 16.0 | 0.15 | 19971218 | 227.42530 | 180.52710 | 176.74636 | 3.99010  | 0.1461922 | 2.3136492 | 26 | 2 | 1988–1995 | 0.89 | M-v | 4 | Williams | 25955 | 1988 RN <sub>3</sub>  |
| 1988 RC <sub>5</sub>  | 13.5 | 0.15 | 19971218 | 171.03257 | 289.55703 | 49.68304  | 5.76357  | 0.1178615 | 2.4097175 | 27 | 3 | 1988–1998 | 0.73 | M-v | 3 | Williams | 29095 | 1988 RC <sub>5</sub>  |
| 1988 RA <sub>11</sub> | 13.5 | 0.15 | 19971218 | 195.19904 | 209.87320 | 121.48066 | 3.10982  | 0.0815330 | 3.3346287 | 37 | 7 | 1977–1998 | 0.74 | M-v | 1 | Williams | 29316 | 1988 RA <sub>11</sub> |
| 1988 SN <sub>1</sub>  | 14.5 | 0.15 | 19971218 | 226.22557 | 210.48595 | 114.80362 | 7.55135  | 0.1651267 | 2.3434636 | 21 | 4 | 1988–1998 | 0.84 | M-v | 2 | Williams | 31136 | 1988 SN <sub>1</sub>  |
| 1988 SY <sub>1</sub>  | 14.0 | 0.15 | 19971218 | 247.44530 | 225.97512 | 49.97376  | 7.41325  | 0.0788756 | 2.3902788 | 16 | 4 | 1981–1998 | 0.57 | M-v | 2 | Williams | 25648 | 1988 SY <sub>1</sub>  |
| 1988 VB <sub>1</sub>  | 13.0 | 0.15 | 19971218 | 118.23737 | 3.85850   | 2.02087   | 13.27076 | 0.1764032 | 2.5387768 | 37 | 4 | 1988–1998 | 0.59 | M-v | 3 | Williams | 31273 | 1988 VB <sub>1</sub>  |
| 1988 VM <sub>2</sub>  | 13.5 | 0.15 | 19971218 | 72.61386  | 353.82666 | 53.83888  | 12.69331 | 0.2985905 | 2.5826914 | 26 | 4 | 1963–1998 | 0.71 | M-v | 2 | Williams | 22969 | 1988 VM <sub>2</sub>  |
| 1988 VS <sub>6</sub>  | 13.0 | 0.15 | 19971218 | 36.79258  | 211.71459 | 209.46749 | 4.90323  | 0.2386266 | 3.9522144 | 62 | 3 | 1988–1998 | 0.72 | M-v | 3 | Williams | 31273 | 1988 VS <sub>6</sub>  |
| 1988 XX <sub>1</sub>  | 13.0 | 0.15 | 19971218 | 115.90889 | 349.96736 | 25.48385  | 14.43036 | 0.1861892 | 2.5841755 | 43 | 5 | 1988–1998 | 0.62 | M-v | 2 | Williams | 28613 | 1988 XX <sub>1</sub>  |
| 1989 BE <sub>1</sub>  | 13.5 | 0.15 | 19971218 | 141.72154 | 332.58421 | 108.16736 | 4.05198  | 0.1576290 | 2.4503544 | 20 | 6 | 1980–1997 | 0.95 | M-v | 2 | Williams | 29611 | 1989 BE <sub>1</sub>  |
| 1989 CH <sub>3</sub>  | 14.5 | 0.15 | 19971218 | 352.24779 | 186.64395 | 264.28638 | 7.09296  | 0.1919522 | 2.8008492 | 33 | 2 | 1989–1998 | 0.79 | M-v | 4 | Williams | 31227 | 1989 CH <sub>3</sub>  |
| 1989 CE <sub>6</sub>  | 13.0 | 0.15 | 19971218 | 231.82306 | 313.93912 | 326.11940 | 12.09082 | 0.1576651 | 2.6997043 | 27 | 2 | 1989–1998 | 0.53 | M-v | 5 | Williams | 31273 | 1989 CE <sub>6</sub>  |
| 1989 EX               | 13.0 | 0.15 | 19971218 | 46.08721  | 60.18856  | 135.76818 | 11.81008 | 0.1292218 | 2.5594648 | 18 | 3 | 1989–1997 | 0.82 | M-v | 4 | Williams | 30091 | 1989 EX               |
| 1989 EF <sub>6</sub>  | 14.0 | 0.15 | 19971218 | 9.89448   | 146.62529 | 330.91285 | 8.92152  | 0.0352687 | 2.7219971 | 24 | 2 | 1989–1998 | 0.68 | M-v | 5 | Williams | 31227 | 1989 EF <sub>6</sub>  |
| 1989 GB               | 13.0 | 0.15 | 19890404 | 347.56213 | 171.81738 | 41.02057  | 13.63653 | 0.0645360 | 2.3924164 | 12 | 1 | 29 days   | 1.39 |     |   | Williams |       | 1989 GB               |
| 1989 KF               | 12.5 | 0.15 | 19971218 | 280.01448 | 153.24192 | 83.32069  | 16.27833 | 0.0957975 | 2.8544539 | 21 | 3 | 1989–1998 | 0.86 | M-v | 3 | Williams | 31273 | 1989 KF               |
| 1989 QV               | 13.0 | 0.15 | 19971218 | 80.76366  | 37.05509  | 24.74973  | 23.56518 | 0.1330964 | 3.1661402 | 23 | 4 | 1989–1998 | 0.67 | M-v | 2 | Williams | 30894 | 1989 QV               |
| 1989 SQ               | 14.0 | 0.15 | 19971218 | 66.45257  | 107.11923 | 302.17363 | 4.25419  | 0.2300691 | 2.3664383 | 26 | 4 | 1955–1998 | 0.86 | M-v | 2 | Williams | 28884 | 1989 SQ               |
| 1989 SR <sub>1</sub>  | 14.5 | 0.15 | 19971218 | 222.54618 | 212.96962 | 80.36609  | 4.61287  | 0.0824018 | 2.2590324 | 31 | 5 | 1989–1998 | 0.90 | M-v | 2 | Williams | 28884 | 1989 SR <sub>1</sub>  |
| 1989 SH <sub>3</sub>  | 14.5 | 0.15 | 19971218 | 52.80959  | 272.47000 | 97.83705  | 1.90567  | 0.2286253 | 2.4535417 | 32 | 3 | 1989–1998 | 0.63 | M-v | 4 | Williams | 24582 | 1989 SH <sub>3</sub>  |
| 1989 SR <sub>3</sub>  | 13.0 | 0.15 | 19971218 | 55.60417  | 335.50729 | 103.36909 | 3.56252  | 0.0542762 | 3.4078991 | 28 | 2 | 1989–1998 | 0.66 | M-v | 5 | Marsden  | 31227 | 1989 SR <sub>3</sub>  |
| 1989 SJ <sub>5</sub>  | 13.5 | 0.15 | 19971218 | 250.00492 | 182.98834 | 47.97547  | 7.13871  | 0.0719539 | 2.3414595 | 30 | 5 | 1984–1998 | 0.73 | M-v | 2 | Williams | 31273 | 1989 SJ <sub>5</sub>  |
| 1989 TY <sub>4</sub>  | 15.5 | 0.15 | 19971218 | 248.34845 | 115.94616 | 164.03947 | 5.92652  | 0.1570568 | 2.2291958 | 27 | 4 | 1989–1998 | 0.93 | M-v | 3 | Williams | 25537 | 1989 TY <sub>4</sub>  |
| 1989 TU <sub>10</sub> | 14.0 | 0.15 | 19971218 | 60.46065  | 230.66575 | 179.86129 | 6.12353  | 0.2477261 | 2.3794738 | 32 | 5 | 1978–1998 | 0.70 | M-v | 1 | Williams | 31273 | 1989 TU <sub>10</sub> |
| 1989 UE               | 14.0 | 0.15 | 19971218 | 90.96616  | 324.46595 | 68.29996  | 3.23050  | 0.2257459 | 2.3593815 | 27 | 3 | 1989–1998 | 0.66 | M-v | 3 | Williams | 23684 | 1989 UE               |
| 1989 WR               | 13.5 | 0.15 | 19971218 | 167.78226 | 327.49576 | 25.90909  | 6.83932  | 0.1813486 | 2.2707193 | 19 | 4 | 1955–1998 | 0.79 | M-v | 2 | Williams | 28884 | 1989 WR               |
| 1989 WJ <sub>1</sub>  | 13.5 | 0.15 | 19971218 | 59.27352  | 176.11447 | 218.35857 | 5.94731  | 0.1462068 | 2.4487665 | 30 | 7 | 1954–1998 | 0.87 | M-v | 2 | Williams | 28316 | 1989 WJ <sub>1</sub>  |
| 1989 WC <sub>2</sub>  | 13.5 | 0.15 | 19971218 | 340.76010 | 19.54304  | 64.92202  | 9.31283  | 0.1739415 | 2.5577649 | 39 | 5 | 1982–1998 | 0.98 | M-v | 3 | Williams | 31137 | 1989 WC <sub>2</sub>  |
| 1990 DZ <sub>1</sub>  | 13.0 | 0.15 | 19971218 | 16.82082  | 181.11820 | 316.05461 | 5.93687  | 0.0917244 | 2.4641935 | 25 | 4 | 1986–1998 | 0.67 | M-v | 4 | Williams | 25080 | 1990 DZ <sub>1</sub>  |
| 1990 EA <sub>7</sub>  | 13.0 | 0.15 | 19971218 | 217.99314 | 286.27282 | 351.50987 | 9.30402  | 0.0466260 | 2.5469000 | 39 | 7 | 1953–1998 | 0.82 | M-v | 2 | Williams | 24240 | 1990 EA <sub>7</sub>  |
| 1990 GS               | 14.0 | 0.15 | 19971218 | 203.92990 | 308.27738 | 359.33135 | 11.42569 | 0.0625359 | 2.5352930 | 22 | 5 | 1954–1998 | 0.82 | M-v | 3 | Williams | 27728 | 1990 GS               |
| 1990 HJ               | 14.0 | 0.15 | 19971218 | 56.24567  | 110.72560 | 50.37454  | 3.90252  | 0.1463808 | 2.3924104 | 18 | 4 | 1968–1997 | 0.57 | M-v | 2 | Williams | 29942 | 1990 HJ               |
| 1990 HW <sub>1</sub>  | 13.5 | 0.15 | 19971218 | 56.30558  | 306.83183 | 135.79508 | 15.25244 | 0.0580155 | 2.5589671 | 14 | 2 | 1990–1998 | 0.42 | M-v | 4 | Williams | 31228 | 1990 HW <sub>1</sub>  |

|                       |      |      |          |           |           |           |          |           |           |    |   |           |      |     |   |          |       |                       |
|-----------------------|------|------|----------|-----------|-----------|-----------|----------|-----------|-----------|----|---|-----------|------|-----|---|----------|-------|-----------------------|
| 1990 KX               | 13.5 | 0.15 | 19971218 | 87.51126  | 168.21030 | 104.92492 | 5.43665  | 0.1488694 | 2.2099180 | 23 | 5 | 1981–1996 | 0.65 | M-v | 2 | Williams | 26925 | 1990 KX               |
| 1990 OX <sub>1</sub>  | 14.0 | 0.15 | 19971218 | 320.41717 | 280.19044 | 87.02760  | 5.73328  | 0.1193001 | 2.3978805 | 35 | 3 | 1989–1996 | 0.51 | M-v | 3 | Williams | 27325 | 1990 OX <sub>1</sub>  |
| 1990 QV <sub>1</sub>  | 13.5 | 0.15 | 19971218 | 137.60265 | 264.11669 | 119.26205 | 3.02435  | 0.0853891 | 2.9052685 | 42 | 4 | 1990–1997 | 0.81 | M-v | 2 | Williams | 31005 | 1990 QV <sub>1</sub>  |
| 1990 QO <sub>3</sub>  | 12.0 | 0.15 | 19971218 | 57.92294  | 52.64037  | 354.59671 | 10.61368 | 0.0761521 | 3.1293043 | 78 | 4 | 1990–1998 | 0.68 | M-v | 1 | Williams | 31274 | 1990 QO <sub>3</sub>  |
| 1990 RE <sub>7</sub>  | 13.0 | 0.15 | 19971218 | 78.27247  | 66.91608  | 358.74673 | 10.50203 | 0.1079463 | 2.9854841 | 27 | 4 | 1982–1998 | 0.70 | M-v | 1 | Williams | 31274 | 1990 RE <sub>7</sub>  |
| 1990 RW <sub>7</sub>  | 13.0 | 0.15 | 19971218 | 69.08359  | 227.15999 | 164.61905 | 3.59371  | 0.1752503 | 3.1718103 | 25 | 3 | 1990–1998 | 0.63 | M-v | 3 | Williams | 29134 | 1990 RW <sub>7</sub>  |
| 1990 RM <sub>17</sub> | 12.5 | 0.15 | 19971218 | 127.68255 | 47.39975  | 342.97272 | 10.24111 | 0.1117762 | 2.9996495 | 20 | 5 | 1977–1998 | 0.84 | M-v | 2 | Williams | 29134 | 1990 RM <sub>17</sub> |
| 1990 ST <sub>6</sub>  | 14.0 | 0.15 | 19971218 | 148.49531 | 216.75113 | 105.13125 | 4.57274  | 0.1421361 | 3.1067688 | 20 | 3 | 1979–1998 | 0.59 | M-v | 4 | Williams | 31005 | 1990 ST <sub>6</sub>  |
| 1990 SF <sub>9</sub>  | 13.0 | 0.15 | 19971218 | 133.50489 | 288.09220 | 34.30895  | 5.68573  | 0.1642036 | 3.1446644 | 27 | 4 | 1979–1998 | 0.75 | M-v | 2 | Williams | 31137 | 1990 SF <sub>9</sub>  |
| 1990 SC <sub>13</sub> | 12.5 | 0.15 | 19971218 | 297.87858 | 316.63207 | 267.16309 | 0.90516  | 0.0077604 | 2.9078585 | 49 | 5 | 1985–1998 | 0.57 | M-v | 1 | Williams | 29316 | 1990 SC <sub>13</sub> |
| 1990 SX <sub>16</sub> | 13.0 | 0.15 | 19971218 | 138.61758 | 339.16070 | 11.70074  | 10.19346 | 0.1191519 | 2.9765968 | 21 | 7 | 1954–1998 | 0.78 | M-v | 2 | Williams | 28885 | 1990 SX <sub>16</sub> |
| 1990 TU               | 12.5 | 0.15 | 19971218 | 136.29407 | 175.04495 | 209.43769 | 12.32359 | 0.1372610 | 3.0024832 | 42 | 6 | 1985–1998 | 0.76 | M-v | 2 | Williams | 26420 | 1990 TU               |
| 1990 TJ <sub>3</sub>  | 14.0 | 0.15 | 19971218 | 66.55942  | 305.61635 | 90.36942  | 4.73655  | 0.1294950 | 2.2055976 | 28 | 5 | 1954–1998 | 0.75 | M-v | 2 | Williams | 31274 | 1990 TJ <sub>3</sub>  |
| 1990 TK <sub>8</sub>  | 12.5 | 0.15 | 19971218 | 314.26483 | 171.95578 | 42.97565  | 10.83570 | 0.0670211 | 3.0244538 | 39 | 8 | 1988–1998 | 0.67 | M-v | 1 | Williams | 30895 | 1990 TK <sub>8</sub>  |
| 1990 TK <sub>13</sub> | 13.5 | 0.15 | 19971218 | 136.39478 | 260.80453 | 99.21524  | 10.80696 | 0.1012639 | 3.0638308 | 23 | 3 | 1990–1998 | 0.50 | M-v | 3 | Williams | 28584 | 1990 TK <sub>13</sub> |
| 1990 UB <sub>1</sub>  | 11.5 | 0.15 | 19971218 | 96.46936  | 15.46762  | 32.90861  | 14.76033 | 0.1499179 | 3.1486809 | 20 | 3 | 1990–1998 | 0.78 | M-v | 3 | Williams | 31228 | 1990 UB <sub>1</sub>  |
| 1990 UZ <sub>1</sub>  | 15.0 | 0.15 | 19971218 | 63.55699  | 261.97354 | 135.78198 | 4.43412  | 0.1585662 | 2.2062366 | 18 | 3 | 1990–1998 | 0.78 | M-v | 4 | Williams | 31274 | 1990 UZ <sub>1</sub>  |
| 1990 UJ <sub>5</sub>  | 12.5 | 0.15 | 19971218 | 178.51389 | 154.02693 | 175.30310 | 9.46308  | 0.0818428 | 3.0777975 | 20 | 4 | 1990–1998 | 0.76 | M-v | 2 | Williams | 23672 | 1990 UJ <sub>5</sub>  |
| 1990 WX <sub>3</sub>  | 14.0 | 0.15 | 19971218 | 72.03645  | 307.00788 | 95.79637  | 6.69407  | 0.1688146 | 2.2085441 | 33 | 5 | 1980–1998 | 0.69 | M-v | 1 | Williams | 31274 | 1990 WX <sub>3</sub>  |
| 1990 YC               | 14.0 | 0.15 | 19971218 | 71.90963  | 336.41215 | 82.16092  | 2.76570  | 0.1594053 | 2.2185877 | 31 | 5 | 1988–1998 | 0.76 | M-v | 2 | Williams | 25440 | 1990 YC               |
| 1990 YK               | 14.0 | 0.15 | 19971218 | 6.18322   | 322.32631 | 172.36239 | 2.29132  | 0.1573796 | 2.2450546 | 36 | 6 | 1981–1998 | 0.89 | M-v | 1 | Williams | 28614 | 1990 YK               |
| 1991 CN               | 13.5 | 0.15 | 19971218 | 341.49803 | 162.67692 | 1.35022   | 3.98422  | 0.0736528 | 2.2736208 | 50 | 6 | 1989–1998 | 0.68 | M-v | 1 | Williams | 28885 | 1991 CN               |
| 1991 CB <sub>1</sub>  | 17.5 | 0.15 | 19971218 | 281.48765 | 345.55268 | 317.56183 | 14.57509 | 0.5947648 | 1.6872264 | 41 | 4 | 1991–1998 | 0.53 | M-v | 3 | Williams | 31274 | 1991 CB <sub>1</sub>  |
| 1991 CU <sub>1</sub>  | 14.0 | 0.15 | 19971218 | 356.41592 | 227.97083 | 276.87293 | 3.87631  | 0.1335485 | 2.2861459 | 50 | 9 | 1955–1998 | 0.89 | M-v | 1 | Williams | 29135 | 1991 CU <sub>1</sub>  |
| 1991 ED               | 14.5 | 0.15 | 19971218 | 243.75865 | 242.09120 | 35.25679  | 7.30049  | 0.1074051 | 2.2902029 | 11 | 3 | 1981–1998 | 0.83 | M-v | 5 | Williams | 18128 | 1991 ED               |
| 1991 GW               | 14.5 | 0.15 | 19971218 | 293.58689 | 171.34899 | 38.45512  | 7.95815  | 0.1890574 | 2.3571967 | 23 | 3 | 1991–1998 | 0.69 | M-v | 4 | Williams | 28072 | 1991 GW               |
| 1991 GO <sub>1</sub>  | 13.5 | 0.15 | 19971218 | 38.73076  | 251.34574 | 192.04239 | 22.70067 | 0.3135680 | 2.3406846 | 16 | 3 | 1975–1998 | 0.83 | M-v | 4 | Williams | 30654 | 1991 GO <sub>1</sub>  |
| 1991 GR <sub>1</sub>  | 14.0 | 0.15 | 19971218 | 284.37401 | 98.00369  | 142.81322 | 7.07154  | 0.0956296 | 2.3664603 | 25 | 5 | 1988–1998 | 0.57 | M-v | 2 | Williams | 29658 | 1991 GR <sub>1</sub>  |
| 1991 GR <sub>2</sub>  | 14.5 | 0.15 | 19971218 | 234.43887 | 295.03735 | 18.56955  | 2.21333  | 0.1877779 | 2.3009807 | 25 | 4 | 1971–1998 | 0.80 | M-v | 3 | Williams | 25081 | 1991 GR <sub>2</sub>  |
| 1991 GY <sub>2</sub>  | 16.0 | 0.15 | 19971218 | 324.98883 | 346.75799 | 197.02778 | 5.26942  | 0.0942993 | 2.3403205 | 21 | 3 | 1991–1998 | 0.62 | M-v | 4 | Williams | 29098 | 1991 GY <sub>2</sub>  |
| 1991 GK <sub>5</sub>  | 14.5 | 0.15 | 19971218 | 34.34575  | 56.96844  | 22.77495  | 2.65381  | 0.1671255 | 2.3937869 | 22 | 3 | 1982–1998 | 0.63 | M-v | 5 | Williams | 31229 | 1991 GK <sub>5</sub>  |
| 1991 GG <sub>7</sub>  | 14.0 | 0.15 | 19971218 | 0.27954   | 94.30777  | 18.86496  | 4.21657  | 0.1580998 | 2.4000332 | 39 | 3 | 1982–1998 | 0.47 | M-v | 4 | Williams | 31274 | 1991 GG <sub>7</sub>  |
| 1991 GH <sub>10</sub> | 14.0 | 0.15 | 19971218 | 47.33830  | 10.76903  | 51.74688  | 6.83965  | 0.1019555 | 2.4162355 | 57 | 5 | 1989–1998 | 0.59 | M-v | 1 | Williams | 31274 | 1991 GH <sub>10</sub> |
| 1991 GM <sub>10</sub> | 11.5 | 0.15 | 19971218 | 175.63317 | 234.97056 | 105.80797 | 4.64616  | 0.2267564 | 3.9969604 | 29 | 4 | 1978–1998 | 0.65 | M-v | 2 | Williams | 29135 | 1991 GM <sub>10</sub> |
| 1991 HM               | 13.5 | 0.15 | 19971218 | 243.87324 | 192.88831 | 57.28176  | 11.09129 | 0.0970771 | 2.4227348 | 18 | 4 | 1981–1998 | 0.75 | M-v | 2 | Williams | 28316 | 1991 HM               |
| 1991 LM               | 11.5 | 0.15 | 19971218 | 181.22846 | 191.03961 | 103.51952 | 16.54775 | 0.0872842 | 2.5691752 | 21 | 2 | 1991–1998 | 0.48 | M-v | 4 | Williams | 31229 | 1991 LM               |
| 1991 PH <sub>2</sub>  | 15.0 | 0.15 | 19971218 | 189.30918 | 244.37138 | 82.18296  | 1.33191  | 0.0864535 | 2.5530859 | 22 | 3 | 1991–1998 | 0.62 | M-v | 4 | Williams | 28845 | 1991 PH <sub>2</sub>  |
| 1991 PE <sub>3</sub>  | 14.0 | 0.15 | 19971218 | 181.43224 | 294.69429 | 110.99276 | 3.29948  | 0.2101322 | 2.4144856 | 26 | 4 | 1980–1995 | 0.90 | M-v | 2 | Williams | 22083 | 1991 PE <sub>3</sub>  |
| 1991 PE <sub>10</sub> | 13.5 | 0.15 | 19971218 | 101.98681 | 37.97952  | 338.43786 | 8.67604  | 0.1738226 | 2.7907854 | 24 | 6 | 1954–1998 | 0.62 | M-v | 1 | Williams | 28614 | 1991 PE <sub>10</sub> |
| 1991 PY <sub>10</sub> | 13.0 | 0.15 | 19971218 | 80.63793  | 226.40454 | 188.24900 | 9.15090  | 0.1517891 | 2.7715486 | 19 | 4 | 1977–1998 | 1.05 | M-v | 2 | Williams | 30655 | 1991 PY <sub>10</sub> |
| 1991 PW <sub>16</sub> | 14.3 | 0.15 | 19971218 | 262.16561 | 147.11586 | 136.86280 | 3.39721  | 0.1584634 | 2.4574243 | 35 | 5 | 1971–1995 | 0.75 | M-v | 2 | Marsden  | 22084 | 1991 PW <sub>16</sub> |
| 1991 PZ <sub>17</sub> | 14.0 | 0.15 | 19971218 | 234.06902 | 306.81699 | 109.84587 | 6.01212  | 0.1558562 | 2.2948699 | 24 | 4 | 1989–1996 | 0.56 | M-v | 1 | Williams | 29659 | 1991 PZ <sub>17</sub> |
| 1991 RJ               | 13.0 | 0.15 | 19971218 | 200.67249 | 331.31339 | 338.08720 | 13.19408 | 0.1609924 | 2.6227633 | 33 | 8 | 1951–1998 | 0.91 | M-v | 2 | Williams | 30290 | 1991 RJ               |
| 1991 RP               | 14.0 | 0.15 | 19910812 | 349.90761 | 192.26338 | 156.58639 | 26.07097 | 0.2591805 | 2.4168553 | 11 | 1 | 38 days   | 1.00 |     |   | Williams |       | 1991 RP               |
| 1991 RN <sub>5</sub>  | 13.5 | 0.15 | 19971218 | 147.12911 | 192.68012 | 162.49617 | 5.69161  | 0.0670872 | 2.7291400 | 22 | 4 | 1982–1998 | 0.69 | M-v | 2 | Williams | 28846 | 1991 RN <sub>5</sub>  |
| 1991 RZ <sub>10</sub> | 14.0 | 0.15 | 19971218 | 66.43507  | 241.96900 | 82.20699  | 2.49082  | 0.2573402 | 3.1782984 | 26 | 2 | 1991–1998 | 0.83 | M-v | 4 | Williams | 31230 | 1991 RZ <sub>10</sub> |
| 1991 RQ <sub>11</sub> | 13.5 | 0.15 | 19971218 | 294.44072 | 59.15272  | 134.69514 | 15.91032 | 0.0425161 | 2.6242102 | 31 | 5 | 1990–1998 | 0.87 | M-v | 2 | Williams | 31274 | 1991 RQ <sub>11</sub> |
| 1991 RE <sub>20</sub> | 13.5 | 0.15 | 19971218 | 42.84994  | 107.08559 | 344.26360 | 11.27408 | 0.0763300 | 2.7677834 | 24 | 2 | 1991–1998 | 0.50 | M-v | 4 | Williams | 31101 | 1991 RE <sub>20</sub> |
| 1991 RJ <sub>22</sub> | 14.0 | 0.15 | 19971218 | 6.46907   | 214.51187 | 120.63597 | 4.48086  | 0.2112995 | 2.1454549 | 30 | 3 | 1991–1997 | 0.61 | M-v | 3 | Williams | 30896 | 1991 RJ <sub>22</sub> |
| 1991 RD <sub>24</sub> | 14.0 | 0.15 | 19971218 | 311.73554 | 138.36281 | 121.43607 | 5.61066  | 0.1053865 | 2.4188792 | 34 | 6 | 1982–1997 | 0.70 | M-v | 1 | Williams | 29317 | 1991 RD <sub>24</sub> |
| 1991 RS <sub>40</sub> | 14.0 | 0.15 | 19971218 | 127.46067 | 326.98250 | 31.03405  | 2.10650  | 0.0811406 | 2.7806681 | 23 | 2 | 1991–1998 | 0.53 | M-v | 5 | Williams | 31230 | 1991 RS <sub>40</sub> |
| 1991 SM               | 13.5 | 0.15 | 19910921 | 2.59709   | 220.55821 | 122.80068 | 11.20325 | 0.1201526 | 3.0096433 | 7  | 1 | 27 days   | 0.20 |     |   | Williams |       | 1991 SM               |
| 1991 SN               | 13.0 | 0.15 | 19910921 | 31.59650  | 201.57284 | 107.50617 | 10.98895 | 0.0862878 | 3.0226001 | 6  | 1 | 27 days   | 0.42 |     |   | Williams |       | 1991 SN               |

|                       |      |      |          |           |           |           |          |           |           |     |    |           |      |     |   |          |       |                       |
|-----------------------|------|------|----------|-----------|-----------|-----------|----------|-----------|-----------|-----|----|-----------|------|-----|---|----------|-------|-----------------------|
| 1991 SO               | 15.0 | 0.15 | 19971218 | 159.68834 | 352.58127 | 54.38567  | 7.74871  | 0.3306760 | 2.5525038 | 10  | 3  | 1979–1991 | 0.48 | M-v | 4 | Williams | 23517 | 1991 SO               |
| 1991 SP               | 16.0 | 0.15 | 19910921 | 3.19995   | 267.55561 | 77.13314  | 6.36939  | 0.1982062 | 2.2768312 | 7   | 1  | 27 days   | 0.45 |     |   | Williams |       | 1991 SP               |
| 1991 SQ               | 14.5 | 0.15 | 19910901 | 347.34581 | 322.48919 | 39.13293  | 10.49600 | 0.2345397 | 2.7250263 | 9   | 1  | 55 days   | 0.59 |     |   | Williams |       | 1991 SQ               |
| 1991 SR               | 14.0 | 0.15 | 19910921 | 316.78326 | 266.45524 | 134.85648 | 15.18457 | 0.1117037 | 2.6170611 | 5   | 1  | 24 days   | 0.51 |     |   | Williams |       | 1991 SR               |
| 1991 ST               | 14.0 | 0.15 | 19971218 | 354.68838 | 228.95256 | 79.74592  | 6.85580  | 0.2207058 | 2.2006246 | 17  | 5  | 1952–1994 | 0.86 | M-v | 2 | Williams | 29659 | 1991 ST               |
| 1991 SU               | 14.5 | 0.15 | 19910921 | 325.00780 | 284.35591 | 110.18012 | 8.39986  | 0.1370949 | 2.4130645 | 7   | 1  | 28 days   | 0.57 |     |   | Williams |       | 1991 SU               |
| 1991 SA <sub>1</sub>  | 14.0 | 0.15 | 19971218 | 71.29572  | 197.79935 | 143.48020 | 15.42488 | 0.1604568 | 3.0371143 | 12  | 1  | 66 days   | 0.55 | M-v | 4 | Williams |       | 1991 SA <sub>1</sub>  |
| 1991 TW <sub>1</sub>  | 13.0 | 0.15 | 19971218 | 115.73602 | 347.11695 | 51.79313  | 5.86504  | 0.1612983 | 2.7567623 | 26  | 6  | 1973–1998 | 0.83 | M-v | 2 | Williams | 28886 | 1991 TW <sub>1</sub>  |
| 1991 TQ <sub>6</sub>  | 15.0 | 0.15 | 19971218 | 338.25984 | 242.14466 | 285.09942 | 3.94010  | 0.0990595 | 2.7347701 | 17  | 5  | 1980–1998 | 0.68 | M-v | 2 | Williams | 25649 | 1991 TQ <sub>6</sub>  |
| 1991 UC               | 13.0 | 0.15 | 19971218 | 113.98090 | 55.48899  | 313.11949 | 1.06792  | 0.0326957 | 2.8716414 | 18  | 3  | 1990–1998 | 0.94 | M-v | 5 | Williams | 31274 | 1991 UC               |
| 1991 VH               | 16.5 | 0.15 | 19971218 | 53.24620  | 207.05752 | 139.48567 | 13.91652 | 0.1438462 | 1.1365704 | 195 | 2  | 1991–1998 | 0.54 | M-v | 2 | Marsden  | 31274 | 1991 VH               |
| 1991 VJ <sub>1</sub>  | 15.0 | 0.15 | 19971218 | 181.93280 | 275.43625 | 107.88007 | 2.42924  | 0.3153096 | 2.5673861 | 45  | 2  | 1991–1995 | 0.51 | M-v | 3 | Williams | 30091 | 1991 VJ <sub>1</sub>  |
| 1991 VX <sub>5</sub>  | 13.0 | 0.15 | 19971218 | 316.37104 | 82.55346  | 87.11781  | 10.86133 | 0.0496625 | 2.9850801 | 27  | 2  | 1991–1998 | 0.86 | M-v | 5 | Williams | 31275 | 1991 VX <sub>5</sub>  |
| 1991 VD <sub>6</sub>  | 14.0 | 0.15 | 19971218 | 85.65838  | 278.49978 | 118.77728 | 7.94580  | 0.1368371 | 2.9531211 | 15  | 2  | 1991–1998 | 0.60 | M-v | 5 | Williams | 31230 | 1991 VD <sub>6</sub>  |
| 1991 VB <sub>9</sub>  | 13.5 | 0.15 | 19971218 | 8.32735   | 314.04131 | 95.32726  | 2.88300  | 0.1177471 | 3.2572651 | 40  | 4  | 1979–1998 | 0.67 | M-v | 3 | Williams | 31138 | 1991 VB <sub>9</sub>  |
| 1991 YZ               | 12.0 | 0.15 | 19971218 | 352.86309 | 213.28797 | 317.56651 | 10.03834 | 0.0445088 | 3.0157782 | 16  | 3  | 1987–1998 | 0.88 | M-v | 4 | Williams | 21977 | 1991 YZ               |
| 1992 BB <sub>5</sub>  | 12.5 | 0.15 | 19971218 | 69.01199  | 316.69742 | 101.56841 | 6.89037  | 0.2016238 | 3.1925286 | 29  | 6  | 1979–1998 | 0.70 | M-v | 1 | Williams | 29660 | 1992 BB <sub>5</sub>  |
| 1992 CQ <sub>2</sub>  | 12.0 | 0.15 | 19971218 | 179.49497 | 172.73782 | 157.74166 | 10.22937 | 0.0849374 | 3.0714901 | 26  | 4  | 1990–1998 | 0.91 | M-v | 2 | Marsden  | 23538 | 1992 CQ <sub>2</sub>  |
| 1992 CU <sub>2</sub>  | 13.5 | 0.15 | 19971218 | 111.95092 | 98.75549  | 277.13450 | 8.11088  | 0.0804798 | 3.1736011 | 24  | 4  | 1988–1998 | 0.70 | M-v | 1 | Williams | 31275 | 1992 CU <sub>2</sub>  |
| 1992 DM <sub>6</sub>  | 12.0 | 0.15 | 19971218 | 189.69845 | 234.99601 | 116.00459 | 2.25380  | 0.1638538 | 3.1187824 | 28  | 6  | 1962–1998 | 0.67 | M-v | 1 | Williams | 28886 | 1992 DM <sub>6</sub>  |
| 1992 DB <sub>10</sub> | 14.0 | 0.15 | 19971218 | 215.94181 | 111.92890 | 191.19202 | 5.94153  | 0.0735986 | 3.2458357 | 19  | 4  | 1977–1998 | 0.51 | M-v | 2 | Williams | 23861 | 1992 DB <sub>10</sub> |
| 1992 EB <sub>2</sub>  | 15.0 | 0.15 | 19971218 | 309.27622 | 65.75033  | 156.32085 | 5.96201  | 0.1134215 | 3.2253412 | 21  | 3  | 1992–1998 | 0.85 | M-v | 4 | Williams | 24762 | 1992 EB <sub>2</sub>  |
| 1992 EC <sub>12</sub> | 13.0 | 0.15 | 19971218 | 221.36449 | 146.51273 | 162.83446 | 12.21039 | 0.0530670 | 3.1991528 | 25  | 5  | 1989–1998 | 0.56 | M-v | 1 | Williams | 28847 | 1992 EC <sub>12</sub> |
| 1992 FO <sub>3</sub>  | 15.0 | 0.15 | 19971218 | 81.74967  | 203.49601 | 185.03226 | 1.23187  | 0.0421889 | 2.1658168 | 42  | 6  | 1982–1998 | 0.73 | M-v | 1 | Williams | 31275 | 1992 FO <sub>3</sub>  |
| 1992 GF <sub>2</sub>  | 15.0 | 0.15 | 19971218 | 143.99786 | 300.27624 | 36.52098  | 2.13361  | 0.1172751 | 2.2066198 | 21  | 3  | 1992–1998 | 0.72 | M-v | 5 | Williams | 31231 | 1992 GF <sub>2</sub>  |
| 1992 JE               | 16.0 | 0.15 | 19971218 | 232.48290 | 109.50379 | 193.93354 | 5.86306  | 0.4631208 | 2.1901295 | 82  | 5  | 1979–1998 | 0.78 | M-v | 2 | Williams | 28615 | 1992 JE               |
| 1992 OO <sub>1</sub>  | 13.0 | 0.15 | 19971218 | 228.90665 | 60.60038  | 138.23353 | 14.82016 | 0.0130477 | 2.5542655 | 33  | 4  | 1970–1998 | 0.81 | M-v | 1 | Williams | 31231 | 1992 OO <sub>1</sub>  |
| 1992 OY <sub>2</sub>  | 14.0 | 0.15 | 19971218 | 109.35989 | 227.58958 | 134.27230 | 4.56822  | 0.1940573 | 2.4614877 | 28  | 3  | 1989–1998 | 0.90 | M-v | 4 | Williams | 31275 | 1992 OY <sub>2</sub>  |
| 1992 OJ <sub>8</sub>  | 13.5 | 0.15 | 19971218 | 185.18104 | 18.53040  | 301.00139 | 6.75408  | 0.1321718 | 2.2961306 | 39  | 3  | 1992–1998 | 0.75 | M-v | 4 | Williams | 31275 | 1992 OJ <sub>8</sub>  |
| 1992 PV <sub>1</sub>  | 14.5 | 0.15 | 19971218 | 197.04111 | 176.10411 | 151.93748 | 4.44118  | 0.1736392 | 2.2730093 | 31  | 4  | 1992–1998 | 0.74 | M-v | 2 | Williams | 29660 | 1992 PV <sub>1</sub>  |
| 1992 RZ <sub>5</sub>  | 14.5 | 0.15 | 19971218 | 347.23980 | 77.30600  | 83.18216  | 3.06158  | 0.1659537 | 2.4041105 | 25  | 4  | 1992–1998 | 0.82 | M-v | 2 | Williams | 31275 | 1992 RZ <sub>5</sub>  |
| 1992 ST               | 14.0 | 0.15 | 19971218 | 84.57569  | 16.09569  | 30.94297  | 8.17233  | 0.3919030 | 2.5564055 | 42  | 4  | 1988–1998 | 0.71 | M-v | 2 | Williams | 29660 | 1992 ST               |
| 1992 SW <sub>3</sub>  | 15.5 | 0.15 | 19971218 | 99.83090  | 13.43199  | 44.45478  | 1.90541  | 0.1699535 | 2.3903248 | 36  | 5  | 1989–1998 | 0.52 | M-v | 1 | Williams | 28615 | 1992 SW <sub>3</sub>  |
| 1992 SM <sub>12</sub> | 13.5 | 0.15 | 19971218 | 208.89829 | 151.02251 | 149.85340 | 6.21950  | 0.1383952 | 2.3855523 | 25  | 6  | 1987–1998 | 0.90 | M-v | 2 | Marsden  | 31275 | 1992 SM <sub>12</sub> |
| 1992 SK <sub>26</sub> | 15.0 | 0.15 | 19971218 | 105.58966 | 211.84586 | 167.49484 | 4.54282  | 0.1602655 | 2.5424843 | 30  | 4  | 1980–1998 | 0.48 | M-v | 4 | Williams | 29661 | 1992 SK <sub>26</sub> |
| 1992 SP <sub>26</sub> | 15.0 | 0.15 | 19971218 | 155.88679 | 275.61341 | 84.20981  | 4.03331  | 0.1899938 | 2.4135857 | 28  | 5  | 1988–1998 | 0.68 | M-v | 2 | Williams | 29661 | 1992 SP <sub>26</sub> |
| 1992 UJ               | 14.5 | 0.15 | 19971218 | 86.38129  | 95.21819  | 308.02669 | 2.36192  | 0.1882481 | 2.5435999 | 19  | 4  | 1988–1998 | 0.66 | M-v | 3 | Williams | 28317 | 1992 UJ               |
| 1992 UR               | 13.5 | 0.15 | 19971218 | 160.73842 | 313.71402 | 39.15029  | 14.83293 | 0.1966152 | 2.4087903 | 28  | 5  | 1977–1998 | 0.85 | M-v | 2 | Williams | 28615 | 1992 UR               |
| 1992 UX <sub>4</sub>  | 12.5 | 0.15 | 19971218 | 18.19267  | 173.17856 | 239.64018 | 16.13663 | 0.3282473 | 2.8682240 | 27  | 3  | 1929–1998 | 0.87 | M-v | 3 | Williams | 27729 | 1992 UX <sub>4</sub>  |
| 1992 UK <sub>5</sub>  | 13.5 | 0.15 | 19971218 | 234.73628 | 250.47741 | 53.40732  | 5.15780  | 0.2604120 | 2.3250650 | 24  | 5  | 1974–1998 | 0.80 | M-v | 2 | Williams | 29661 | 1992 UK <sub>5</sub>  |
| 1992 UL <sub>6</sub>  | 13.5 | 0.15 | 19971218 | 22.45219  | 5.84395   | 74.94734  | 6.31252  | 0.1816518 | 2.7362180 | 28  | 3  | 1980–1998 | 0.72 | M-v | 3 | Williams | 31232 | 1992 UL <sub>6</sub>  |
| 1992 WX <sub>2</sub>  | 13.5 | 0.15 | 19971218 | 7.87234   | 283.71462 | 205.60866 | 3.26304  | 0.1197559 | 2.6295832 | 70  | 7  | 1958–1998 | 0.67 | M-v | 1 | Williams | 29661 | 1992 WX <sub>2</sub>  |
| 1992 WN <sub>3</sub>  | 13.0 | 0.15 | 19971218 | 51.03655  | 339.57629 | 71.48462  | 9.60995  | 0.2193692 | 2.7632901 | 32  | 2  | 1992–1998 | 0.60 | M-v | 4 | Williams | 31233 | 1992 WN <sub>3</sub>  |
| 1992 WG <sub>5</sub>  | 13.0 | 0.15 | 19971218 | 13.38898  | 22.52579  | 88.05935  | 14.15693 | 0.1140288 | 2.7090051 | 22  | 4  | 1989–1998 | 0.51 | M-v | 1 | Williams | 31275 | 1992 WG <sub>5</sub>  |
| 1992 YH               | 13.0 | 0.15 | 19971218 | 100.36838 | 339.34092 | 70.07827  | 13.84027 | 0.1936151 | 2.5901636 | 18  | 4  | 1989–1998 | 0.52 | M-v | 3 | Williams | 29616 | 1992 YH               |
| 1992 YU <sub>1</sub>  | 13.5 | 0.15 | 19971218 | 111.88130 | 85.28466  | 286.58065 | 5.12315  | 0.0828976 | 2.7239474 | 25  | 4  | 1982–1998 | 0.88 | M-v | 2 | Williams | 31233 | 1992 YU <sub>1</sub>  |
| 1992 YS <sub>2</sub>  | 12.5 | 0.15 | 19971218 | 352.70764 | 13.71319  | 78.07071  | 3.20962  | 0.0377035 | 2.9277667 | 38  | 3  | 1991–1998 | 0.74 | M-v | 4 | Williams | 31139 | 1992 YS <sub>2</sub>  |
| 1992 YW <sub>3</sub>  | 11.5 | 0.15 | 19971218 | 18.43906  | 26.41084  | 87.89090  | 12.02560 | 0.2118342 | 2.7993474 | 36  | 5  | 1956–1998 | 0.59 | M-v | 1 | Williams | 31139 | 1992 YW <sub>3</sub>  |
| 1993 CO               | 12.0 | 0.15 | 19971218 | 40.22479  | 37.54026  | 43.31348  | 2.55957  | 0.0737735 | 2.9229600 | 59  | 10 | 1976–1998 | 0.82 | M-v | 1 | Marsden  | 28887 | 1993 CO               |
| 1993 EJ               | 14.0 | 0.15 | 19971218 | 71.35819  | 162.57950 | 49.72433  | 7.04585  | 0.0751370 | 2.4157022 | 20  | 2  | 1993–1997 | 0.91 | M-v | 4 | Williams | 30092 | 1993 EJ               |
| 1993 FA <sub>2</sub>  | 13.0 | 0.15 | 19971218 | 300.54592 | 84.63536  | 98.33956  | 6.16462  | 0.1098147 | 3.1913500 | 30  | 2  | 1993–1998 | 0.43 | M-v | 4 | Williams | 31233 | 1993 FA <sub>2</sub>  |
| 1993 FF <sub>4</sub>  | 13.5 | 0.15 | 19971218 | 25.29530  | 58.55962  | 41.87936  | 2.34934  | 0.1417474 | 3.0598109 | 21  | 3  | 1982–1998 | 0.59 | M-v | 5 | Williams | 31275 | 1993 FF <sub>4</sub>  |
| 1993 FZ <sub>4</sub>  | 14.0 | 0.15 | 19971218 | 173.99549 | 195.19953 | 122.79097 | 2.59100  | 0.1404378 | 3.2170036 | 30  | 3  | 1993–1998 | 0.59 | M-v | 3 | Williams | 26190 | 1993 FZ <sub>4</sub>  |

|                       |      |      |          |           |           |           |          |           |           |    |   |           |      |     |   |          |       |                       |
|-----------------------|------|------|----------|-----------|-----------|-----------|----------|-----------|-----------|----|---|-----------|------|-----|---|----------|-------|-----------------------|
| 1993 FM <sub>7</sub>  | 14.0 | 0.15 | 19971218 | 103.58486 | 313.00522 | 109.18905 | 3.42456  | 0.0159749 | 2.9071774 | 19 | 3 | 1990–1998 | 0.73 | M-v | 2 | Williams | 30979 | 1993 FM <sub>7</sub>  |
| 1993 FN <sub>8</sub>  | 14.0 | 0.15 | 19971218 | 322.28537 | 27.49465  | 140.09564 | 6.49181  | 0.1068655 | 3.1253746 | 11 | 2 | 1993–1998 | 0.50 | M-v | 4 | Williams | 31233 | 1993 FN <sub>8</sub>  |
| 1993 FS <sub>13</sub> | 13.5 | 0.15 | 19971218 | 19.97829  | 256.86966 | 53.02068  | 6.00701  | 0.1580813 | 2.3000596 | 13 | 2 | 1993–1994 | 0.99 | M-v | 5 | Williams | 24408 | 1993 FS <sub>13</sub> |
| 1993 FU <sub>13</sub> | 13.5 | 0.15 | 19971218 | 236.37552 | 1.97346   | 74.64020  | 4.24675  | 0.1551415 | 2.2508414 | 12 | 3 | 1988–1993 | 0.70 | M-v | 3 | Williams | 29617 | 1993 FU <sub>13</sub> |
| 1993 FF <sub>14</sub> | 13.0 | 0.15 | 19930314 | 320.83468 | 207.79185 | 24.44409  | 14.25835 | 0.1323208 | 2.6587388 | 5  | 1 | 30 days   | 0.19 |     |   | Williams |       | 1993 FF <sub>14</sub> |
| 1993 FS <sub>14</sub> | 12.0 | 0.15 | 19971218 | 78.93876  | 295.18097 | 105.04544 | 6.44296  | 0.1595288 | 3.1623704 | 19 | 4 | 1992–1998 | 0.69 | M-v | 2 | Williams | 31275 | 1993 FS <sub>14</sub> |
| 1993 FT <sub>14</sub> | 14.0 | 0.15 | 19971218 | 93.59238  | 344.19036 | 131.73324 | 5.54210  | 0.2462201 | 2.5946651 | 26 | 3 | 1993–1997 | 0.43 | M-v | 3 | Williams | 29137 | 1993 FT <sub>14</sub> |
| 1993 FY <sub>14</sub> | 12.0 | 0.15 | 19930314 | 247.10302 | 266.26487 | 37.01487  | 11.58414 | 0.0569313 | 2.9861928 | 4  | 1 | 7 days    | 0.25 |     |   | Williams |       | 1993 FY <sub>14</sub> |
| 1993 FA <sub>15</sub> | 12.5 | 0.15 | 19930314 | 179.49038 | 314.01465 | 50.78785  | 7.68672  | 0.1247339 | 2.4005114 | 5  | 1 | 30 days   | 0.32 |     |   | Williams |       | 1993 FA <sub>15</sub> |
| 1993 FE <sub>15</sub> | 12.5 | 0.15 | 19930314 | 36.87340  | 338.84556 | 159.12237 | 11.23204 | 0.1239354 | 2.5751390 | 6  | 1 | 7 days    | 0.73 |     |   | Williams |       | 1993 FE <sub>15</sub> |
| 1993 FG <sub>15</sub> | 12.5 | 0.15 | 19930314 | 251.33746 | 204.57490 | 109.31413 | 5.80569  | 0.2180105 | 2.5980358 | 5  | 1 | 7 days    | 0.44 |     |   | Williams |       | 1993 FG <sub>15</sub> |
| 1993 FM <sub>16</sub> | 12.5 | 0.15 | 19971218 | 65.78276  | 341.38573 | 67.55828  | 5.99104  | 0.1164276 | 3.2447759 | 20 | 4 | 1993–1998 | 0.57 | M-v | 1 | Williams | 28887 | 1993 FM <sub>16</sub> |
| 1993 FH <sub>22</sub> | 13.0 | 0.15 | 19971218 | 212.07791 | 107.47409 | 196.76131 | 0.57692  | 0.1554536 | 3.1530010 | 23 | 5 | 1977–1998 | 0.80 | M-v | 2 | Marsden  | 28887 | 1993 FH <sub>22</sub> |
| 1993 FY <sub>22</sub> | 13.5 | 0.15 | 19971218 | 49.43588  | 87.57464  | 358.20052 | 8.43230  | 0.1014205 | 3.0979680 | 14 | 3 | 1971–1998 | 0.94 | M-v | 5 | Williams | 23524 | 1993 FY <sub>22</sub> |
| 1993 FK <sub>23</sub> | 13.0 | 0.15 | 19971218 | 253.75183 | 270.26547 | 4.75935   | 8.50947  | 0.0827946 | 3.0129020 | 14 | 4 | 1972–1998 | 0.53 | M-v | 2 | Williams | 28887 | 1993 FK <sub>23</sub> |
| 1993 FG <sub>24</sub> | 12.0 | 0.15 | 19971218 | 234.03100 | 92.40240  | 194.79274 | 9.93318  | 0.0978287 | 3.0409965 | 34 | 7 | 1953–1998 | 0.88 | M-v | 1 | Williams | 29662 | 1993 FG <sub>24</sub> |
| 1993 FT <sub>41</sub> | 13.0 | 0.15 | 19971218 | 80.93957  | 93.30249  | 1.69207   | 1.64117  | 0.0601839 | 2.8461057 | 26 | 6 | 1981–1998 | 0.90 | M-v | 1 | Williams | 28887 | 1993 FT <sub>41</sub> |
| 1993 FR <sub>44</sub> | 12.0 | 0.15 | 19971218 | 15.12662  | 131.46621 | 334.03922 | 4.20063  | 0.1292879 | 3.1220793 | 33 | 5 | 1979–1998 | 0.54 | M-v | 1 | Marsden  | 28616 | 1993 FR <sub>44</sub> |
| 1993 FH <sub>49</sub> | 14.0 | 0.15 | 19971218 | 106.54348 | 227.95145 | 190.55267 | 1.64293  | 0.0760052 | 2.8957831 | 24 | 3 | 1990–1995 | 0.97 | M-v | 5 | Williams | 27915 | 1993 FH <sub>49</sub> |
| 1993 FR <sub>58</sub> | 14.0 | 0.15 | 19971218 | 104.03797 | 190.57906 | 237.01848 | 1.01227  | 0.0900075 | 2.8331241 | 46 | 4 | 1986–1995 | 0.73 | M-v | 3 | Williams | 30092 | 1993 FR <sub>58</sub> |
| 1993 FK <sub>81</sub> | 13.0 | 0.15 | 19971218 | 319.46837 | 14.07985  | 172.33824 | 9.97370  | 0.0421844 | 3.0522597 | 21 | 3 | 1993–1998 | 0.66 | M-v | 4 | Williams | 30092 | 1993 FK <sub>81</sub> |
| 1993 OB               | 13.0 | 0.15 | 19971218 | 24.95966  | 84.06566  | 281.27410 | 21.43622 | 0.2972810 | 2.4105859 | 29 | 2 | 1993–1998 | 0.74 | M-v | 2 | Williams | 31139 | 1993 OB               |
| 1993 QO               | 14.0 | 0.15 | 19971218 | 51.11474  | 77.57849  | 314.04367 | 21.94795 | 0.2844525 | 2.2986282 | 38 | 3 | 1986–1998 | 0.67 | M-v | 2 | Williams | 31276 | 1993 QO               |
| 1993 QO <sub>8</sub>  | 15.5 | 0.15 | 19971218 | 8.28325   | 29.71044  | 38.31871  | 3.04297  | 0.2079707 | 2.3511391 | 45 | 2 | 1993–1998 | 0.72 | M-v | 4 | Williams | 31139 | 1993 QO <sub>8</sub>  |
| 1993 RL <sub>5</sub>  | 14.5 | 0.15 | 19971218 | 51.95930  | 70.63008  | 307.53730 | 2.59217  | 0.0609479 | 2.3456886 | 30 | 4 | 1984–1998 | 0.68 | M-v | 2 | Williams | 31139 | 1993 RL <sub>5</sub>  |
| 1993 SZ               | 14.5 | 0.15 | 19971218 | 71.56321  | 170.43266 | 216.14470 | 3.08812  | 0.1553879 | 2.2705292 | 30 | 3 | 1993–1998 | 0.64 | M-v | 4 | Williams | 31276 | 1993 SZ               |
| 1993 TC <sub>3</sub>  | 15.0 | 0.15 | 19971218 | 112.89770 | 193.38496 | 166.26256 | 2.39394  | 0.2067924 | 2.2118805 | 23 | 4 | 1980–1998 | 0.86 | M-v | 2 | Williams | 30472 | 1993 TC <sub>3</sub>  |
| 1993 TH <sub>32</sub> | 13.5 | 0.15 | 19971218 | 152.08979 | 120.79505 | 142.15160 | 2.70044  | 0.1846799 | 2.3838471 | 46 | 4 | 1988–1998 | 0.73 | M-v | 3 | Williams | 31276 | 1993 TH <sub>32</sub> |
| 1993 TZ <sub>32</sub> | 15.0 | 0.15 | 19971218 | 96.48005  | 272.68679 | 124.14343 | 2.77645  | 0.0488437 | 2.1801613 | 25 | 5 | 1954–1998 | 0.48 | M-v | 2 | Williams | 27936 | 1993 TZ <sub>32</sub> |
| 1993 TE <sub>34</sub> | 15.0 | 0.15 | 19971218 | 143.10757 | 177.46931 | 151.18222 | 3.98594  | 0.1642647 | 2.1992648 | 23 | 2 | 1993–1998 | 0.74 | M-v | 5 | Williams | 31235 | 1993 TE <sub>34</sub> |
| 1993 TU <sub>36</sub> | 12.5 | 0.15 | 19971218 | 65.18257  | 242.06063 | 94.56109  | 10.47956 | 0.1743863 | 2.4228494 | 29 | 4 | 1988–1998 | 0.39 | M-v | 3 | Williams | 31007 | 1993 TU <sub>36</sub> |
| 1993 UU               | 13.5 | 0.15 | 19971218 | 91.37553  | 322.38398 | 59.14156  | 7.83914  | 0.1971346 | 2.2625670 | 15 | 3 | 1993–1998 | 0.59 | M-v | 4 | Williams | 25216 | 1993 UU               |
| 1993 UD <sub>1</sub>  | 15.0 | 0.15 | 19971218 | 121.56817 | 238.31232 | 70.48682  | 6.10411  | 0.1726758 | 2.3342801 | 26 | 2 | 1993–1998 | 0.86 | M-v | 5 | Williams | 31235 | 1993 UD <sub>1</sub>  |
| 1993 UD <sub>3</sub>  | 13.0 | 0.15 | 19971218 | 77.96039  | 98.63451  | 256.35882 | 5.32356  | 0.1501471 | 2.3995168 | 26 | 2 | 1993–1998 | 0.64 | M-v | 4 | Williams | 31140 | 1993 UD <sub>3</sub>  |
| 1993 UF <sub>7</sub>  | 14.5 | 0.15 | 19971218 | 73.63198  | 267.07215 | 145.71966 | 4.52991  | 0.1099010 | 2.2285512 | 21 | 4 | 1986–1998 | 0.78 | M-v | 2 | Williams | 27716 | 1993 UF <sub>7</sub>  |
| 1993 VS               | 15.0 | 0.15 | 19971218 | 17.99552  | 271.47219 | 126.08304 | 1.51824  | 0.1739259 | 2.5359468 | 39 | 2 | 1993–1998 | 0.54 | M-v | 4 | Williams | 31276 | 1993 VS               |
| 1993 VN <sub>2</sub>  | 14.5 | 0.15 | 19971218 | 111.35265 | 203.34682 | 154.38272 | 2.80192  | 0.1662954 | 2.3120686 | 40 | 4 | 1982–1998 | 0.83 | M-v | 2 | Williams | 28616 | 1993 VN <sub>2</sub>  |
| 1993 VC <sub>5</sub>  | 15.0 | 0.15 | 19971218 | 33.25084  | 251.19993 | 162.25935 | 21.62939 | 0.3244099 | 2.3719121 | 40 | 4 | 1986–1998 | 0.55 | M-v | 1 | Williams | 30472 | 1993 VC <sub>5</sub>  |
| 1993 VB <sub>8</sub>  | 14.5 | 0.15 | 19971218 | 68.48730  | 334.02854 | 104.23521 | 7.04964  | 0.0708776 | 2.3100789 | 17 | 3 | 1989–1998 | 0.43 | M-v | 3 | Williams | 31236 | 1993 VB <sub>8</sub>  |
| 1993 XV               | 13.5 | 0.15 | 19971218 | 27.24059  | 136.83920 | 289.01979 | 6.37590  | 0.2104995 | 2.4759689 | 34 | 2 | 1993–1998 | 0.53 | M-v | 4 | Marsden  | 31276 | 1993 XV               |
| 1993 XN <sub>1</sub>  | 12.5 | 0.15 | 19971218 | 172.37012 | 181.81489 | 95.03922  | 16.46662 | 0.1504451 | 2.5851997 | 44 | 4 | 1991–1998 | 0.76 | M-v | 2 | Williams | 31276 | 1993 XN <sub>1</sub>  |
| 1993 XO <sub>1</sub>  | 13.5 | 0.15 | 19971218 | 181.61704 | 115.95717 | 212.63641 | 4.27860  | 0.1651654 | 2.2559443 | 30 | 4 | 1993–1998 | 0.65 | M-v | 1 | Williams | 28888 | 1993 XO <sub>1</sub>  |
| 1993 XP <sub>1</sub>  | 14.5 | 0.15 | 19971218 | 342.01813 | 16.55307  | 151.82108 | 5.01324  | 0.0430721 | 2.3267720 | 25 | 5 | 1953–1998 | 0.79 | M-v | 2 | Williams | 28318 | 1993 XP <sub>1</sub>  |
| 1994 AF               | 14.5 | 0.15 | 19971218 | 50.67473  | 165.40567 | 240.58434 | 3.46640  | 0.1869320 | 2.4552242 | 22 | 2 | 1994–1998 | 0.64 | M-v | 5 | Williams | 31237 | 1994 AF               |
| 1994 AV <sub>1</sub>  | 14.0 | 0.15 | 19971218 | 359.08899 | 207.46897 | 302.10370 | 6.01092  | 0.1803433 | 2.4044917 | 31 | 3 | 1989–1998 | 0.56 | M-v | 3 | Williams | 31237 | 1994 AV <sub>1</sub>  |
| 1994 AH <sub>3</sub>  | 13.5 | 0.15 | 19971218 | 8.56843   | 231.38313 | 267.20849 | 4.40110  | 0.0496863 | 2.4028189 | 30 | 9 | 1972–1998 | 0.74 | M-v | 1 | Williams | 29137 | 1994 AH <sub>3</sub>  |
| 1994 AE <sub>11</sub> | 15.0 | 0.15 | 19971218 | 49.03021  | 347.36868 | 77.76461  | 4.73373  | 0.1486368 | 2.4819218 | 19 | 6 | 1951–1998 | 0.72 | M-v | 1 | Williams | 29662 | 1994 AE <sub>11</sub> |
| 1994 AC <sub>17</sub> | 13.5 | 0.15 | 19971218 | 312.78413 | 55.48216  | 106.47418 | 3.62686  | 0.2191253 | 2.5591412 | 47 | 4 | 1986–1998 | 0.77 | M-v | 3 | Williams | 31276 | 1994 AC <sub>17</sub> |
| 1994 BM               | 14.0 | 0.15 | 19971218 | 71.43884  | 112.21923 | 316.76269 | 6.02842  | 0.1141050 | 2.4046450 | 48 | 3 | 1993–1998 | 0.87 | M-v | 3 | Williams | 30472 | 1994 BM               |
| 1994 BW               | 14.0 | 0.15 | 19971218 | 301.27568 | 123.33757 | 104.98375 | 7.30685  | 0.0918271 | 2.3228960 | 15 | 3 | 1991–1998 | 0.44 | M-v | 4 | Williams | 29920 | 1994 BW               |
| 1994 BA <sub>1</sub>  | 14.5 | 0.15 | 19971218 | 21.82603  | 75.65207  | 7.44877   | 6.64315  | 0.1361708 | 2.5777583 | 28 | 3 | 1992–1998 | 0.81 | M-v | 4 | Williams | 31237 | 1994 BA <sub>1</sub>  |
| 1994 BN <sub>4</sub>  | 14.0 | 0.15 | 19971218 | 197.39130 | 75.00308  | 254.36838 | 5.69628  | 0.1497483 | 2.3074230 | 50 | 3 | 1994–1998 | 0.52 | M-v | 3 | Williams | 29318 | 1994 BN <sub>4</sub>  |
| 1994 CE <sub>1</sub>  | 14.0 | 0.15 | 19971218 | 50.05452  | 108.68271 | 320.84780 | 13.35932 | 0.1418368 | 2.5446938 | 31 | 2 | 1994–1998 | 0.71 | M-v | 4 | Williams | 31276 | 1994 CE <sub>1</sub>  |

|                       |      |      |          |           |           |           |          |           |           |     |   |           |      |     |   |          |       |                       |
|-----------------------|------|------|----------|-----------|-----------|-----------|----------|-----------|-----------|-----|---|-----------|------|-----|---|----------|-------|-----------------------|
| 1994 CN <sub>2</sub>  | 16.5 | 0.15 | 19971218 | 124.99804 | 248.12974 | 99.37617  | 1.43825  | 0.3950344 | 1.5733043 | 101 | 3 | 1994–1998 | 0.52 | M-v | 4 | Marsden  | 31276 | 1994 CN <sub>2</sub>  |
| 1994 CS <sub>2</sub>  | 12.5 | 0.15 | 19971218 | 18.23714  | 337.93475 | 132.80789 | 14.86269 | 0.0885282 | 2.5816014 | 20  | 2 | 1994–1998 | 0.50 | M-v | 4 | Williams | 31238 | 1994 CS <sub>2</sub>  |
| 1994 CT <sub>12</sub> | 13.5 | 0.15 | 19971218 | 61.15239  | 292.53676 | 125.86329 | 7.63539  | 0.1304780 | 2.5519786 | 20  | 2 | 1994–1998 | 0.63 | M-v | 5 | Williams | 31238 | 1994 CT <sub>12</sub> |
| 1994 CC <sub>18</sub> | 14.0 | 0.15 | 19971218 | 59.67251  | 56.30248  | 358.48239 | 12.91457 | 0.1737850 | 2.5643394 | 23  | 4 | 1990–1998 | 0.83 | M-v | 3 | Williams | 23785 | 1994 CC <sub>18</sub> |
| 1994 EB               | 14.0 | 0.15 | 19971218 | 27.93730  | 321.00005 | 172.56153 | 6.56903  | 0.0789626 | 2.4691645 | 24  | 4 | 1990–1998 | 0.81 | M-v | 3 | Williams | 29944 | 1994 EB               |
| 1994 EQ               | 13.5 | 0.15 | 19971218 | 269.31671 | 230.23865 | 22.82971  | 12.90543 | 0.1480449 | 2.5739951 | 18  | 3 | 1990–1998 | 0.67 | M-v | 4 | Williams | 29920 | 1994 EQ               |
| 1994 EJ <sub>1</sub>  | 12.5 | 0.15 | 19971218 | 44.96944  | 263.49042 | 179.82686 | 21.82173 | 0.0689573 | 2.6639118 | 33  | 4 | 1990–1998 | 0.72 | M-v | 2 | Williams | 29662 | 1994 EJ <sub>1</sub>  |
| 1994 ER <sub>3</sub>  | 13.5 | 0.15 | 19971218 | 356.41462 | 351.77318 | 141.66198 | 7.60438  | 0.2544629 | 2.5926695 | 26  | 4 | 1951–1998 | 0.64 | M-v | 1 | Williams | 31276 | 1994 ER <sub>3</sub>  |
| 1994 FS               | 14.0 | 0.15 | 19971218 | 254.70176 | 64.16556  | 205.74395 | 1.87183  | 0.1821546 | 2.4388505 | 48  | 4 | 1994–1998 | 0.68 | M-v | 1 | Williams | 28888 | 1994 FS               |
| 1994 GQ               | 12.5 | 0.15 | 19971218 | 307.73070 | 111.43923 | 41.21042  | 13.54740 | 0.0970469 | 2.9113330 | 16  | 4 | 1951–1994 | 0.69 | M-v | 3 | Williams | 25532 | 1994 GQ               |
| 1994 GY <sub>9</sub>  | 14.5 | 0.15 | 19971218 | 18.97779  | 262.84919 | 173.64021 | 10.42211 | 0.2121701 | 2.6991008 | 34  | 4 | 1952–1998 | 0.51 | M-v | 2 | Williams | 31276 | 1994 GY <sub>9</sub>  |
| 1994 HD               | 13.5 | 0.15 | 19971218 | 333.66848 | 320.94960 | 195.38823 | 27.04967 | 0.2370506 | 2.6896776 | 27  | 3 | 1994–1998 | 0.39 | M-v | 2 | Williams | 25643 | 1994 HD               |
| 1994 JF <sub>1</sub>  | 17.0 | 0.15 | 19971218 | 306.25054 | 153.32151 | 119.62693 | 3.49304  | 0.4810848 | 2.5403676 | 75  | 3 | 1990–1998 | 0.68 | M-v | 1 | Williams | 27447 | 1994 JF <sub>1</sub>  |
| 1994 JS <sub>1</sub>  | 14.0 | 0.15 | 19971218 | 334.73953 | 22.23009  | 168.82087 | 19.44845 | 0.3511222 | 2.6036724 | 44  | 3 | 1994–1998 | 0.63 | M-v | 2 | Williams | 31276 | 1994 JS <sub>1</sub>  |
| 1994 RX               | 13.5 | 0.15 | 19971218 | 284.98394 | 257.04624 | 125.88667 | 8.17981  | 0.2503348 | 2.4285370 | 27  | 5 | 1977–1996 | 0.63 | M-v | 2 | Williams | 29138 | 1994 RX               |
| 1994 TF <sub>2</sub>  | 19.0 | 0.15 | 19971218 | 305.46508 | 349.60227 | 175.32233 | 23.75545 | 0.2838919 | 0.9932022 | 118 | 4 | 1994–1997 | 0.69 | M-v | 3 | Marsden  | 30900 | 1994 TF <sub>2</sub>  |
| 1994 VW <sub>1</sub>  | 15.5 | 0.15 | 19971218 | 36.53524  | 320.00882 | 109.38319 | 15.53900 | 0.2598887 | 1.9626800 | 37  | 3 | 1994–1998 | 0.49 | M-v | 2 | Williams | 31277 | 1994 VW <sub>1</sub>  |
| 1994 VC <sub>7</sub>  | 10.5 | 0.15 | 19971218 | 222.20356 | 263.18707 | 52.65511  | 14.21220 | 0.1595856 | 3.9923590 | 26  | 4 | 1986–1998 | 0.65 | M-v | 1 | Williams | 30873 | 1994 VC <sub>7</sub>  |
| 1994 XK               | 14.0 | 0.15 | 19971218 | 359.05892 | 295.54994 | 56.99400  | 5.39685  | 0.2081443 | 2.4460962 | 27  | 4 | 1982–1997 | 0.65 | M-v | 2 | Marsden  | 30783 | 1994 XK               |
| 1995 AW <sub>2</sub>  | 13.0 | 0.15 | 19971218 | 243.18003 | 305.52758 | 248.16565 | 5.38998  | 0.1154733 | 2.2716546 | 50  | 4 | 1986–1998 | 0.60 | M-v | 2 | Williams | 31140 | 1995 AW <sub>2</sub>  |
| 1995 EO               | 15.0 | 0.15 | 19971218 | 317.09304 | 261.73899 | 236.01742 | 3.21361  | 0.1004974 | 2.2890346 | 73  | 3 | 1995–1998 | 0.56 | M-v | 3 | Marsden  | 31277 | 1995 EO               |
| 1995 GW               | 13.5 | 0.15 | 19971218 | 325.21904 | 118.16809 | 35.74454  | 8.41977  | 0.1355856 | 2.3112442 | 27  | 2 | 1995–1998 | 0.64 | M-v | 4 | Williams | 31106 | 1995 GW               |
| 1995 HP               | 14.0 | 0.15 | 19971218 | 198.44080 | 214.50943 | 100.26914 | 3.59153  | 0.2393954 | 2.3275614 | 18  | 3 | 1995–1998 | 0.40 | M-v | 3 | Williams | 28591 | 1995 HP               |
| 1995 KH               | 16.0 | 0.15 | 19971218 | 345.92336 | 13.28815  | 147.50591 | 1.92702  | 0.0925357 | 2.2136607 | 50  | 4 | 1988–1998 | 0.49 | M-v | 1 | Williams | 28075 | 1995 KH               |
| 1995 KZ               | 14.5 | 0.15 | 19971218 | 220.45223 | 154.53751 | 138.73822 | 24.39243 | 0.1930169 | 2.3488612 | 47  | 4 | 1988–1998 | 0.45 | M-v | 2 | Williams | 29138 | 1995 KZ               |
| 1995 KL <sub>1</sub>  | 13.5 | 0.15 | 19971218 | 287.40389 | 284.49004 | 306.57818 | 22.06295 | 0.2079000 | 2.3114861 | 29  | 3 | 1974–1998 | 0.40 | M-v | 2 | Williams | 31277 | 1995 KL <sub>1</sub>  |
| 1995 NB               | 13.5 | 0.15 | 19971218 | 148.26135 | 257.13701 | 107.42437 | 5.36118  | 0.3592751 | 2.9123674 | 86  | 4 | 1992–1998 | 0.55 | M-v | 1 | Williams | 28889 | 1995 NB               |
| 1995 OE               | 13.0 | 0.15 | 19971218 | 349.54033 | 217.28162 | 255.80774 | 8.89761  | 0.0571072 | 3.0613992 | 54  | 3 | 1995–1998 | 0.45 | M-v | 3 | Marsden  | 29138 | 1995 OE               |
| 1995 OG               | 14.5 | 0.15 | 19971218 | 122.97043 | 54.52348  | 312.83761 | 10.14219 | 0.1154978 | 2.9798831 | 51  | 3 | 1995–1998 | 0.75 | M-v | 3 | Williams | 31277 | 1995 OG               |
| 1995 OJ               | 15.5 | 0.15 | 19971218 | 328.24511 | 72.44886  | 125.53387 | 3.08415  | 0.1739829 | 2.3445736 | 34  | 3 | 1980–1998 | 0.29 | M-v | 3 | Williams | 31240 | 1995 OJ               |
| 1995 OK               | 15.5 | 0.15 | 19971218 | 228.05524 | 204.26341 | 125.09758 | 6.96364  | 0.1403407 | 2.3065883 | 35  | 5 | 1992–1998 | 0.57 | M-v | 2 | Williams | 29664 | 1995 OK               |
| 1995 OT               | 14.0 | 0.15 | 19971218 | 251.46143 | 268.81089 | 33.28588  | 4.14965  | 0.2047453 | 2.2822665 | 21  | 5 | 1985–1998 | 0.90 | M-v | 2 | Williams | 29664 | 1995 OT               |
| 1995 OD <sub>1</sub>  | 14.5 | 0.15 | 19971218 | 335.97428 | 5.75105   | 154.65024 | 12.25395 | 0.0875038 | 3.0069010 | 46  | 3 | 1995–1998 | 0.61 | M-v | 3 | Williams | 31277 | 1995 OD <sub>1</sub>  |
| 1995 OE <sub>1</sub>  | 15.0 | 0.15 | 19971218 | 106.19656 | 255.55189 | 153.83134 | 2.49228  | 0.0639048 | 2.8627267 | 40  | 3 | 1995–1998 | 0.54 | M-v | 3 | Williams | 28889 | 1995 OE <sub>1</sub>  |
| 1995 PC               | 15.0 | 0.15 | 19971218 | 135.35808 | 306.50173 | 36.71484  | 0.30226  | 0.2098182 | 3.1279416 | 41  | 4 | 1991–1998 | 0.68 | M-v | 1 | Williams | 28889 | 1995 PC               |
| 1995 SH               | 13.5 | 0.15 | 19971218 | 350.71154 | 9.07175   | 188.95751 | 13.53736 | 0.0933839 | 2.6206162 | 47  | 3 | 1995–1998 | 0.43 | M-v | 2 | Williams | 31141 | 1995 SH               |
| 1995 SD <sub>5</sub>  | 12.0 | 0.15 | 19971218 | 203.42263 | 329.47686 | 350.81186 | 13.38092 | 0.0679525 | 2.9593946 | 23  | 4 | 1993–1998 | 0.73 | M-v | 1 | Williams | 29946 | 1995 SD <sub>5</sub>  |
| 1995 SO <sub>5</sub>  | 13.5 | 0.15 | 19971218 | 223.50737 | 256.91638 | 54.66775  | 14.06743 | 0.1987599 | 2.5333475 | 13  | 3 | 1987–1998 | 0.58 | M-v | 2 | Williams | 26582 | 1995 SO <sub>5</sub>  |
| 1995 SR <sub>9</sub>  | 15.0 | 0.15 | 19971218 | 62.43124  | 94.78509  | 355.83448 | 12.95927 | 0.1252479 | 3.1531517 | 33  | 2 | 1995–1998 | 0.71 | M-v | 4 | Williams | 31240 | 1995 SR <sub>9</sub>  |
| 1995 SO <sub>29</sub> | 13.5 | 0.15 | 19971218 | 144.82251 | 239.26737 | 139.69915 | 2.03938  | 0.2071566 | 3.1181035 | 35  | 5 | 1973–1998 | 0.78 | M-v | 2 | Williams | 29318 | 1995 SO <sub>29</sub> |
| 1995 SV <sub>52</sub> | 12.5 | 0.15 | 19971218 | 112.44309 | 258.86154 | 141.77552 | 7.09301  | 0.1453137 | 3.1567747 | 18  | 3 | 1992–1998 | 0.53 | M-v | 3 | Williams | 27731 | 1995 SV <sub>52</sub> |
| 1995 TG               | 12.5 | 0.15 | 19971218 | 155.79876 | 301.29928 | 60.82107  | 12.18477 | 0.1705743 | 3.1065641 | 84  | 3 | 1995–1998 | 0.56 | M-v | 3 | Williams | 29319 | 1995 TG               |
| 1995 US               | 12.0 | 0.15 | 19971218 | 210.10352 | 354.05839 | 328.03751 | 21.46934 | 0.1174831 | 2.9750120 | 22  | 6 | 1974–1998 | 0.64 | M-v | 1 | Williams | 30665 | 1995 US               |
| 1995 US <sub>11</sub> | 14.5 | 0.15 | 19971218 | 212.24271 | 313.26103 | 12.06913  | 12.21321 | 0.2740354 | 2.6298123 | 21  | 4 | 1978–1998 | 0.43 | M-v | 2 | Williams | 26423 | 1995 US <sub>11</sub> |
| 1995 WC <sub>4</sub>  | 12.0 | 0.15 | 19971218 | 201.10502 | 273.12935 | 62.35452  | 14.71674 | 0.2132507 | 3.1254980 | 20  | 5 | 1973–1998 | 0.72 | M-v | 1 | Williams | 28861 | 1995 WC <sub>4</sub>  |
| 1995 WB <sub>6</sub>  | 13.5 | 0.15 | 19971218 | 244.73619 | 127.42854 | 189.36398 | 8.55936  | 0.1460600 | 2.7910352 | 33  | 6 | 1953–1998 | 0.62 | M-v | 1 | Williams | 29665 | 1995 WB <sub>6</sub>  |
| 1996 DF               | 13.0 | 0.15 | 19971218 | 286.96153 | 280.28098 | 128.10776 | 5.91385  | 0.0681435 | 2.3698050 | 17  | 5 | 1989–1996 | 0.65 | M-v | 2 | Williams | 28890 | 1996 DF               |
| 1996 DH               | 16.5 | 0.15 | 19971218 | 190.75184 | 351.33243 | 309.40499 | 17.23139 | 0.2767008 | 1.5871888 | 114 | 2 | 1996–1998 | 0.56 | M-v | 3 | Marsden  | 31278 | 1996 DH               |
| 1996 EN               | 16.5 | 0.15 | 19971218 | 266.20679 | 125.08320 | 164.24400 | 37.95322 | 0.4309287 | 1.5066850 | 266 | 3 | 1996–1998 | 0.54 | M-v | 1 | Marsden  | 31278 | 1996 EN               |
| 1996 FP <sub>1</sub>  | 11.7 | 0.15 | 19960318 | 346.77802 | 169.75869 | 1.51812   | 3.53044  | 0.0942399 | 3.9201246 | 6   | 1 | 7 days    | 0.37 |     |   | D Nakano |       | 1996 FP <sub>1</sub>  |
| 1996 FG <sub>3</sub>  | 18.5 | 0.15 | 19971218 | 108.32225 | 23.38265  | 300.47845 | 1.98148  | 0.3497327 | 1.0543527 | 244 | 3 | 1996–1998 | 0.60 | M-v | 4 | Marsden  | 31278 | 1996 FG <sub>3</sub>  |
| 1996 GU               | 11.0 | 0.15 | 19960407 | 135.92637 | 250.96382 | 131.26872 | 2.10305  | 0.1812305 | 2.8931278 | 8   | 1 | 4 days    | 0.27 |     |   | D Nakano |       | 1996 GU               |
| 1996 GR <sub>15</sub> | 16.6 | 0.15 | 19960427 | 357.21067 | 101.11593 | 112.28488 | 0.84820  | 0.1370053 | 2.3091117 | 8   | 1 | 9 days    | 0.73 |     |   | D Nakano |       | 1996 GR <sub>15</sub> |

|                       |      |      |          |           |           |           |          |           |            |     |   |           |      |     |   |          |       |                       |
|-----------------------|------|------|----------|-----------|-----------|-----------|----------|-----------|------------|-----|---|-----------|------|-----|---|----------|-------|-----------------------|
| 1996 HW <sub>1</sub>  | 15.5 | 0.15 | 19971218 | 119.55100 | 176.78505 | 177.27796 | 8.42570  | 0.4487412 | 2.0465736  | 154 | 4 | 1980–1998 | 0.65 | M-v | 2 | Williams | 31141 | 1996 HW <sub>1</sub>  |
| 1996 HF <sub>14</sub> | 13.4 | 0.15 | 19960517 | 152.62241 | 32.00312  | 37.01501  | 2.36932  | 0.0518035 | 2.9495051  | 12  | 1 | 35 days   | 0.97 |     | D | Nakano   |       | 1996 HF <sub>14</sub> |
| 1996 LO <sub>1</sub>  | 17.5 | 0.15 | 19960626 | 326.26334 | 73.18586  | 252.89075 | 20.78691 | 0.3299607 | 2.3384281  | 12  | 1 | 8 days    | 0.27 |     | D | Nakano   |       | 1996 LO <sub>1</sub>  |
| 1996 LP <sub>1</sub>  | 15.0 | 0.15 | 19971218 | 72.39771  | 246.61338 | 138.01689 | 7.14033  | 0.1824368 | 2.1932450  | 30  | 2 | 1996–1998 | 0.56 | M-v | 4 | Williams | 31242 | 1996 LP <sub>1</sub>  |
| 1996 NF <sub>3</sub>  | 12.5 | 0.15 | 19971218 | 357.57640 | 298.95817 | 142.44719 | 10.08137 | 0.0746195 | 2.6938002  | 25  | 4 | 1975–1998 | 0.71 | M-v | 2 | Williams | 31142 | 1996 NF <sub>3</sub>  |
| 1996 NW <sub>3</sub>  | 13.9 | 0.15 | 19960805 | 2.53342   | 296.97130 | 20.06196  | 0.05026  | 0.1540318 | 3.1694094  | 11  | 1 | 26 days   | 0.77 |     | D | Nakano   |       | 1996 NW <sub>3</sub>  |
| 1996 OF               | 16.0 | 0.15 | 19971218 | 74.89423  | 287.39393 | 106.05864 | 6.91737  | 0.1101740 | 2.2694606  | 28  | 2 | 1996–1998 | 0.31 | M-v | 3 | Marsden  | 31242 | 1996 OF               |
| 1996 OL               | 15.0 | 0.15 | 19971218 | 146.61208 | 230.13935 | 96.90654  | 4.53320  | 0.1646307 | 2.2545345  | 33  | 2 | 1996–1998 | 0.49 | M-v | 4 | Williams | 31278 | 1996 OL               |
| 1996 OF <sub>2</sub>  | 15.6 | 0.15 | 19960716 | 335.29176 | 150.46670 | 226.99897 | 10.34368 | 0.2152177 | 2.5723425  | 8   | 1 | 3 days    | 1.09 |     | D | Nakano   |       | 1996 OF <sub>2</sub>  |
| 1996 OJ <sub>2</sub>  | 15.0 | 0.15 | 19971218 | 90.17817  | 78.78441  | 295.78287 | 9.96984  | 0.2557699 | 2.4304128  | 62  | 3 | 1994–1998 | 0.50 | M-v | 2 | Williams | 31243 | 1996 OJ <sub>2</sub>  |
| 1996 PK               | 14.5 | 0.15 | 19971218 | 284.49359 | 203.37253 | 7.65399   | 3.04076  | 0.0830071 | 2.3138760  | 73  | 3 | 1991–1998 | 0.56 | M-v | 3 | Williams | 31278 | 1996 PK               |
| 1996 PB <sub>8</sub>  | 15.0 | 0.15 | 19960805 | 346.27825 | 172.90803 | 173.50684 | 2.23706  | 0.2970962 | 3.1739198  | 12  | 1 | 34 days   | 0.47 |     | D | Nakano   |       | 1996 PB <sub>8</sub>  |
| 1996 QU               | 14.5 | 0.15 | 19971218 | 75.18035  | 82.85248  | 326.81712 | 22.50849 | 0.2581526 | 2.3168648  | 56  | 3 | 1982–1998 | 0.74 | M-v | 2 | Williams | 31243 | 1996 QU               |
| 1996 RB               | 13.5 | 0.15 | 19971218 | 97.88390  | 0.86905   | 323.19209 | 8.06222  | 0.3155995 | 2.8739827  | 20  | 4 | 1984–1998 | 0.72 | M-v | 3 | Williams | 28088 | 1996 RB               |
| 1996 RC <sub>1</sub>  | 15.5 | 0.15 | 19971218 | 168.01850 | 173.45091 | 138.13504 | 2.46063  | 0.1267255 | 2.2252981  | 35  | 3 | 1995–1998 | 0.56 | M-v | 4 | Williams | 31278 | 1996 RC <sub>1</sub>  |
| 1996 RE <sub>1</sub>  | 15.0 | 0.15 | 19971218 | 53.55472  | 330.36526 | 76.73783  | 4.64813  | 0.2676566 | 2.5900005  | 28  | 2 | 1996–1998 | 0.38 | M-v | 4 | Marsden  | 31244 | 1996 RE <sub>1</sub>  |
| 1996 RK <sub>1</sub>  | 16.0 | 0.15 | 19971218 | 64.18038  | 11.95349  | 37.74930  | 2.13270  | 0.2098499 | 2.7517000  | 25  | 2 | 1996–1998 | 0.65 | M-v | 4 | Marsden  | 31244 | 1996 RK <sub>1</sub>  |
| 1996 RQ <sub>2</sub>  | 14.0 | 0.15 | 19971218 | 290.92594 | 240.08232 | 314.23389 | 1.55940  | 0.1502767 | 2.4083031  | 46  | 4 | 1991–1998 | 0.50 | M-v | 2 | Marsden  | 31278 | 1996 RQ <sub>2</sub>  |
| 1996 RB <sub>4</sub>  | 13.0 | 0.15 | 19971218 | 70.52034  | 137.26420 | 288.59231 | 12.23736 | 0.1362512 | 2.6115311  | 31  | 3 | 1992–1998 | 0.54 | M-v | 3 | Williams | 28319 | 1996 RB <sub>4</sub>  |
| 1996 RD <sub>4</sub>  | 13.0 | 0.15 | 19971218 | 183.63647 | 252.45839 | 48.92459  | 13.35592 | 0.1618153 | 2.7168096  | 60  | 2 | 1996–1998 | 0.56 | M-v | 3 | Williams | 31244 | 1996 RD <sub>4</sub>  |
| 1996 RW <sub>15</sub> | 16.6 | 0.15 | 19960914 | 27.81676  | 137.26400 | 179.23969 | 6.75389  | 0.1537417 | 2.2987745  | 12  | 1 | 24 days   | 0.75 |     | D | Nakano   |       | 1996 RW <sub>15</sub> |
| 1996 RJ <sub>30</sub> | 16.5 | 0.15 | 19960914 | 4.20308   | 66.79125  | 283.20188 | 2.30558  | 0.3109793 | 2.5910523  | 3   | 1 | 6 days    | 0.00 |     | D | Nakano   |       | 1996 RJ <sub>30</sub> |
| 1996 SS <sub>4</sub>  | 15.0 | 0.15 | 19971218 | 291.13170 | 8.32599   | 202.19967 | 3.74174  | 0.0612572 | 2.3533932  | 51  | 3 | 1995–1998 | 0.44 | M-v | 3 | Williams | 31278 | 1996 SS <sub>4</sub>  |
| 1996 TG               | 14.5 | 0.15 | 19971218 | 153.31763 | 25.83736  | 323.05726 | 3.40434  | 0.1276234 | 2.2280912  | 36  | 5 | 1986–1998 | 0.60 | M-v | 2 | Williams | 29140 | 1996 TG               |
| 1996 TC <sub>7</sub>  | 15.9 | 0.15 | 19961004 | 43.86758  | 274.86803 | 20.06858  | 2.07006  | 0.2511511 | 2.3280318  | 9   | 1 | 5 days    | 0.22 |     | D | Nakano   |       | 1996 TC <sub>7</sub>  |
| 1996 TG <sub>7</sub>  | 14.5 | 0.15 | 19971218 | 143.95935 | 298.29723 | 27.01217  | 2.59534  | 0.1968917 | 2.4305485  | 31  | 3 | 1991–1998 | 0.64 | M-v | 3 | Williams | 31245 | 1996 TG <sub>7</sub>  |
| 1996 TX <sub>7</sub>  | 15.0 | 0.15 | 19971218 | 216.64783 | 128.32165 | 147.84478 | 4.15748  | 0.1404484 | 2.2457110  | 21  | 2 | 1996–1998 | 0.76 | M-v | 4 | Williams | 31245 | 1996 TX <sub>7</sub>  |
| 1996 TL <sub>9</sub>  | 14.5 | 0.15 | 19971218 | 199.45010 | 215.47517 | 89.33303  | 4.87513  | 0.1854885 | 2.3134939  | 61  | 3 | 1992–1998 | 0.35 | M-v | 2 | Marsden  | 31278 | 1996 TL <sub>9</sub>  |
| 1996 TR <sub>9</sub>  | 15.0 | 0.15 | 19971218 | 161.76434 | 188.56512 | 136.09301 | 4.33179  | 0.1958512 | 2.2779667  | 54  | 3 | 1971–1998 | 0.43 | M-v | 3 | Marsden  | 31278 | 1996 TR <sub>9</sub>  |
| 1996 TY <sub>9</sub>  | 13.0 | 0.15 | 19971218 | 257.44726 | 344.70253 | 263.48122 | 29.71814 | 0.3157948 | 1.9970988  | 37  | 3 | 1991–1998 | 0.58 | M-v | 2 | Williams | 30902 | 1996 TY <sub>9</sub>  |
| 1996 TL <sub>10</sub> | 15.0 | 0.15 | 19971218 | 137.54893 | 44.84148  | 320.81143 | 4.77301  | 0.1817674 | 2.2559340  | 24  | 5 | 1971–1998 | 0.89 | M-v | 2 | Williams | 28619 | 1996 TL <sub>10</sub> |
| 1996 TN <sub>10</sub> | 12.5 | 0.15 | 19971218 | 46.08559  | 68.13416  | 359.56324 | 9.59700  | 0.0928802 | 2.9886717  | 20  | 7 | 1980–1998 | 0.81 | M-v | 1 | Williams | 31278 | 1996 TN <sub>10</sub> |
| 1996 TO <sub>10</sub> | 13.5 | 0.15 | 19971218 | 114.50376 | 305.54249 | 88.89710  | 6.11435  | 0.1771010 | 2.2332279  | 13  | 3 | 1989–1998 | 0.65 | M-v | 4 | Williams | 30460 | 1996 TO <sub>10</sub> |
| 1996 TR <sub>10</sub> | 13.0 | 0.15 | 19971218 | 161.00703 | 144.14129 | 160.55069 | 10.61637 | 0.2542431 | 2.3969749  | 19  | 5 | 1981–1998 | 0.95 | M-v | 2 | Williams | 31278 | 1996 TR <sub>10</sub> |
| 1996 TT <sub>11</sub> | 14.5 | 0.15 | 19971218 | 121.50343 | 150.02828 | 199.30662 | 1.58407  | 0.1516833 | 2.6109919  | 33  | 3 | 1992–1998 | 0.51 | M-v | 3 | Marsden  | 31278 | 1996 TT <sub>11</sub> |
| 1996 TL <sub>12</sub> | 12.5 | 0.15 | 19971218 | 135.35469 | 299.75224 | 36.12066  | 13.49239 | 0.1885045 | 2.6860987  | 40  | 4 | 1960–1998 | 0.53 | M-v | 3 | Williams | 31278 | 1996 TL <sub>12</sub> |
| 1996 TC <sub>15</sub> | 14.0 | 0.15 | 19971218 | 184.90657 | 268.30824 | 85.04510  | 9.87123  | 0.1405541 | 2.6994386  | 35  | 3 | 1994–1998 | 0.41 | M-v | 2 | Williams | 31279 | 1996 TC <sub>15</sub> |
| 1996 TF <sub>15</sub> | 13.5 | 0.15 | 19971218 | 55.58115  | 3.67033   | 38.90496  | 1.32044  | 0.1653000 | 3.2276560  | 27  | 2 | 1996–1998 | 0.50 | M-v | 4 | Williams | 31246 | 1996 TF <sub>15</sub> |
| 1996 TG <sub>16</sub> | 15.4 | 0.15 | 19961004 | 196.12758 | 185.84105 | 340.72683 | 15.36054 | 0.0266012 | 3.0950335  | 11  | 1 | 14 days   | 0.21 |     | D | Nakano   |       | 1996 TG <sub>16</sub> |
| 1996 TN <sub>19</sub> | 15.5 | 0.15 | 19971218 | 168.89085 | 282.16156 | 36.83467  | 0.66476  | 0.2022395 | 2.3702998  | 21  | 4 | 1978–1998 | 0.47 | M-v | 1 | Williams | 29140 | 1996 TN <sub>19</sub> |
| 1996 TR <sub>41</sub> | 14.5 | 0.15 | 19971218 | 13.30796  | 344.98443 | 124.04810 | 3.72642  | 0.1117587 | 2.5721817  | 20  | 4 | 1980–1998 | 0.84 | M-v | 2 | Williams | 31279 | 1996 TR <sub>41</sub> |
| 1996 TL <sub>66</sub> | 5.0  | 0.15 | 19971218 | 358.56127 | 183.77041 | 217.76199 | 23.95081 | 0.5851635 | 84.5078934 | 119 | 2 | 1996–1998 | 0.50 | M-v | 4 | Marsden  | 31144 | 1996 TL <sub>66</sub> |
| 1996 TO <sub>66</sub> | 4.5  | 0.15 | 19971218 | 104.62960 | 246.82757 | 355.19954 | 27.33208 | 0.1294780 | 43.7154051 | 84  | 2 | 1996–1997 | 0.58 | M-v | 6 | Marsden  | 31009 | 1996 TO <sub>66</sub> |
| 1996 TJ <sub>67</sub> | 16.5 | 0.15 | 19961004 | 53.91622  | 294.69493 | 39.63478  | 2.53408  | 0.0721512 | 2.8934768  | 8   | 1 | 8 days    | 0.13 |     |   | Williams |       | 1996 TJ <sub>67</sub> |
| 1996 UC               | 13.5 | 0.15 | 19971218 | 80.58849  | 273.30861 | 92.99143  | 2.99411  | 0.2477891 | 3.1492617  | 63  | 5 | 1974–1998 | 0.56 | M-v | 2 | Williams | 31279 | 1996 UC               |
| 1996 UU               | 14.0 | 0.15 | 19971218 | 91.40048  | 199.97370 | 210.04965 | 12.77160 | 0.1527003 | 2.5588340  | 37  | 3 | 1992–1998 | 0.56 | M-v | 3 | Williams | 31247 | 1996 UU               |
| 1996 UX               | 13.0 | 0.15 | 19971218 | 61.99628  | 172.60607 | 262.50224 | 0.98561  | 0.0703645 | 2.8537384  | 26  | 4 | 1991–1998 | 0.61 | M-v | 2 | Williams | 28865 | 1996 UX               |
| 1996 UL <sub>1</sub>  | 14.0 | 0.15 | 19971218 | 118.33327 | 140.81600 | 206.04583 | 11.67057 | 0.0702488 | 3.0391827  | 50  | 2 | 1996–1998 | 0.69 | M-v | 3 | Williams | 31247 | 1996 UL <sub>1</sub>  |
| 1996 UD <sub>3</sub>  | 13.5 | 0.15 | 19971218 | 213.50467 | 289.38662 | 348.22620 | 4.80837  | 0.0068051 | 2.7494805  | 40  | 2 | 1996–1998 | 0.77 | M-v | 4 | Williams | 31247 | 1996 UD <sub>3</sub>  |
| 1996 UH <sub>5</sub>  | 14.0 | 0.15 | 19961113 | 346.80428 | 199.22266 | 214.78287 | 13.99017 | 0.1700599 | 2.5253637  | 16  | 1 | 31 days   | 0.38 |     |   | Williams |       | 1996 UH <sub>5</sub>  |
| 1996 VM               | 13.5 | 0.15 | 19971218 | 264.33777 | 168.10315 | 72.22924  | 14.83032 | 0.1139945 | 2.5589761  | 23  | 2 | 1996–1998 | 0.82 | M-v | 4 | Williams | 31247 | 1996 VM               |
| 1996 VP               | 14.5 | 0.15 | 19971218 | 236.34185 | 196.51163 | 51.80366  | 2.99079  | 0.1676324 | 2.4162728  | 68  | 4 | 1988–1998 | 0.56 | M-v | 3 | Marsden  | 31279 | 1996 VP               |
| 1996 VC <sub>1</sub>  | 13.5 | 0.15 | 19971218 | 110.26936 | 96.46608  | 271.30232 | 0.94442  | 0.1077586 | 2.9512696  | 36  | 4 | 1991–1998 | 0.46 | M-v | 3 | Williams | 31279 | 1996 VC <sub>1</sub>  |

|                       |      |      |          |           |           |           |          |           |           |    |   |           |      |     |   |          |       |                       |
|-----------------------|------|------|----------|-----------|-----------|-----------|----------|-----------|-----------|----|---|-----------|------|-----|---|----------|-------|-----------------------|
| 1996 VO <sub>1</sub>  | 12.5 | 0.15 | 19971218 | 136.37168 | 329.72576 | 34.56847  | 14.12681 | 0.1768468 | 2.5936572 | 23 | 3 | 1979–1998 | 0.57 | M-v | 3 | Williams | 29140 | 1996 VO <sub>1</sub>  |
| 1996 VR <sub>1</sub>  | 14.5 | 0.15 | 19971218 | 154.84715 | 271.07353 | 58.63804  | 15.38312 | 0.0527327 | 2.6733118 | 34 | 2 | 1996–1998 | 0.44 | M-v | 4 | Marsden  | 31248 | 1996 VR <sub>1</sub>  |
| 1996 VG <sub>2</sub>  | 15.0 | 0.15 | 19971218 | 115.37832 | 209.55061 | 192.43789 | 1.89986  | 0.2047893 | 2.4080889 | 17 | 4 | 1981–1998 | 0.52 | M-v | 3 | Williams | 30785 | 1996 VG <sub>2</sub>  |
| 1996 VJ <sub>2</sub>  | 14.5 | 0.15 | 19971218 | 208.18412 | 83.86881  | 202.38921 | 4.88883  | 0.1510773 | 2.2452991 | 49 | 2 | 1996–1998 | 0.43 | M-v | 3 | Williams | 31248 | 1996 VJ <sub>2</sub>  |
| 1996 VM <sub>2</sub>  | 14.5 | 0.15 | 19971218 | 139.04100 | 274.52678 | 69.13125  | 12.29293 | 0.2157108 | 2.6689596 | 30 | 2 | 1996–1998 | 0.26 | M-v | 3 | Marsden  | 31248 | 1996 VM <sub>2</sub>  |
| 1996 VU <sub>2</sub>  | 13.5 | 0.15 | 19971218 | 63.35587  | 234.23398 | 169.08935 | 2.35651  | 0.2243200 | 3.1084844 | 36 | 2 | 1996–1998 | 0.76 | M-v | 4 | Williams | 31248 | 1996 VU <sub>2</sub>  |
| 1996 VS <sub>4</sub>  | 13.0 | 0.15 | 19971218 | 261.21590 | 195.40609 | 59.24672  | 4.11793  | 0.0505818 | 2.6924045 | 19 | 4 | 1982–1998 | 0.59 | M-v | 2 | Williams | 28600 | 1996 VS <sub>4</sub>  |
| 1996 VB <sub>5</sub>  | 13.5 | 0.15 | 19971218 | 176.47890 | 287.20327 | 51.36284  | 6.42310  | 0.0462429 | 2.2289619 | 54 | 3 | 1986–1998 | 0.61 | M-v | 3 | Williams | 31279 | 1996 VB <sub>5</sub>  |
| 1996 VD <sub>6</sub>  | 13.5 | 0.15 | 19971218 | 82.39596  | 207.46830 | 208.11368 | 3.90654  | 0.1308383 | 3.2155314 | 18 | 2 | 1996–1998 | 0.39 | M-v | 4 | Williams | 31249 | 1996 VD <sub>6</sub>  |
| 1996 VP <sub>6</sub>  | 14.0 | 0.15 | 19971218 | 103.51032 | 65.26153  | 326.37009 | 4.96929  | 0.1936726 | 2.5179183 | 22 | 4 | 1984–1998 | 0.85 | M-v | 3 | Williams | 28891 | 1996 VP <sub>6</sub>  |
| 1996 VQ <sub>6</sub>  | 13.5 | 0.15 | 19971218 | 184.68856 | 229.59082 | 71.42047  | 13.85843 | 0.1854332 | 2.6504759 | 30 | 3 | 1990–1998 | 0.40 | M-v | 3 | Marsden  | 31279 | 1996 VQ <sub>6</sub>  |
| 1996 VA <sub>7</sub>  | 14.0 | 0.15 | 19971218 | 330.61292 | 325.06401 | 209.82787 | 3.89748  | 0.0909584 | 2.5798434 | 37 | 3 | 1994–1998 | 0.51 | M-v | 3 | Williams | 31010 | 1996 VA <sub>7</sub>  |
| 1996 VE <sub>8</sub>  | 13.0 | 0.15 | 19971218 | 102.22022 | 153.02831 | 255.24756 | 5.49113  | 0.0693692 | 2.4854553 | 16 | 4 | 1980–1998 | 0.75 | M-v | 4 | Williams | 28602 | 1996 VE <sub>8</sub>  |
| 1996 VL <sub>8</sub>  | 14.5 | 0.15 | 19971218 | 173.39326 | 36.89038  | 295.83598 | 4.00855  | 0.2164099 | 2.2216879 | 27 | 4 | 1989–1998 | 0.79 | M-v | 2 | Williams | 29117 | 1996 VL <sub>8</sub>  |
| 1996 VB <sub>9</sub>  | 11.5 | 0.15 | 19971218 | 45.81635  | 259.45301 | 160.31977 | 4.51099  | 0.2524120 | 4.0001962 | 23 | 5 | 1990–1998 | 0.69 | M-v | 1 | Williams | 31279 | 1996 VB <sub>9</sub>  |
| 1996 VD <sub>9</sub>  | 13.5 | 0.15 | 19971218 | 116.65924 | 270.63561 | 115.46274 | 4.06228  | 0.1200215 | 2.6219345 | 16 | 4 | 1987–1998 | 0.80 | M-v | 2 | Williams | 28603 | 1996 VD <sub>9</sub>  |
| 1996 VE <sub>9</sub>  | 12.0 | 0.15 | 19971218 | 324.63049 | 95.08006  | 78.63316  | 11.00536 | 0.0447277 | 3.0086998 | 37 | 5 | 1951–1998 | 0.57 | M-v | 2 | Williams | 29320 | 1996 VE <sub>9</sub>  |
| 1996 VY <sub>29</sub> | 14.0 | 0.15 | 19971218 | 182.69206 | 135.87319 | 185.60803 | 2.95981  | 0.1627580 | 2.2901776 | 18 | 4 | 1982–1998 | 0.70 | M-v | 4 | Williams | 29118 | 1996 VY <sub>29</sub> |
| 1996 VB <sub>30</sub> | 15.0 | 0.15 | 19971218 | 145.04744 | 195.47188 | 150.46213 | 2.61394  | 0.2354939 | 2.4314492 | 15 | 3 | 1995–1998 | 0.60 | M-v | 4 | Williams | 29118 | 1996 VB <sub>30</sub> |
| 1996 VJ <sub>30</sub> | 13.5 | 0.15 | 19971218 | 160.31455 | 104.33240 | 243.70973 | 5.43765  | 0.1439672 | 2.3995793 | 22 | 3 | 1992–1998 | 0.67 | M-v | 3 | Williams | 28868 | 1996 VJ <sub>30</sub> |
| 1996 VM <sub>30</sub> | 14.0 | 0.15 | 19971218 | 142.19006 | 326.85097 | 46.04107  | 9.29051  | 0.2066124 | 2.2847352 | 18 | 4 | 1958–1998 | 0.43 | M-v | 2 | Williams | 29118 | 1996 VM <sub>30</sub> |
| 1996 WZ               | 12.0 | 0.15 | 19971218 | 121.82521 | 325.24494 | 56.81664  | 11.02480 | 0.0922730 | 3.0043060 | 23 | 5 | 1970–1998 | 0.42 | M-v | 1 | Williams | 29666 | 1996 WZ               |
| 1996 WC <sub>3</sub>  | 15.0 | 0.15 | 19971218 | 126.68100 | 146.34423 | 199.69570 | 10.44926 | 0.1991903 | 2.6989310 | 32 | 4 | 1994–1998 | 0.31 | M-v | 1 | Williams | 31279 | 1996 WC <sub>3</sub>  |
| 1996 XC               | 14.0 | 0.15 | 19971218 | 265.93351 | 167.40422 | 96.10751  | 6.70519  | 0.1904465 | 2.4373907 | 39 | 3 | 1991–1998 | 0.40 | M-v | 4 | Marsden  | 31279 | 1996 XC               |
| 1996 XR               | 14.5 | 0.15 | 19971218 | 179.38883 | 270.53136 | 51.96960  | 1.66778  | 0.1093715 | 2.6366513 | 35 | 2 | 1996–1998 | 0.44 | M-v | 4 | Williams | 31279 | 1996 XR               |
| 1996 XF <sub>1</sub>  | 13.0 | 0.15 | 19971218 | 113.30506 | 290.33196 | 85.06721  | 5.85579  | 0.1625162 | 3.1712604 | 25 | 6 | 1979–1998 | 0.71 | M-v | 2 | Williams | 29320 | 1996 XF <sub>1</sub>  |
| 1996 XR <sub>1</sub>  | 11.5 | 0.15 | 19971218 | 108.73068 | 285.78492 | 87.84215  | 4.62438  | 0.2161835 | 3.9690872 | 31 | 4 | 1987–1998 | 0.40 | M-v | 1 | Williams | 31279 | 1996 XR <sub>1</sub>  |
| 1996 XT <sub>1</sub>  | 13.0 | 0.15 | 19971218 | 173.06740 | 271.65696 | 79.84150  | 3.23174  | 0.0773732 | 2.8780076 | 18 | 3 | 1994–1998 | 0.62 | M-v | 4 | Williams | 28870 | 1996 XT <sub>1</sub>  |
| 1996 XU <sub>1</sub>  | 12.5 | 0.15 | 19971218 | 11.32031  | 107.52627 | 93.78620  | 7.93097  | 0.1598433 | 2.4145386 | 18 | 4 | 1977–1996 | 0.44 | M-v | 1 | Williams | 28891 | 1996 XU <sub>1</sub>  |
| 1996 XE <sub>2</sub>  | 14.0 | 0.15 | 19971218 | 41.78459  | 51.12805  | 75.27548  | 7.34974  | 0.0586387 | 2.3815571 | 31 | 3 | 1985–1998 | 0.63 | M-v | 2 | Marsden  | 29140 | 1996 XE <sub>2</sub>  |
| 1996 XG <sub>9</sub>  | 13.5 | 0.15 | 19971218 | 298.24655 | 168.78063 | 60.81085  | 9.11003  | 0.1635705 | 2.7912045 | 36 | 3 | 1993–1998 | 0.49 | M-v | 3 | Williams | 31249 | 1996 XG <sub>9</sub>  |
| 1996 XW <sub>12</sub> | 14.0 | 0.15 | 19971218 | 157.08789 | 266.25876 | 88.21931  | 7.52345  | 0.1512166 | 2.3734980 | 19 | 3 | 1994–1998 | 0.60 | M-v | 4 | Williams | 28872 | 1996 XW <sub>12</sub> |
| 1996 XV <sub>19</sub> | 13.0 | 0.15 | 19971218 | 194.28384 | 151.28240 | 186.61750 | 1.93176  | 0.1913921 | 2.4812317 | 20 | 5 | 1929–1998 | 0.69 | M-v | 2 | Williams | 29140 | 1996 XV <sub>19</sub> |
| 1996 XZ <sub>25</sub> | 13.0 | 0.15 | 19971218 | 117.33117 | 293.05127 | 108.88684 | 12.12720 | 0.1321386 | 3.1184979 | 28 | 5 | 1979–1998 | 0.47 | M-v | 1 | Marsden  | 28874 | 1996 XZ <sub>25</sub> |
| 1996 XN <sub>26</sub> | 13.0 | 0.15 | 19971218 | 212.99251 | 227.27587 | 64.84949  | 2.95422  | 0.0486567 | 2.8675296 | 27 | 3 | 1986–1998 | 0.89 | M-v | 3 | Williams | 31279 | 1996 XN <sub>26</sub> |
| 1996 XT <sub>30</sub> | 12.0 | 0.15 | 19971218 | 279.22583 | 148.80958 | 80.73855  | 18.18520 | 0.0935221 | 3.1788890 | 16 | 3 | 1982–1998 | 0.53 | M-v | 4 | Williams | 31279 | 1996 XT <sub>30</sub> |
| 1996 YB <sub>1</sub>  | 13.0 | 0.15 | 19971218 | 113.71121 | 88.00237  | 335.59182 | 2.72893  | 0.0806230 | 2.7907871 | 18 | 3 | 1991–1997 | 0.52 | M-v | 2 | Williams | 29141 | 1996 YB <sub>1</sub>  |
| 1996 YG <sub>1</sub>  | 14.5 | 0.15 | 19971218 | 297.28510 | 188.98390 | 77.22362  | 12.85176 | 0.1194179 | 2.4849335 | 47 | 2 | 1996–1998 | 0.58 | M-v | 4 | Marsden  | 31250 | 1996 YG <sub>1</sub>  |
| 1996 YV <sub>1</sub>  | 14.5 | 0.15 | 19971218 | 116.95651 | 116.54443 | 330.66521 | 1.57266  | 0.1825366 | 2.6309173 | 34 | 3 | 1993–1997 | 0.64 | M-v | 2 | Williams | 29667 | 1996 YV <sub>1</sub>  |
| 1996 YH <sub>2</sub>  | 14.0 | 0.15 | 19971218 | 170.47708 | 353.67524 | 53.91102  | 4.59450  | 0.0983713 | 2.4115654 | 18 | 4 | 1969–1997 | 0.57 | M-v | 2 | Williams | 30671 | 1996 YH <sub>2</sub>  |
| 1996 YO <sub>2</sub>  | 13.5 | 0.15 | 19971218 | 37.44385  | 30.54482  | 75.23992  | 3.20180  | 0.0428430 | 2.8367334 | 31 | 5 | 1977–1998 | 0.67 | M-v | 1 | Williams | 29667 | 1996 YO <sub>2</sub>  |
| 1996 YP <sub>3</sub>  | 13.5 | 0.15 | 19971218 | 257.95692 | 178.92950 | 63.85140  | 15.01489 | 0.0650037 | 2.5824878 | 27 | 3 | 1990–1998 | 0.59 | M-v | 3 | Williams | 31279 | 1996 YP <sub>3</sub>  |
| 1997 AA               | 13.5 | 0.15 | 19971218 | 138.43621 | 297.18678 | 93.06752  | 3.33154  | 0.0500621 | 2.8696419 | 37 | 4 | 1990–1998 | 0.42 | M-v | 1 | Marsden  | 30671 | 1997 AA               |
| 1997 AU               | 14.0 | 0.15 | 19971218 | 180.29343 | 339.65252 | 20.66104  | 2.17399  | 0.0867165 | 2.8821448 | 19 | 3 | 1993–1998 | 0.54 | M-v | 4 | Williams | 29141 | 1997 AU               |
| 1997 AY               | 12.0 | 0.15 | 19971218 | 159.72505 | 290.47650 | 63.84219  | 4.12001  | 0.2087217 | 3.1351551 | 29 | 7 | 1951–1998 | 0.76 | M-v | 1 | Williams | 29320 | 1997 AY               |
| 1997 AO <sub>1</sub>  | 10.5 | 0.15 | 19971218 | 226.94917 | 187.44553 | 112.84722 | 5.17733  | 0.0712682 | 3.9511326 | 22 | 4 | 1986–1998 | 0.57 | M-v | 1 | Williams | 30460 | 1997 AO <sub>1</sub>  |
| 1997 AU <sub>3</sub>  | 13.0 | 0.15 | 19971218 | 125.92988 | 23.90133  | 336.72520 | 10.28789 | 0.1451067 | 2.9348966 | 21 | 2 | 1997–1998 | 0.47 | M-v | 4 | Williams | 31250 | 1997 AU <sub>3</sub>  |
| 1997 AP <sub>4</sub>  | 14.0 | 0.15 | 19971218 | 70.74310  | 308.63926 | 198.60338 | 1.50103  | 0.1543447 | 2.4251433 | 24 | 3 | 1988–1997 | 0.65 | M-v | 3 | Williams | 29320 | 1997 AP <sub>4</sub>  |
| 1997 AM <sub>5</sub>  | 14.5 | 0.15 | 19971218 | 73.95716  | 131.95943 | 18.80506  | 3.60232  | 0.1418140 | 2.3322463 | 29 | 4 | 1983–1997 | 0.88 | M-v | 2 | Williams | 29667 | 1997 AM <sub>5</sub>  |
| 1997 AK <sub>6</sub>  | 14.0 | 0.15 | 19971218 | 346.89721 | 129.04706 | 64.96671  | 1.55026  | 0.1519894 | 3.1803738 | 18 | 4 | 1992–1998 | 0.74 | M-v | 1 | Williams | 29634 | 1997 AK <sub>6</sub>  |
| 1997 AP <sub>14</sub> | 14.5 | 0.15 | 19971218 | 154.02019 | 248.23255 | 147.19138 | 0.98278  | 0.1636763 | 2.6846182 | 43 | 2 | 1995–1997 | 0.78 | M-v | 4 | Williams | 29667 | 1997 AP <sub>14</sub> |
| 1997 AX <sub>14</sub> | 14.0 | 0.15 | 19971218 | 203.03865 | 210.56454 | 113.83276 | 13.01193 | 0.3224835 | 2.6031263 | 33 | 3 | 1982–1998 | 0.42 | M-v | 2 | Marsden  | 29125 | 1997 AX <sub>14</sub> |
| 1997 BB <sub>2</sub>  | 14.0 | 0.15 | 19971218 | 300.35807 | 295.27688 | 1.90512   | 3.13847  | 0.1327642 | 2.1572281 | 34 | 6 | 1976–1997 | 0.75 | M-v | 2 | Williams | 29947 | 1997 BB <sub>2</sub>  |

|                       |      |      |          |           |           |           |          |           |            |     |   |           |      |     |     |          |       |                       |
|-----------------------|------|------|----------|-----------|-----------|-----------|----------|-----------|------------|-----|---|-----------|------|-----|-----|----------|-------|-----------------------|
| 1997 CT <sub>1</sub>  | 12.5 | 0.15 | 19971218 | 127.51842 | 102.26162 | 256.90653 | 2.88834  | 0.3081305 | 3.9479989  | 35  | 3 | 1979–1998 | 0.36 | M-v | 4   | Marsden  | 31250 | 1997 CT <sub>1</sub>  |
| 1997 CW <sub>11</sub> | 17.0 | 0.15 | 19971218 | 221.90276 | 323.08996 | 25.62330  | 3.00293  | 0.1300837 | 2.3882813  | 25  | 3 | 1994–1997 | 0.41 | M-v | 4   | Williams | 29128 | 1997 CW <sub>11</sub> |
| 1997 CU <sub>19</sub> | 14.0 | 0.15 | 19971218 | 119.66464 | 1.30602   | 112.32181 | 4.20904  | 0.1129352 | 2.3350459  | 17  | 4 | 1985–1997 | 0.65 | M-v | 2   | Williams | 29640 | 1997 CU <sub>19</sub> |
| 1997 CU <sub>26</sub> | 6.5  | 0.15 | 19971218 | 324.93751 | 242.13604 | 300.47772 | 23.42520 | 0.1681332 | 15.7087920 | 274 | 2 | 1997–1998 | 0.49 | M-v | 3   | Williams | 31279 | 1997 CU <sub>26</sub> |
| 1997 ET <sub>1</sub>  | 13.5 | 0.15 | 19971218 | 130.83612 | 305.13122 | 84.87977  | 3.19264  | 0.0853317 | 2.8445276  | 50  | 5 | 1981–1998 | 0.58 | M-v | 3   | Marsden  | 31145 | 1997 ET <sub>1</sub>  |
| 1997 FU               | 12.5 | 0.15 | 19971218 | 163.65785 | 6.51269   | 48.23867  | 13.99417 | 0.1384649 | 2.5915999  | 34  | 3 | 1981–1997 | 0.82 | M-v | 4   | Williams | 29948 | 1997 FU               |
| 1997 GW <sub>26</sub> | 17.0 | 0.15 | 19970313 | 290.38287 | 94.27316  | 166.58632 | 1.20408  | 0.0947535 | 2.3494681  | 11  | 1 | 39 days   | 0.50 |     |     | Williams |       | 1997 GW <sub>26</sub> |
| 1997 ND <sub>3</sub>  | 13.9 | 0.15 | 19970731 | 339.27820 | 35.02641  | 293.22812 | 15.58405 | 0.1652109 | 3.1512595  | 11  | 1 | 24 days   | 0.35 |     | D   | Nakano   |       | 1997 ND <sub>3</sub>  |
| 1997 PK <sub>2</sub>  | 14.5 | 0.15 | 19971218 | 46.06974  | 9.22993   | 302.53236 | 6.09528  | 0.1415819 | 2.3674644  | 35  | 1 | 80 days   | 0.47 | M-v | 4   | Marsden  | 30903 | 1997 PK <sub>2</sub>  |
| 1997 QA               | 14.0 | 0.15 | 19971218 | 54.96976  | 25.68096  | 317.86460 | 6.80824  | 0.0833196 | 2.4115569  | 55  | 3 | 1980–1998 | 0.52 | M-v | 2   | Marsden  | 31250 | 1997 QA               |
| 1997 RD <sub>1</sub>  | 16.0 | 0.15 | 19971218 | 24.92400  | 161.69587 | 170.24307 | 13.49465 | 0.4040737 | 2.6629806  | 217 | 1 | 79 days   | 0.49 | M-v | 3   | Marsden  | 31010 | 1997 RD <sub>1</sub>  |
| 1997 RM <sub>1</sub>  | 15.0 | 0.15 | 19970909 | 16.75733  | 289.09615 | 2.69741   | 5.06605  | 0.3519791 | 2.4213853  | 43  | 1 | 33 days   | 0.91 |     |     | Marsden  |       | 1997 RM <sub>1</sub>  |
| 1997 RR <sub>5</sub>  | 14.4 | 0.15 | 19970909 | 339.25686 | 210.45110 | 187.74351 | 1.01303  | 0.0739981 | 3.0141946  | 11  | 1 | 21 days   | 0.25 |     | D   | Nakano   |       | 1997 RR <sub>5</sub>  |
| 1997 RD <sub>8</sub>  | 15.5 | 0.15 | 19970909 | 89.45529  | 34.17268  | 207.89126 | 1.29327  | 0.1611343 | 2.2311964  | 12  | 1 | 7 days    | 0.45 |     | D   | Nakano   |       | 1997 RD <sub>8</sub>  |
| 1997 RB <sub>9</sub>  | 14.5 | 0.15 | 19971218 | 39.70893  | 356.06750 | 332.29975 | 4.57792  | 0.1566360 | 2.6152321  | 42  | 1 | 139 days  | 0.45 | M-v | 4   | Williams |       | 1997 RB <sub>9</sub>  |
| 1997 RL <sub>13</sub> | 9.5  | 0.15 | 19970820 | 0.00000   | 51.69205  | 312.53093 | 5.74373  | 0.0000000 | 44.5156285 | 4   | 1 | 1 days    | 0.12 |     | E   | Marsden  |       | 1997 RL <sub>13</sub> |
| 1997 SY <sub>3</sub>  | 14.6 | 0.15 | 19970909 | 33.26539  | 345.88276 | 309.84536 | 10.17299 | 0.1000303 | 2.9849957  | 15  | 1 | 20 days   | 0.51 |     | D   | Nakano   |       | 1997 SY <sub>3</sub>  |
| 1997 SE <sub>5</sub>  | 15.0 | 0.15 | 19971218 | 11.64897  | 56.38804  | 288.05877 | 2.61437  | 0.6674868 | 3.7224253  | 414 | 1 | 241 days  | 0.54 | M-v | 3   | Williams | 31280 | 1997 SE <sub>5</sub>  |
| 1997 SB <sub>10</sub> | 13.5 | 0.15 | 19971218 | 320.02046 | 250.20304 | 233.08796 | 4.36780  | 0.1634771 | 2.5634760  | 37  | 3 | 1978–1998 | 0.60 | M-v | 3   | Williams | 31145 | 1997 SB <sub>10</sub> |
| 1997 SO <sub>33</sub> | 14.0 | 0.15 | 19971218 | 20.27613  | 12.56734  | 32.09554  | 3.56811  | 0.1157049 | 2.3074142  | 18  | 1 | 136 days  | 0.42 | M-v | 4 D | Williams |       | 1997 SO <sub>33</sub> |
| 1997 TB <sub>10</sub> | 14.5 | 0.15 | 19971218 | 352.77235 | 213.33598 | 219.76887 | 0.87456  | 0.2815815 | 3.0270454  | 33  | 2 | 1994–1998 | 0.51 | M-v | 3   | Williams | 31012 | 1997 TB <sub>10</sub> |
| 1997 TA <sub>18</sub> | 14.5 | 0.15 | 19971218 | 35.46599  | 225.95217 | 187.64831 | 11.44672 | 0.1789162 | 2.6388832  | 41  | 1 | 145 days  | 0.42 | M-v | 4   | Williams | 31280 | 1997 TA <sub>18</sub> |
| 1997 TC <sub>18</sub> | 13.5 | 0.15 | 19971218 | 307.82135 | 61.89442  | 55.41531  | 5.14691  | 0.0733753 | 2.2638376  | 35  | 3 | 1973–1998 | 0.66 | M-v | 4   | Williams | 30988 | 1997 TC <sub>18</sub> |
| 1997 TM <sub>27</sub> | 14.0 | 0.15 | 19971019 | 37.39172  | 306.96400 | 11.10020  | 2.69169  | 0.2650458 | 2.6412715  | 14  | 1 | 22 days   | 0.59 |     |     | Williams |       | 1997 TM <sub>27</sub> |
| 1997 UY <sub>3</sub>  | 14.0 | 0.15 | 19971218 | 350.69906 | 200.19333 | 235.91507 | 2.72873  | 0.1520362 | 2.5838742  | 46  | 2 | 1989–1998 | 0.62 | M-v | 3   | Williams | 31280 | 1997 UY <sub>3</sub>  |
| 1997 UK <sub>5</sub>  | 14.5 | 0.15 | 19971218 | 40.76177  | 29.97022  | 320.51731 | 13.50300 | 0.2201464 | 2.5512998  | 31  | 1 | 110 days  | 0.42 | M-v | 4   | Williams | 31280 | 1997 UK <sub>5</sub>  |
| 1997 UZ <sub>8</sub>  | 13.5 | 0.15 | 19971218 | 95.55470  | 102.60020 | 217.86700 | 3.83664  | 0.0768797 | 2.3902123  | 38  | 3 | 1978–1998 | 0.70 | M-v | 2   | Williams | 31280 | 1997 UZ <sub>8</sub>  |
| 1997 UF <sub>9</sub>  | 16.5 | 0.15 | 19971218 | 280.09164 | 157.75628 | 37.28328  | 25.87961 | 0.6042392 | 1.4423933  | 139 | 1 | 115 days  | 0.58 | M-v | 4   | Williams | 31280 | 1997 UF <sub>9</sub>  |
| 1997 UG <sub>9</sub>  | 15.5 | 0.15 | 19971218 | 7.81251   | 13.76116  | 34.33980  | 8.03429  | 0.3768496 | 2.6431563  | 33  | 1 | 121 days  | 0.74 | M-v | 4   | Williams |       | 1997 UG <sub>9</sub>  |
| 1997 US <sub>9</sub>  | 17.5 | 0.15 | 19971218 | 232.65989 | 357.19419 | 212.31466 | 20.01606 | 0.2818387 | 2.0523770  | 129 | 1 | 126 days  | 0.59 | M-v | 4   | Marsden  | 31280 | 1997 US <sub>9</sub>  |
| 1997 UU <sub>10</sub> | 15.0 | 0.15 | 19971218 | 292.14733 | 112.88313 | 22.10025  | 4.03004  | 0.1471418 | 2.4309441  | 25  | 1 | 113 days  | 0.62 | M-v | 5   | Williams | 31280 | 1997 UU <sub>10</sub> |
| 1997 UG <sub>15</sub> | 14.5 | 0.15 | 19971218 | 4.24967   | 282.05465 | 134.85481 | 2.71649  | 0.1619106 | 2.4361671  | 21  | 1 | 120 days  | 0.43 | M-v | 4   | Williams |       | 1997 UG <sub>15</sub> |
| 1997 UA <sub>22</sub> | 14.5 | 0.15 | 19971218 | 46.53309  | 252.24378 | 106.67878 | 5.78451  | 0.2017101 | 2.2903387  | 24  | 1 | 125 days  | 0.67 | M-v | 4   | Williams | 31281 | 1997 UA <sub>22</sub> |
| 1997 UQ <sub>24</sub> | 16.5 | 0.15 | 19971108 | 346.91589 | 73.31849  | 314.57467 | 1.81806  | 0.1896054 | 2.7379168  | 22  | 1 | 32 days   | 0.41 |     |     | Williams |       | 1997 UQ <sub>24</sub> |
| 1997 UC <sub>25</sub> | 14.5 | 0.15 | 19971019 | 52.26717  | 133.18578 | 183.23110 | 3.59551  | 0.1071425 | 2.1624432  | 14  | 1 | 5 days    | 0.48 |     | E   | Williams |       | 1997 UC <sub>25</sub> |
| 1997 VV               | 11.5 | 0.15 | 19971218 | 359.53220 | 162.64178 | 241.64423 | 12.60948 | 0.0673301 | 3.1712450  | 29  | 1 | 107 days  | 0.59 | M-v | 4   | Williams | 31281 | 1997 VV               |
| 1997 VW               | 12.5 | 0.15 | 19971218 | 248.82688 | 289.45932 | 255.84086 | 10.91585 | 0.1102780 | 2.6783129  | 29  | 1 | 114 days  | 0.58 | M-v | 4   | Williams |       | 1997 VW               |
| 1997 VU <sub>2</sub>  | 12.0 | 0.15 | 19971218 | 134.96748 | 311.62948 | 293.32373 | 8.91310  | 0.0635005 | 2.9879872  | 31  | 3 | 1989–1998 | 0.48 | M-v | 4   | Williams | 31281 | 1997 VU <sub>2</sub>  |
| 1997 VW <sub>3</sub>  | 13.5 | 0.15 | 19971218 | 46.71818  | 219.28337 | 154.72266 | 2.51722  | 0.0862699 | 2.8431025  | 23  | 1 | 99 days   | 0.54 | M-v | 5   | Williams |       | 1997 VW <sub>3</sub>  |
| 1997 VV <sub>4</sub>  | 15.5 | 0.15 | 19971218 | 23.82911  | 176.40096 | 205.72630 | 2.07437  | 0.2228294 | 2.5851998  | 25  | 1 | 119 days  | 0.69 | M-v | 5   | Marsden  |       | 1997 VV <sub>4</sub>  |
| 1997 VC <sub>5</sub>  | 13.0 | 0.15 | 19971218 | 94.27045  | 265.30447 | 63.58911  | 10.63683 | 0.0871772 | 3.0778684  | 24  | 1 | 112 days  | 0.38 | M-v | 4   | Williams | 31281 | 1997 VC <sub>5</sub>  |
| 1997 VX <sub>5</sub>  | 13.0 | 0.15 | 19971218 | 100.28669 | 156.81502 | 166.67572 | 10.67417 | 0.0532314 | 2.5365383  | 24  | 4 | 1980–1998 | 0.35 | M-v | 1   | Williams | 31018 | 1997 VX <sub>5</sub>  |
| 1997 VZ <sub>5</sub>  | 15.0 | 0.15 | 19971128 | 349.67934 | 17.57026  | 72.34725  | 6.48801  | 0.2239839 | 2.6322692  | 21  | 1 | 59 days   | 0.76 |     |     | Williams |       | 1997 VZ <sub>5</sub>  |
| 1997 VM <sub>6</sub>  | 13.0 | 0.15 | 19971218 | 33.10330  | 159.83670 | 284.58550 | 12.38215 | 0.1241327 | 2.5914549  | 20  | 1 | 107 days  | 0.38 | M-v | 4   | Williams | 31281 | 1997 VM <sub>6</sub>  |
| 1997 VO <sub>6</sub>  | 12.0 | 0.15 | 19971218 | 19.60049  | 157.44585 | 244.43800 | 12.62085 | 0.0652665 | 3.1291779  | 43  | 4 | 1975–1998 | 0.75 | M-v | 2   | Williams | 31281 | 1997 VO <sub>6</sub>  |
| 1997 WX               | 14.5 | 0.15 | 19971218 | 354.25440 | 29.67607  | 9.27463   | 8.00065  | 0.0698200 | 2.3418474  | 20  | 1 | 117 days  | 0.37 | M-v | 5   | Williams | 31281 | 1997 WX               |
| 1997 WV <sub>1</sub>  | 14.5 | 0.15 | 19971128 | 271.30603 | 237.93969 | 289.83835 | 3.44749  | 0.0790106 | 2.2824850  | 24  | 1 | 49 days   | 1.29 |     |     | Williams |       | 1997 WV <sub>1</sub>  |
| 1997 WJ <sub>2</sub>  | 14.0 | 0.15 | 19971218 | 263.40797 | 109.56899 | 73.31987  | 3.90864  | 0.0502188 | 2.2869917  | 27  | 3 | 1971–1998 | 0.79 | M-v | 5   | Williams | 31151 | 1997 WJ <sub>2</sub>  |
| 1997 WR <sub>2</sub>  | 15.0 | 0.15 | 19971128 | 357.71103 | 197.50250 | 239.76879 | 1.43183  | 0.0478630 | 2.2753858  | 18  | 1 | 45 days   | 0.78 |     |     | Williams |       | 1997 WR <sub>2</sub>  |
| 1997 WR <sub>5</sub>  | 14.0 | 0.15 | 19971218 | 214.02101 | 118.61830 | 88.99106  | 2.89098  | 0.0105274 | 2.6734348  | 26  | 1 | 109 days  | 0.65 | M-v | 5   | Williams |       | 1997 WR <sub>5</sub>  |
| 1997 WL <sub>7</sub>  | 14.0 | 0.15 | 19971218 | 326.31309 | 213.62328 | 250.60894 | 3.48549  | 0.0901736 | 2.6450240  | 27  | 2 | 1991–1998 | 0.83 | M-v | 4   | Williams | 31151 | 1997 WL <sub>7</sub>  |
| 1997 WW <sub>7</sub>  | 10.5 | 0.15 | 19971128 | 23.83494  | 153.19428 | 249.87673 | 5.70596  | 0.0708679 | 5.1647275  | 31  | 1 | 45 days   | 1.04 |     |     | Williams |       | 1997 WW <sub>7</sub>  |
| 1997 WE <sub>8</sub>  | 13.0 | 0.15 | 19971218 | 213.41396 | 325.12851 | 248.50367 | 4.96764  | 0.0916309 | 2.6926917  | 13  | 2 | 1995–1998 | 0.54 | M-v | 5   | Williams | 31119 | 1997 WE <sub>8</sub>  |

|                       |      |      |          |           |           |           |          |           |           |     |   |           |      |     |   |          |       |                       |
|-----------------------|------|------|----------|-----------|-----------|-----------|----------|-----------|-----------|-----|---|-----------|------|-----|---|----------|-------|-----------------------|
| 1997 WU <sub>8</sub>  | 14.5 | 0.15 | 19971218 | 45.49702  | 212.76854 | 152.73569 | 2.60521  | 0.1254161 | 2.7251097 | 22  | 1 | 116 days  | 0.59 | M-v | 4 | Williams |       | 1997 WU <sub>8</sub>  |
| 1997 WH <sub>10</sub> | 15.0 | 0.15 | 19971218 | 330.05108 | 317.18903 | 135.64183 | 3.01735  | 0.0091449 | 2.8590060 | 15  | 1 | 93 days   | 0.28 | M-v | 5 | Williams | 31281 | 1997 WH <sub>10</sub> |
| 1997 WP <sub>14</sub> | 14.0 | 0.15 | 19971218 | 354.79898 | 297.60944 | 131.02666 | 2.58067  | 0.0817604 | 3.0935111 | 32  | 4 | 1991–1998 | 0.72 | M-v | 1 | Williams | 31281 | 1997 WP <sub>14</sub> |
| 1997 WR <sub>21</sub> | 15.0 | 0.15 | 19971218 | 48.82034  | 112.32247 | 276.41369 | 4.62649  | 0.1662420 | 2.2657669 | 28  | 2 | 1993–1998 | 0.70 | M-v | 4 | Williams | 31282 | 1997 WR <sub>21</sub> |
| 1997 WB <sub>22</sub> | 13.0 | 0.15 | 19971218 | 248.38827 | 137.17244 | 98.25242  | 9.30357  | 0.0921442 | 2.3152733 | 46  | 3 | 1942–1998 | 0.42 | M-v | 3 | Williams | 31282 | 1997 WB <sub>22</sub> |
| 1997 WQ <sub>22</sub> | 16.0 | 0.15 | 19971218 | 83.12923  | 67.15162  | 310.53102 | 1.82706  | 0.1771654 | 2.2623364 | 24  | 2 | 1993–1998 | 0.36 | M-v | 4 | Williams | 31282 | 1997 WQ <sub>22</sub> |
| 1997 WS <sub>22</sub> | 17.0 | 0.15 | 19971218 | 176.97177 | 196.96268 | 59.29798  | 23.98323 | 0.1207445 | 1.2696682 | 88  | 1 | 91 days   | 0.50 | M-v | 4 | Williams | 31282 | 1997 WS <sub>22</sub> |
| 1997 WT <sub>22</sub> | 19.0 | 0.15 | 19971218 | 319.96372 | 74.56780  | 72.08579  | 8.16082  | 0.3061056 | 1.4852685 | 110 | 1 | 96 days   | 0.48 | M-v | 4 | Marsden  | 31282 | 1997 WT <sub>22</sub> |
| 1997 WU <sub>22</sub> | 15.5 | 0.15 | 19971218 | 216.24059 | 334.10280 | 260.93945 | 15.97517 | 0.4420651 | 1.4675928 | 76  | 2 | 1990–1998 | 0.51 | M-v | 4 | Williams | 31282 | 1997 WU <sub>22</sub> |
| 1997 WO <sub>23</sub> | 15.5 | 0.15 | 19971218 | 330.74591 | 51.32966  | 111.94369 | 7.65834  | 0.1277913 | 2.7522460 | 33  | 1 | 94 days   | 0.38 | M-v | 4 | Williams |       | 1997 WO <sub>23</sub> |
| 1997 WT <sub>23</sub> | 14.5 | 0.15 | 19971218 | 51.63626  | 94.34921  | 254.68743 | 1.49917  | 0.1919480 | 2.4094166 | 36  | 5 | 1982–1998 | 0.58 | M-v | 1 | Williams | 31282 | 1997 WT <sub>23</sub> |
| 1997 WZ <sub>29</sub> | 12.5 | 0.15 | 19971218 | 39.32954  | 106.96780 | 258.55572 | 6.69842  | 0.2179759 | 3.1861430 | 25  | 3 | 1974–1998 | 0.87 | M-v | 3 | Williams | 31121 | 1997 WZ <sub>29</sub> |
| 1997 WZ <sub>30</sub> | 13.5 | 0.15 | 19971218 | 44.73189  | 287.95187 | 81.42332  | 3.01608  | 0.0845202 | 2.8037205 | 20  | 1 | 109 days  | 0.55 | M-v | 4 | Williams | 31282 | 1997 WZ <sub>30</sub> |
| 1997 WQ <sub>31</sub> | 13.5 | 0.15 | 19971218 | 40.83411  | 291.22602 | 80.10463  | 3.13753  | 0.1166743 | 2.9469960 | 16  | 1 | 84 days   | 0.57 | M-v | 5 | Williams |       | 1997 WQ <sub>31</sub> |
| 1997 WP <sub>32</sub> | 13.5 | 0.15 | 19971218 | 323.51211 | 324.72481 | 146.25600 | 1.92256  | 0.1446663 | 3.0863076 | 19  | 1 | 90 days   | 0.55 | M-v | 6 | Williams |       | 1997 WP <sub>32</sub> |
| 1997 WB <sub>33</sub> | 13.5 | 0.15 | 19971218 | 22.50426  | 168.46918 | 224.99631 | 3.35520  | 0.1421799 | 3.3812666 | 32  | 2 | 1996–1998 | 0.52 | M-v | 3 | Williams | 31251 | 1997 WB <sub>33</sub> |
| 1997 WW <sub>36</sub> | 15.5 | 0.15 | 19971218 | 306.17342 | 23.21691  | 105.07659 | 3.99421  | 0.0502545 | 2.2337091 | 17  | 1 | 65 days   | 0.65 | M-v | 6 | Williams |       | 1997 WW <sub>36</sub> |
| 1997 WB <sub>37</sub> | 11.5 | 0.15 | 19971218 | 195.83294 | 144.51991 | 86.69084  | 11.86975 | 0.0984349 | 3.2146827 | 31  | 1 | 93 days   | 0.44 | M-v | 4 | Williams | 31282 | 1997 WB <sub>37</sub> |
| 1997 WT <sub>37</sub> | 13.5 | 0.15 | 19971218 | 88.81232  | 337.77449 | 351.09950 | 2.47055  | 0.1122754 | 2.3961778 | 25  | 2 | 1993–1998 | 0.79 | M-v | 5 | Williams | 31122 | 1997 WT <sub>37</sub> |
| 1997 WF <sub>43</sub> | 14.0 | 0.15 | 19971218 | 166.45577 | 189.41617 | 78.81276  | 6.96001  | 0.0760074 | 2.3039748 | 21  | 1 | 39 days   | 0.62 |     |   | Williams |       | 1997 WF <sub>43</sub> |
| 1997 WG <sub>44</sub> | 14.5 | 0.15 | 19971218 | 40.94154  | 296.11012 | 83.88490  | 6.65462  | 0.1307084 | 2.6268376 | 17  | 1 | 32 days   | 0.68 |     |   | Williams |       | 1997 WG <sub>44</sub> |
| 1997 WL <sub>44</sub> | 13.5 | 0.15 | 19971218 | 25.01291  | 230.39268 | 173.27700 | 0.91703  | 0.1545352 | 3.0555003 | 29  | 3 | 1991–1998 | 0.58 | M-v | 4 | Williams | 31122 | 1997 WL <sub>44</sub> |
| 1997 WT <sub>44</sub> | 14.0 | 0.15 | 19971218 | 303.29774 | 296.43463 | 212.54456 | 1.26258  | 0.1702785 | 2.8448658 | 17  | 1 | 32 days   | 1.16 |     |   | Williams |       | 1997 WT <sub>44</sub> |
| 1997 WJ <sub>46</sub> | 15.0 | 0.15 | 19971218 | 27.72536  | 312.10643 | 76.17549  | 9.04851  | 0.1464491 | 2.3206570 | 20  | 1 | 37 days   | 0.96 |     |   | Williams |       | 1997 WJ <sub>46</sub> |
| 1997 WE <sub>47</sub> | 13.5 | 0.15 | 19971218 | 0.31609   | 339.97305 | 87.24171  | 11.79386 | 0.0682578 | 3.0701835 | 14  | 1 | 87 days   | 0.41 | M-v | 5 | Williams |       | 1997 WE <sub>47</sub> |
| 1997 WK <sub>47</sub> | 13.5 | 0.15 | 19971218 | 28.99911  | 324.02658 | 66.05838  | 3.86642  | 0.1390864 | 2.9753550 | 24  | 1 | 120 days  | 0.62 | M-v | 4 | Williams |       | 1997 WK <sub>47</sub> |
| 1997 WO <sub>51</sub> | 13.0 | 0.15 | 19971218 | 290.33077 | 53.35288  | 95.88857  | 6.57788  | 0.1309178 | 3.1195504 | 25  | 1 | 90 days   | 0.58 | M-v | 6 | Williams |       | 1997 WO <sub>51</sub> |
| 1997 WQ <sub>54</sub> | 13.5 | 0.15 | 19971218 | 337.10036 | 332.69764 | 121.47485 | 2.71079  | 0.1391718 | 3.1398286 | 15  | 1 | 90 days   | 0.27 | M-v | 5 | Williams |       | 1997 WQ <sub>54</sub> |
| 1997 XG               | 15.5 | 0.15 | 19971218 | 46.74639  | 334.06576 | 88.22893  | 0.70404  | 0.1088465 | 2.2108799 | 18  | 1 | 87 days   | 0.53 | M-v | 6 | Williams |       | 1997 XG               |
| 1997 XQ               | 14.0 | 0.15 | 19971218 | 354.95328 | 175.43532 | 288.33601 | 2.25594  | 0.1595884 | 2.5751197 | 30  | 1 | 54 days   | 0.42 |     |   | Williams |       | 1997 XQ               |
| 1997 XF <sub>1</sub>  | 15.0 | 0.15 | 19971218 | 63.31306  | 106.40917 | 250.16307 | 20.39418 | 0.1041535 | 1.9300279 | 28  | 1 | 88 days   | 0.46 | M-v | 4 | Williams |       | 1997 XF <sub>1</sub>  |
| 1997 XQ <sub>2</sub>  | 12.5 | 0.15 | 19971218 | 98.44762  | 139.78922 | 182.81292 | 2.56973  | 0.0888158 | 2.7234592 | 74  | 3 | 1991–1998 | 0.64 | M-v | 2 | Williams | 31283 | 1997 XQ <sub>2</sub>  |
| 1997 XS <sub>3</sub>  | 14.0 | 0.15 | 19971218 | 274.70079 | 121.37283 | 102.77948 | 5.45478  | 0.1855731 | 3.1691248 | 21  | 1 | 88 days   | 0.32 | M-v | 4 | Williams |       | 1997 XS <sub>3</sub>  |
| 1997 XX <sub>3</sub>  | 13.0 | 0.15 | 19971218 | 250.92803 | 137.68586 | 159.08501 | 5.36893  | 0.1889590 | 3.9479301 | 25  | 2 | 1997–1998 | 0.49 | M-v | 4 | Williams | 31283 | 1997 XX <sub>3</sub>  |
| 1997 XV <sub>4</sub>  | 15.5 | 0.15 | 19971218 | 38.80263  | 317.92386 | 128.64911 | 2.25556  | 0.0913049 | 2.2498804 | 21  | 1 | 86 days   | 0.65 | M-v | 6 | Williams |       | 1997 XV <sub>4</sub>  |
| 1997 XW <sub>4</sub>  | 15.0 | 0.15 | 19971218 | 95.87011  | 79.53976  | 311.39752 | 0.85746  | 0.1155437 | 2.8345986 | 12  | 1 | 63 days   | 0.94 | M-v | 7 | Williams |       | 1997 XW <sub>4</sub>  |
| 1997 XD <sub>5</sub>  | 15.0 | 0.15 | 19971218 | 264.82084 | 116.61187 | 124.35478 | 6.21322  | 0.0463093 | 2.4303515 | 13  | 1 | 81 days   | 0.30 | M-v | 5 | Williams |       | 1997 XD <sub>5</sub>  |
| 1997 XM <sub>5</sub>  | 14.2 | 0.15 | 19971218 | 306.51708 | 235.34593 | 275.82482 | 10.64072 | 0.1200108 | 2.3554485 | 21  | 1 | 90 days   | 0.39 | M-v | 4 | Nakano   |       | 1997 XM <sub>5</sub>  |
| 1997 XT <sub>5</sub>  | 12.5 | 0.15 | 19971218 | 61.32346  | 254.91916 | 102.24292 | 7.41571  | 0.1467369 | 3.1176843 | 41  | 3 | 1989–1998 | 0.73 | M-v | 3 | Williams | 31283 | 1997 XT <sub>5</sub>  |
| 1997 XV <sub>7</sub>  | 13.5 | 0.15 | 19971218 | 47.54015  | 117.68107 | 293.54659 | 11.61474 | 0.1718871 | 2.6833818 | 15  | 1 | 50 days   | 0.52 |     |   | Williams |       | 1997 XV <sub>7</sub>  |
| 1997 XN <sub>8</sub>  | 14.5 | 0.15 | 19971218 | 41.02731  | 117.03393 | 311.65986 | 3.60547  | 0.0853676 | 2.2298427 | 30  | 2 | 1995–1998 | 0.65 | M-v | 4 | Williams | 31252 | 1997 XN <sub>8</sub>  |
| 1997 XY <sub>8</sub>  | 16.0 | 0.15 | 19971218 | 56.66134  | 20.41696  | 72.86878  | 1.28604  | 0.0925708 | 2.4453989 | 15  | 1 | 83 days   | 0.24 | M-v | 6 | Williams |       | 1997 XY <sub>8</sub>  |
| 1997 XH <sub>10</sub> | 15.0 | 0.15 | 19971218 | 328.20375 | 56.49663  | 61.34572  | 6.06023  | 0.1253694 | 2.2851577 | 25  | 2 | 1976–1998 | 0.73 | M-v | 4 | Williams | 31283 | 1997 XH <sub>10</sub> |
| 1997 XK <sub>10</sub> | 13.5 | 0.15 | 19971218 | 23.29713  | 152.35035 | 257.86410 | 14.94469 | 0.1814376 | 2.5924911 | 62  | 2 | 1951–1998 | 0.60 | M-v | 4 | Williams | 31253 | 1997 XK <sub>10</sub> |
| 1997 XL <sub>10</sub> | 13.0 | 0.15 | 19971218 | 27.54627  | 331.34609 | 72.01832  | 11.45769 | 0.1067020 | 2.9779676 | 33  | 1 | 39 days   | 0.81 |     |   | Williams |       | 1997 XL <sub>10</sub> |
| 1997 XZ <sub>10</sub> | 15.0 | 0.15 | 19971218 | 346.70176 | 167.74608 | 289.91135 | 2.19669  | 0.1427519 | 2.5314970 | 38  | 1 | 77 days   | 0.64 | M-v | 5 | Williams |       | 1997 XZ <sub>10</sub> |
| 1997 XF <sub>11</sub> | 17.0 | 0.15 | 19971218 | 96.67323  | 102.46984 | 214.12811 | 4.09484  | 0.4838096 | 1.4417508 | 95  | 1 | 88 days   | 0.53 | M-v | 5 | Marsden  | 31283 | 1997 XF <sub>11</sub> |
| 1997 YD               | 14.5 | 0.15 | 19971218 | 8.11511   | 16.79679  | 54.65524  | 1.43029  | 0.1990525 | 2.3640424 | 16  | 3 | 1975–1998 | 0.58 | M-v | 4 | Williams | 31126 | 1997 YD               |
| 1997 YD <sub>1</sub>  | 15.0 | 0.15 | 19980107 | 319.83981 | 251.25260 | 287.61154 | 22.77428 | 0.2922779 | 2.2804260 | 30  | 1 | 59 days   | 0.67 |     |   | Williams |       | 1997 YD <sub>1</sub>  |
| 1997 YN <sub>1</sub>  | 14.5 | 0.15 | 19971218 | 11.90589  | 313.27311 | 126.98978 | 13.17564 | 0.2554543 | 2.5953217 | 18  | 1 | 73 days   | 0.26 | M-v | 4 | Williams |       | 1997 YN <sub>1</sub>  |
| 1997 YU <sub>1</sub>  | 15.5 | 0.15 | 19971218 | 52.94837  | 90.79940  | 293.09308 | 20.77206 | 0.3653780 | 2.2950570 | 22  | 1 | 92 days   | 0.49 | M-v | 4 | Williams |       | 1997 YU <sub>1</sub>  |
| 1997 YM <sub>3</sub>  | 17.0 | 0.15 | 19971218 | 16.42376  | 73.47066  | 303.62526 | 4.02091  | 0.6737708 | 3.2403516 | 59  | 1 | 62 days   | 0.49 | M-v | 5 | Williams | 31284 | 1997 YM <sub>3</sub>  |
| 1997 YX <sub>3</sub>  | 14.0 | 0.15 | 19971218 | 41.65198  | 85.99692  | 298.94008 | 27.98088 | 0.4202039 | 2.7834588 | 73  | 2 | 1984–1998 | 0.61 | M-v | 3 | Williams | 31284 | 1997 YX <sub>3</sub>  |

1998 MAR. 13

M.P.C. 31425

|                       |      |      |          |           |           |           |          |           |           |    |   |           |      |     |   |          |       |                       |
|-----------------------|------|------|----------|-----------|-----------|-----------|----------|-----------|-----------|----|---|-----------|------|-----|---|----------|-------|-----------------------|
| 1997 YO <sub>4</sub>  | 12.0 | 0.15 | 19971218 | 300.03952 | 73.92293  | 64.75379  | 11.21634 | 0.0594956 | 2.9829327 | 19 | 3 | 1977–1997 | 0.76 | M-v | 3 | Williams | 31284 | 1997 YO <sub>4</sub>  |
| 1997 YR <sub>4</sub>  | 14.5 | 0.15 | 19980107 | 61.84043  | 292.27534 | 109.49861 | 4.08175  | 0.1425512 | 2.2724119 | 13 | 1 | 51 days   | 0.51 |     |   | Williams |       | 1997 YR <sub>4</sub>  |
| 1997 YA <sub>5</sub>  | 13.5 | 0.15 | 19971218 | 351.72353 | 180.18627 | 267.97381 | 16.49117 | 0.1495436 | 2.7595266 | 29 | 1 | 73 days   | 0.36 | M-v | 4 | Williams |       | 1997 YA <sub>5</sub>  |
| 1997 YH <sub>5</sub>  | 14.5 | 0.15 | 19971218 | 51.97011  | 60.58297  | 323.59498 | 3.59028  | 0.2394339 | 2.1886665 | 22 | 3 | 1974–1998 | 0.52 | M-v | 4 | Williams | 31255 | 1997 YH <sub>5</sub>  |
| 1997 YJ <sub>5</sub>  | 11.5 | 0.15 | 19971218 | 98.97388  | 54.41501  | 304.35760 | 13.82536 | 0.0860028 | 3.3391509 | 17 | 2 | 1977–1998 | 0.62 | M-v | 5 | Williams | 31255 | 1997 YJ <sub>5</sub>  |
| 1997 YZ <sub>6</sub>  | 16.0 | 0.15 | 19971218 | 347.25700 | 165.24672 | 269.76568 | 19.33562 | 0.0976475 | 1.8702093 | 15 | 1 | 65 days   | 0.50 | M-v | 6 | Williams |       | 1997 YZ <sub>6</sub>  |
| 1997 YF <sub>7</sub>  | 16.5 | 0.15 | 19971218 | 347.91450 | 348.03517 | 108.32276 | 4.51268  | 0.2158078 | 2.3648762 | 17 | 1 | 64 days   | 0.76 | M-v | 5 | Williams |       | 1997 YF <sub>7</sub>  |
| 1997 YN <sub>7</sub>  | 13.5 | 0.15 | 19971218 | 87.47982  | 274.81154 | 110.67784 | 15.57774 | 0.1253726 | 2.6026433 | 11 | 1 | 60 days   | 0.42 | M-v | 5 | Williams |       | 1997 YN <sub>7</sub>  |
| 1997 YO <sub>7</sub>  | 13.0 | 0.15 | 19971218 | 344.82437 | 41.66217  | 103.74379 | 11.66975 | 0.0634143 | 2.9820477 | 17 | 2 | 1991–1998 | 0.52 | M-v | 4 | Williams | 31285 | 1997 YO <sub>7</sub>  |
| 1997 YP <sub>7</sub>  | 12.0 | 0.15 | 19971218 | 165.27691 | 278.27711 | 45.00597  | 5.75321  | 0.1460248 | 3.1519006 | 19 | 4 | 1979–1998 | 0.49 | M-v | 2 | Williams | 31256 | 1997 YP <sub>7</sub>  |
| 1997 YR <sub>7</sub>  | 14.0 | 0.15 | 19980107 | 65.16308  | 92.19638  | 299.87647 | 13.93321 | 0.1111269 | 2.5720133 | 21 | 1 | 52 days   | 0.55 |     |   | Williams |       | 1997 YR <sub>7</sub>  |
| 1997 YZ <sub>7</sub>  | 15.0 | 0.15 | 19980107 | 25.07088  | 149.09444 | 280.99023 | 10.47891 | 0.1934521 | 2.5334910 | 23 | 1 | 54 days   | 0.35 |     |   | Marsden  |       | 1997 YZ <sub>7</sub>  |
| 1997 YA <sub>8</sub>  | 13.5 | 0.15 | 19971218 | 281.31372 | 317.17264 | 251.52850 | 11.92047 | 0.2144510 | 2.4507303 | 38 | 2 | 1991–1998 | 0.52 | M-v | 3 | Marsden  | 31285 | 1997 YA <sub>8</sub>  |
| 1997 YE <sub>8</sub>  | 14.5 | 0.15 | 19971218 | 73.82135  | 190.88333 | 181.18351 | 7.30529  | 0.1623528 | 2.4349002 | 21 | 1 | 65 days   | 0.32 | M-v | 5 | Marsden  |       | 1997 YE <sub>8</sub>  |
| 1997 YN <sub>8</sub>  | 14.0 | 0.15 | 19971218 | 152.76031 | 262.69161 | 14.22684  | 2.77497  | 0.1585101 | 2.2486810 | 37 | 1 | 83 days   | 0.60 | M-v | 5 | Williams |       | 1997 YN <sub>8</sub>  |
| 1997 YO <sub>8</sub>  | 16.0 | 0.15 | 19980107 | 350.87311 | 19.81014  | 104.72205 | 15.88175 | 0.2205698 | 2.7528675 | 15 | 1 | 42 days   | 0.54 |     | D | Williams |       | 1997 YO <sub>8</sub>  |
| 1997 YR <sub>8</sub>  | 14.0 | 0.15 | 19980107 | 178.89720 | 291.16868 | 357.25859 | 9.16469  | 0.0695910 | 3.0684108 | 33 | 1 | 52 days   | 0.62 |     |   | Williams |       | 1997 YR <sub>8</sub>  |
| 1997 YK <sub>9</sub>  | 14.5 | 0.15 | 19980107 | 347.41278 | 54.34934  | 40.68163  | 6.82363  | 0.0655569 | 2.3337480 | 15 | 1 | 53 days   | 0.47 |     |   | Williams |       | 1997 YK <sub>9</sub>  |
| 1997 YN <sub>10</sub> | 14.5 | 0.15 | 19980127 | 64.48223  | 316.34679 | 94.80064  | 8.81081  | 0.1996990 | 2.5659821 | 17 | 1 | 59 days   | 0.35 |     |   | Williams |       | 1997 YN <sub>10</sub> |
| 1997 YT <sub>10</sub> | 13.0 | 0.15 | 19971218 | 252.58331 | 136.29201 | 105.86872 | 8.56235  | 0.0490626 | 2.7793469 | 29 | 3 | 1976–1998 | 0.42 | M-v | 4 | Williams | 31257 | 1997 YT <sub>10</sub> |
| 1997 YA <sub>11</sub> | 16.0 | 0.15 | 19980107 | 12.79798  | 330.32121 | 118.47549 | 4.27430  | 0.2868355 | 2.7243516 | 16 | 1 | 35 days   | 0.49 |     |   | Williams |       | 1997 YA <sub>11</sub> |
| 1997 YF <sub>11</sub> | 15.0 | 0.15 | 19980107 | 271.15296 | 114.79610 | 106.09716 | 7.49857  | 0.1216223 | 2.3446856 | 30 | 1 | 57 days   | 0.37 |     |   | Williams |       | 1997 YF <sub>11</sub> |
| 1997 YJ <sub>11</sub> | 14.0 | 0.15 | 19971218 | 270.98195 | 222.00969 | 4.03487   | 3.81126  | 0.1552804 | 2.5732092 | 14 | 1 | 63 days   | 0.43 | M-v | 5 | Williams |       | 1997 YJ <sub>11</sub> |
| 1997 YL <sub>11</sub> | 17.5 | 0.15 | 19971218 | 350.87371 | 91.17005  | 36.79568  | 5.45778  | 0.4209607 | 2.6707491 | 50 | 1 | 65 days   | 0.43 | M-v | 4 | Marsden  | 31285 | 1997 YL <sub>11</sub> |
| 1997 YQ <sub>11</sub> | 15.0 | 0.15 | 19971218 | 236.45717 | 163.04464 | 86.07979  | 7.75920  | 0.1783167 | 2.2809421 | 16 | 1 | 88 days   | 0.49 | M-v | 5 | Marsden  | 31285 | 1997 YQ <sub>11</sub> |
| 1997 YS <sub>11</sub> | 14.0 | 0.15 | 19971218 | 233.28565 | 171.56403 | 108.80089 | 6.27896  | 0.1599119 | 2.2846033 | 22 | 4 | 1950–1998 | 0.49 | M-v | 1 | Williams | 31257 | 1997 YS <sub>11</sub> |
| 1997 YT <sub>11</sub> | 12.5 | 0.15 | 19971218 | 8.44214   | 7.66968   | 121.27236 | 14.54919 | 0.0816116 | 2.6229041 | 11 | 2 | 1994–1998 | 0.51 | M-v | 4 | Williams | 31257 | 1997 YT <sub>11</sub> |
| 1997 YU <sub>11</sub> | 14.5 | 0.15 | 19980127 | 125.28638 | 353.05435 | 20.44906  | 7.04540  | 0.1130138 | 2.3537611 | 11 | 1 | 54 days   | 0.29 |     |   | Williams |       | 1997 YU <sub>11</sub> |
| 1997 YR <sub>13</sub> | 12.5 | 0.15 | 19971218 | 88.22369  | 162.37882 | 217.86266 | 0.10080  | 0.1295189 | 3.2110484 | 22 | 1 | 60 days   | 0.26 | M-v | 5 | Williams |       | 1997 YR <sub>13</sub> |
| 1997 YS <sub>13</sub> | 15.5 | 0.15 | 19980127 | 310.50461 | 222.83606 | 328.49062 | 0.37604  | 0.1352876 | 2.4214492 | 16 | 1 | 55 days   | 0.54 |     |   | Williams |       | 1997 YS <sub>13</sub> |
| 1997 YW <sub>13</sub> | 13.5 | 0.15 | 19971218 | 315.94546 | 266.04193 | 258.81414 | 5.42519  | 0.1161900 | 2.2892776 | 27 | 4 | 1967–1998 | 0.51 | M-v | 3 | Williams | 31258 | 1997 YW <sub>13</sub> |
| 1997 YX <sub>13</sub> | 13.5 | 0.15 | 19980127 | 13.05146  | 351.25506 | 122.81282 | 22.47190 | 0.0738807 | 2.5500100 | 15 | 1 | 55 days   | 0.40 |     |   | Williams |       | 1997 YX <sub>13</sub> |
| 1997 YY <sub>13</sub> | 16.0 | 0.15 | 19980127 | 339.25145 | 220.35102 | 298.04714 | 4.93464  | 0.1646515 | 2.5593595 | 16 | 1 | 54 days   | 0.56 |     |   | Williams |       | 1997 YY <sub>13</sub> |
| 1997 YB <sub>14</sub> | 14.0 | 0.15 | 19971218 | 16.80331  | 331.19176 | 117.35273 | 14.36330 | 0.2100055 | 2.5471199 | 23 | 2 | 1994–1998 | 0.55 | M-v | 4 | Williams | 31286 | 1997 YB <sub>14</sub> |
| 1997 YC <sub>14</sub> | 14.0 | 0.15 | 19971218 | 205.02834 | 329.48318 | 312.28505 | 6.23143  | 0.1716017 | 2.2667605 | 20 | 3 | 1971–1998 | 0.48 | M-v | 4 | Williams | 31258 | 1997 YC <sub>14</sub> |
| 1997 YD <sub>14</sub> | 14.0 | 0.15 | 19971218 | 13.53902  | 149.04068 | 308.94288 | 7.72431  | 0.2048170 | 3.1452403 | 22 | 1 | 118 days  | 0.34 | M-v | 4 | Williams | 31286 | 1997 YD <sub>14</sub> |
| 1997 YE <sub>14</sub> | 12.5 | 0.15 | 19971218 | 214.45852 | 338.10517 | 298.47451 | 8.18609  | 0.1320452 | 2.7925032 | 34 | 4 | 1986–1998 | 0.57 | M-v | 2 | Williams | 31258 | 1997 YE <sub>14</sub> |
| 1997 YF <sub>14</sub> | 15.0 | 0.15 | 19971218 | 19.35985  | 155.36989 | 294.36757 | 5.10762  | 0.1613696 | 2.5401700 | 31 | 2 | 1994–1998 | 0.50 | M-v | 4 | Williams | 31286 | 1997 YF <sub>14</sub> |
| 1997 YH <sub>14</sub> | 14.0 | 0.15 | 19971218 | 304.76467 | 217.95350 | 324.08211 | 1.04253  | 0.0541556 | 2.9314675 | 29 | 1 | 60 days   | 0.50 | M-v | 5 | Williams |       | 1997 YH <sub>14</sub> |
| 1997 YK <sub>14</sub> | 13.5 | 0.15 | 19971218 | 175.89832 | 352.30870 | 315.24073 | 8.60247  | 0.0745417 | 3.1933409 | 16 | 1 | 61 days   | 0.37 | M-v | 6 | Williams |       | 1997 YK <sub>14</sub> |
| 1997 YP <sub>14</sub> | 14.0 | 0.15 | 19980127 | 102.18345 | 47.47090  | 331.12107 | 1.14293  | 0.0735557 | 2.8959611 | 12 | 1 | 55 days   | 0.23 |     |   | Marsden  |       | 1997 YP <sub>14</sub> |
| 1997 YN <sub>16</sub> | 14.5 | 0.15 | 19971218 | 322.06765 | 23.40185  | 130.78903 | 3.05749  | 0.1622407 | 2.4540900 | 14 | 1 | 64 days   | 0.68 | M-v | 6 | Williams |       | 1997 YN <sub>16</sub> |
| 1997 YB <sub>17</sub> | 13.0 | 0.15 | 19971218 | 224.53875 | 309.77771 | 306.79672 | 0.94782  | 0.0217169 | 2.8849924 | 24 | 3 | 1976–1998 | 0.35 | M-v | 4 | Williams | 31258 | 1997 YB <sub>17</sub> |
| 1997 YE <sub>18</sub> | 14.0 | 0.15 | 19980107 | 181.43286 | 346.47478 | 313.39758 | 9.22485  | 0.0333228 | 3.0676013 | 12 | 1 | 32 days   | 0.35 |     |   | Williams |       | 1997 YE <sub>18</sub> |
| 1997 YF <sub>18</sub> | 13.0 | 0.15 | 19980107 | 293.21893 | 185.74944 | 51.54659  | 11.78781 | 0.1407745 | 3.1295285 | 18 | 1 | 59 days   | 0.26 |     |   | Williams |       | 1997 YF <sub>18</sub> |
| 1997 YQ <sub>18</sub> | 16.0 | 0.15 | 19971218 | 217.58369 | 131.33344 | 138.49346 | 15.65730 | 0.0668087 | 2.5341862 | 12 | 1 | 63 days   | 0.21 | M-v | 5 | Williams |       | 1997 YQ <sub>18</sub> |
| 1997 YF <sub>20</sub> | 16.5 | 0.15 | 19980107 | 326.18958 | 210.03095 | 311.05003 | 5.82602  | 0.0365302 | 2.3479969 | 13 | 1 | 56 days   | 0.18 |     |   | Williams |       | 1997 YF <sub>20</sub> |
| 1997 YO <sub>21</sub> | 14.5 | 0.15 | 19980107 | 65.37774  | 294.93579 | 98.51618  | 4.65034  | 0.0987649 | 2.7948388 | 17 | 1 | 53 days   | 0.30 |     |   | Marsden  |       | 1997 YO <sub>21</sub> |
| 1998 AA               | 13.5 | 0.15 | 19971218 | 77.54184  | 85.23877  | 246.59140 | 23.51103 | 0.2455359 | 2.3756976 | 42 | 1 | 81 days   | 0.65 | M-v | 5 | Williams | 31286 | 1998 AA               |
| 1998 AF               | 15.0 | 0.15 | 19971218 | 352.45361 | 307.46556 | 160.59883 | 5.11136  | 0.1009974 | 2.2757489 | 26 | 1 | 60 days   | 0.64 | M-v | 5 | Nakano   |       | 1998 AF               |
| 1998 AH               | 13.5 | 0.15 | 19980127 | 17.07989  | 66.98563  | 13.32975  | 4.05608  | 0.2828632 | 2.6020538 | 42 | 1 | 58 days   | 0.69 |     |   | Williams |       | 1998 AH               |
| 1998 AL               | 14.5 | 0.15 | 19971218 | 39.06309  | 304.78397 | 120.57542 | 5.61623  | 0.1809247 | 2.3778297 | 21 | 1 | 86 days   | 0.36 | M-v | 5 | Williams | 31286 | 1998 AL               |
| 1998 AP               | 13.5 | 0.15 | 19980127 | 339.16619 | 35.73398  | 127.60611 | 8.86600  | 0.1566624 | 2.7904364 | 16 | 1 | 59 days   | 0.36 |     |   | Williams |       | 1998 AP               |

|                       |      |      |          |           |           |           |          |           |           |     |   |           |      |     |   |          |       |                       |
|-----------------------|------|------|----------|-----------|-----------|-----------|----------|-----------|-----------|-----|---|-----------|------|-----|---|----------|-------|-----------------------|
| 1998 AQ               | 13.5 | 0.15 | 19971218 | 294.20393 | 79.21274  | 130.69635 | 22.78354 | 0.1415307 | 3.1707656 | 22  | 2 | 1966–1998 | 0.71 | M-v | 5 | Williams | 31259 | 1998 AQ               |
| 1998 AX               | 13.5 | 0.15 | 19971218 | 23.81134  | 101.12561 | 346.60637 | 6.00613  | 0.1064984 | 2.3979806 | 40  | 3 | 1982–1998 | 0.47 | M-v | 3 | Williams | 31260 | 1998 AX               |
| 1998 AY               | 17.0 | 0.15 | 19980127 | 354.22701 | 45.75636  | 96.72818  | 4.26114  | 0.2146943 | 2.3714927 | 22  | 1 | 51 days   | 0.62 |     |   | Williams |       | 1998 AY               |
| 1998 AZ               | 13.5 | 0.15 | 19980127 | 264.98745 | 272.39390 | 326.92219 | 10.06512 | 0.0775084 | 3.0679176 | 13  | 1 | 54 days   | 0.44 |     |   | Williams |       | 1998 AZ               |
| 1998 AA <sub>1</sub>  | 16.5 | 0.15 | 19980127 | 357.20510 | 34.80787  | 103.37979 | 5.58339  | 0.2410795 | 2.4062943 | 16  | 1 | 50 days   | 0.42 |     |   | Williams |       | 1998 AA <sub>1</sub>  |
| 1998 AB <sub>1</sub>  | 14.5 | 0.15 | 19980127 | 36.78495  | 326.76742 | 121.15344 | 20.64369 | 0.1330627 | 2.8369461 | 13  | 1 | 49 days   | 0.38 |     |   | Williams |       | 1998 AB <sub>1</sub>  |
| 1998 AS <sub>1</sub>  | 13.5 | 0.15 | 19971218 | 340.58175 | 18.75298  | 114.76431 | 2.91450  | 0.1438116 | 3.1101860 | 41  | 3 | 1993–1998 | 0.69 | M-v | 4 | Marsden  | 31260 | 1998 AS <sub>1</sub>  |
| 1998 AH <sub>4</sub>  | 14.5 | 0.15 | 19971218 | 74.40965  | 88.20047  | 300.55236 | 8.89006  | 0.0575157 | 2.9919244 | 16  | 1 | 57 days   | 0.33 |     |   | Williams |       | 1998 AH <sub>4</sub>  |
| 1998 AW <sub>4</sub>  | 15.0 | 0.15 | 19980127 | 333.15573 | 52.97655  | 125.61173 | 17.23265 | 0.1838029 | 3.1553104 | 22  | 1 | 43 days   | 0.69 |     |   | Marsden  |       | 1998 AW <sub>4</sub>  |
| 1998 AX <sub>4</sub>  | 14.5 | 0.15 | 19980127 | 52.51551  | 331.40458 | 93.45604  | 24.33418 | 0.0799292 | 1.9620315 | 26  | 1 | 49 days   | 0.51 |     |   | Williams |       | 1998 AX <sub>4</sub>  |
| 1998 AZ <sub>4</sub>  | 14.5 | 0.15 | 19980127 | 345.34305 | 215.96964 | 271.88283 | 7.06595  | 0.0741903 | 2.2411380 | 12  | 1 | 52 days   | 0.53 |     |   | Williams |       | 1998 AZ <sub>4</sub>  |
| 1998 AA <sub>5</sub>  | 15.5 | 0.15 | 19980127 | 82.87036  | 94.10857  | 273.39376 | 7.79023  | 0.1776869 | 2.7801841 | 18  | 1 | 48 days   | 0.55 |     |   | Williams |       | 1998 AA <sub>5</sub>  |
| 1998 AB <sub>5</sub>  | 15.5 | 0.15 | 19980127 | 198.29885 | 155.47118 | 120.95363 | 7.69031  | 0.1289432 | 2.2997291 | 17  | 1 | 44 days   | 0.66 |     |   | Williams |       | 1998 AB <sub>5</sub>  |
| 1998 AP <sub>5</sub>  | 14.5 | 0.15 | 19980107 | 241.62066 | 304.20596 | 325.56870 | 13.92054 | 0.0934003 | 2.6266050 | 12  | 1 | 30 days   | 0.60 |     |   | Marsden  |       | 1998 AP <sub>5</sub>  |
| 1998 AB <sub>6</sub>  | 15.0 | 0.15 | 19971218 | 183.74170 | 318.26776 | 0.54482   | 2.08377  | 0.2234388 | 2.3792373 | 14  | 1 | 78 days   | 0.20 | M-v | 6 | Williams |       | 1998 AB <sub>6</sub>  |
| 1998 AC <sub>6</sub>  | 16.0 | 0.15 | 19980127 | 358.29468 | 175.13066 | 333.64308 | 6.16704  | 0.0692166 | 2.4589127 | 12  | 1 | 46 days   | 0.14 |     |   | Williams |       | 1998 AC <sub>6</sub>  |
| 1998 AR <sub>6</sub>  | 13.5 | 0.15 | 19980127 | 22.47794  | 3.72642   | 97.87701  | 7.24767  | 0.1110632 | 3.3789224 | 12  | 1 | 44 days   | 0.38 |     |   | Williams |       | 1998 AR <sub>6</sub>  |
| 1998 AK <sub>7</sub>  | 13.5 | 0.15 | 19980127 | 283.62861 | 255.87548 | 320.49308 | 21.39927 | 0.1050634 | 3.1519508 | 16  | 1 | 50 days   | 0.56 |     |   | Williams |       | 1998 AK <sub>7</sub>  |
| 1998 AP <sub>7</sub>  | 14.5 | 0.15 | 19971218 | 117.81574 | 242.40160 | 98.91652  | 4.30253  | 0.0930467 | 2.6878973 | 25  | 2 | 1996–1998 | 0.53 | M-v | 5 | Marsden  | 31260 | 1998 AP <sub>7</sub>  |
| 1998 AQ <sub>7</sub>  | 16.5 | 0.15 | 19980127 | 57.83890  | 13.61011  | 25.32041  | 2.81526  | 0.2277961 | 2.4329019 | 24  | 1 | 43 days   | 0.35 |     |   | Marsden  |       | 1998 AQ <sub>7</sub>  |
| 1998 AK <sub>8</sub>  | 16.5 | 0.15 | 19971218 | 342.93586 | 11.63391  | 126.86055 | 48.23524 | 0.1820257 | 1.7981826 | 142 | 1 | 55 days   | 0.39 | M-v | 4 | Marsden  |       | 1998 AK <sub>8</sub>  |
| 1998 AL <sub>8</sub>  | 14.5 | 0.15 | 19980107 | 341.79064 | 59.61334  | 74.84763  | 2.01244  | 0.1602447 | 2.6579647 | 50  | 1 | 36 days   | 0.31 |     |   | Marsden  |       | 1998 AL <sub>8</sub>  |
| 1998 AN <sub>8</sub>  | 14.0 | 0.15 | 19971218 | 28.53693  | 324.05533 | 44.61850  | 15.55870 | 0.0962934 | 2.6770653 | 23  | 1 | 104 days  | 0.40 | M-v | 4 | Williams | 31287 | 1998 AN <sub>8</sub>  |
| 1998 AP <sub>8</sub>  | 15.0 | 0.15 | 19971218 | 311.05651 | 327.26446 | 164.49440 | 2.27659  | 0.2451722 | 2.5635351 | 25  | 1 | 115 days  | 0.67 | M-v | 5 | Williams | 31287 | 1998 AP <sub>8</sub>  |
| 1998 AQ <sub>8</sub>  | 14.0 | 0.15 | 19971218 | 159.94730 | 94.48174  | 238.04114 | 4.25339  | 0.0197259 | 2.8181225 | 16  | 1 | 64 days   | 0.46 | M-v | 5 | Williams |       | 1998 AQ <sub>8</sub>  |
| 1998 AS <sub>8</sub>  | 13.0 | 0.15 | 19971218 | 55.07362  | 253.77567 | 180.43301 | 1.86460  | 0.0060995 | 2.8909127 | 52  | 4 | 1991–1998 | 0.64 | M-v | 2 | Williams | 31261 | 1998 AS <sub>8</sub>  |
| 1998 AV <sub>8</sub>  | 15.0 | 0.15 | 19971218 | 37.78813  | 208.26079 | 202.82034 | 4.23894  | 0.1147040 | 2.2233789 | 30  | 3 | 1990–1998 | 0.39 | M-v | 4 | Marsden  | 31261 | 1998 AV <sub>8</sub>  |
| 1998 AW <sub>8</sub>  | 15.5 | 0.15 | 19971218 | 355.62815 | 200.35207 | 223.58343 | 4.84058  | 0.1176094 | 2.2516789 | 38  | 1 | 122 days  | 0.79 | M-v | 4 | Williams | 31287 | 1998 AW <sub>8</sub>  |
| 1998 AX <sub>8</sub>  | 14.5 | 0.15 | 19971218 | 28.16451  | 96.32986  | 266.32309 | 2.08060  | 0.2933528 | 3.0593185 | 32  | 1 | 112 days  | 0.79 | M-v | 4 | Williams |       | 1998 AX <sub>8</sub>  |
| 1998 AD <sub>10</sub> | 15.0 | 0.15 | 19980127 | 126.74586 | 51.76898  | 241.81977 | 5.88242  | 0.1653746 | 2.1890382 | 9   | 1 | 38 days   | 0.21 |     |   | Williams |       | 1998 AD <sub>10</sub> |
| 1998 AM <sub>10</sub> | 14.0 | 0.15 | 19971218 | 155.22673 | 173.85093 | 145.92629 | 7.90075  | 0.0904299 | 2.4536600 | 10  | 1 | 61 days   | 0.29 | M-v | 5 | Williams |       | 1998 AM <sub>10</sub> |
| 1998 AF <sub>11</sub> | 13.5 | 0.15 | 19980107 | 188.85697 | 197.47739 | 84.01143  | 3.94290  | 0.0272886 | 2.8873928 | 20  | 1 | 12 days   | 0.59 |     |   | Williams |       | 1998 AF <sub>11</sub> |
| 1998 AG <sub>11</sub> | 14.0 | 0.15 | 19980107 | 212.88305 | 184.66348 | 78.04774  | 3.01566  | 0.1061809 | 2.4362325 | 14  | 1 | 3 days    | 0.29 |     |   | Williams |       | 1998 AG <sub>11</sub> |
| 1998 BB               | 14.4 | 0.15 | 19980127 | 64.97188  | 1.04884   | 34.55292  | 3.57916  | 0.1516905 | 2.2982855 | 13  | 1 | 32 days   | 0.29 |     |   | Nakano   |       | 1998 BB               |
| 1998 BC               | 14.9 | 0.15 | 19980127 | 253.41513 | 260.36163 | 329.45730 | 8.02902  | 0.0390709 | 2.4889554 | 13  | 1 | 36 days   | 0.51 |     |   | Nakano   |       | 1998 BC               |
| 1998 BD               | 13.9 | 0.15 | 19980127 | 89.56556  | 319.03227 | 52.26811  | 5.30632  | 0.1768123 | 2.2636421 | 11  | 1 | 36 days   | 0.45 |     |   | Nakano   |       | 1998 BD               |
| 1998 BG               | 15.5 | 0.15 | 19980127 | 344.32911 | 121.24046 | 352.80400 | 12.42978 | 0.1237976 | 2.6583462 | 33  | 1 | 43 days   |      |     |   | Marsden  |       | 1998 BG               |
| 1998 BH               | 16.0 | 0.15 | 19980127 | 5.49588   | 19.25505  | 93.33767  | 7.47819  | 0.0568975 | 2.3950973 | 30  | 1 | 39 days   |      |     |   | Marsden  |       | 1998 BH               |
| 1998 BK               | 15.2 | 0.15 | 19980127 | 56.17118  | 323.88593 | 81.95122  | 6.16828  | 0.2151969 | 2.3591655 | 21  | 1 | 30 days   | 0.80 |     |   | Nakano   |       | 1998 BK               |
| 1998 BL               | 14.5 | 0.15 | 19971218 | 289.17758 | 130.89091 | 74.49997  | 6.03640  | 0.1001811 | 2.7343616 | 19  | 2 | 1991–1998 | 0.49 | M-v | 4 | Williams | 31261 | 1998 BL               |
| 1998 BM               | 13.0 | 0.15 | 19980127 | 186.47035 | 311.80312 | 347.76913 | 8.38041  | 0.0811055 | 3.1416063 | 16  | 1 | 59 days   | 0.49 |     |   | Williams |       | 1998 BM               |
| 1998 BN               | 13.1 | 0.15 | 19980127 | 28.10155  | 119.27571 | 341.52117 | 9.92668  | 0.0650711 | 2.9754757 | 10  | 1 | 30 days   | 0.44 |     |   | Nakano   |       | 1998 BN               |
| 1998 BO               | 14.7 | 0.15 | 19980127 | 305.68436 | 110.08039 | 85.91187  | 6.11528  | 0.0965606 | 2.2487473 | 13  | 1 | 30 days   | 0.37 |     |   | Nakano   |       | 1998 BO               |
| 1998 BP               | 14.2 | 0.15 | 19980127 | 5.41469   | 96.74412  | 27.92079  | 4.89770  | 0.1000570 | 2.3135005 | 10  | 1 | 30 days   | 0.74 |     |   | Nakano   |       | 1998 BP               |
| 1998 BT               | 12.4 | 0.15 | 19980127 | 285.84973 | 107.85550 | 103.41478 | 11.17045 | 0.0352182 | 2.9626459 | 10  | 1 | 29 days   | 0.41 |     |   | Nakano   |       | 1998 BT               |
| 1998 BU               | 14.0 | 0.15 | 19971218 | 304.62110 | 187.46147 | 357.91668 | 4.44766  | 0.1798033 | 2.5874486 | 15  | 2 | 1994–1998 | 0.60 | M-v | 5 | Williams | 31261 | 1998 BU               |
| 1998 BV               | 14.5 | 0.15 | 19980127 | 10.66164  | 346.08189 | 133.54724 | 5.68129  | 0.1657330 | 2.3237046 | 24  | 1 | 44 days   | 0.57 |     |   | Williams |       | 1998 BV               |
| 1998 BW               | 12.9 | 0.15 | 19980127 | 296.53802 | 268.25298 | 316.11987 | 14.02244 | 0.2124842 | 2.8689100 | 20  | 1 | 29 days   | 0.54 |     |   | Nakano   |       | 1998 BW               |
| 1998 BX               | 13.0 | 0.15 | 19980127 | 68.81959  | 270.14179 | 130.19954 | 8.16229  | 0.2549598 | 3.9653943 | 19  | 1 | 38 days   | 0.54 |     |   | Williams |       | 1998 BX               |
| 1998 BY               | 15.0 | 0.15 | 19980127 | 254.23497 | 257.13186 | 331.17721 | 8.70349  | 0.0095463 | 2.4772488 | 13  | 1 | 29 days   | 0.64 |     |   | Williams |       | 1998 BY               |
| 1998 BZ               | 12.7 | 0.15 | 19980127 | 62.55498  | 307.76768 | 87.41863  | 7.88273  | 0.2184897 | 2.3501295 | 10  | 1 | 29 days   | 0.28 |     |   | Nakano   |       | 1998 BZ               |
| 1998 BA <sub>1</sub>  | 12.4 | 0.15 | 19980127 | 198.09093 | 170.44847 | 133.62285 | 13.69593 | 0.1312645 | 3.0923104 | 12  | 1 | 30 days   | 0.47 |     |   | Nakano   |       | 1998 BA <sub>1</sub>  |
| 1998 BB <sub>1</sub>  | 15.2 | 0.15 | 19980127 | 189.85227 | 343.68119 | 324.87013 | 13.43153 | 0.1286508 | 2.6113172 | 15  | 1 | 29 days   | 0.60 |     |   | Nakano   |       | 1998 BB <sub>1</sub>  |

|                      |      |      |          |           |           |           |          |           |           |     |   |           |      |     |   |          |       |                      |
|----------------------|------|------|----------|-----------|-----------|-----------|----------|-----------|-----------|-----|---|-----------|------|-----|---|----------|-------|----------------------|
| 1998 BC <sub>1</sub> | 12.5 | 0.15 | 19971218 | 17.65777  | 282.60424 | 182.14145 | 0.29167  | 0.1426825 | 3.1856105 | 27  | 5 | 1979–1998 | 0.62 | M-v | 3 | Williams | 31261 | 1998 BC <sub>1</sub> |
| 1998 BD <sub>1</sub> | 14.0 | 0.15 | 19980127 | 302.31079 | 253.53153 | 314.22260 | 11.87836 | 0.1251017 | 2.6834288 | 20  | 1 | 31 days   | 0.51 |     |   | Williams |       | 1998 BD <sub>1</sub> |
| 1998 BE <sub>1</sub> | 14.5 | 0.15 | 19971218 | 5.79025   | 12.77287  | 91.48659  | 6.16962  | 0.0501909 | 2.2790155 | 23  | 3 | 1991–1998 | 0.60 | M-v | 4 | Williams | 31262 | 1998 BE <sub>1</sub> |
| 1998 BF <sub>1</sub> | 14.3 | 0.15 | 19980127 | 8.83666   | 13.57955  | 100.29666 | 12.68511 | 0.0304124 | 2.7206273 | 16  | 1 | 51 days   | 0.47 |     |   | Nakano   |       | 1998 BF <sub>1</sub> |
| 1998 BG <sub>1</sub> | 14.1 | 0.15 | 19980127 | 36.40313  | 356.24290 | 80.53870  | 6.40617  | 0.1285699 | 2.2957933 | 10  | 1 | 29 days   | 0.82 |     |   | Nakano   |       | 1998 BG <sub>1</sub> |
| 1998 BH <sub>1</sub> | 14.0 | 0.15 | 19971218 | 92.77043  | 286.80290 | 69.20136  | 5.45306  | 0.2300657 | 2.3344767 | 16  | 2 | 1975–1998 | 0.75 | M-v | 5 | Williams | 31262 | 1998 BH <sub>1</sub> |
| 1998 BJ <sub>1</sub> | 14.3 | 0.15 | 19980127 | 311.87504 | 68.28082  | 123.05519 | 9.75006  | 0.0662021 | 3.0100608 | 13  | 1 | 29 days   | 0.46 |     |   | Nakano   |       | 1998 BJ <sub>1</sub> |
| 1998 BK <sub>1</sub> | 14.5 | 0.15 | 19971218 | 306.41652 | 95.70293  | 95.59075  | 3.35794  | 0.1479490 | 2.3924474 | 25  | 1 | 96 days   | 0.39 | M-v | 5 | Williams | 31288 | 1998 BK <sub>1</sub> |
| 1998 BL <sub>1</sub> | 14.0 | 0.15 | 19980127 | 112.39775 | 243.19411 | 136.39750 | 11.77771 | 0.0560747 | 2.6936601 | 19  | 1 | 41 days   | 0.53 |     |   | Williams |       | 1998 BL <sub>1</sub> |
| 1998 BM <sub>1</sub> | 14.6 | 0.15 | 19980127 | 15.36596  | 340.02167 | 137.91472 | 6.18738  | 0.1302986 | 3.1686543 | 16  | 1 | 29 days   | 0.43 |     |   | Nakano   |       | 1998 BM <sub>1</sub> |
| 1998 BN <sub>1</sub> | 15.8 | 0.15 | 19980127 | 35.85677  | 71.83043  | 8.57435   | 4.00137  | 0.1009097 | 2.3033728 | 16  | 1 | 29 days   | 0.33 |     |   | Nakano   |       | 1998 BN <sub>1</sub> |
| 1998 BO <sub>1</sub> | 13.5 | 0.15 | 19971218 | 32.52980  | 84.40339  | 347.39685 | 5.30494  | 0.0966085 | 2.3427607 | 25  | 4 | 1950–1998 | 0.41 | M-v | 1 | Williams | 31262 | 1998 BO <sub>1</sub> |
| 1998 BQ <sub>1</sub> | 15.5 | 0.15 | 19980127 | 324.59151 | 66.93074  | 117.59430 | 4.85254  | 0.1630105 | 2.5986208 | 16  | 1 | 40 days   | 0.47 |     |   | Williams |       | 1998 BQ <sub>1</sub> |
| 1998 BR <sub>1</sub> | 12.7 | 0.15 | 19980127 | 100.82132 | 311.98841 | 44.03619  | 5.83881  | 0.2583954 | 2.3693298 | 10  | 1 | 29 days   | 0.38 |     |   | Nakano   |       | 1998 BR <sub>1</sub> |
| 1998 BS <sub>1</sub> | 13.5 | 0.15 | 19971218 | 352.13542 | 127.96093 | 353.16172 | 4.41887  | 0.1220117 | 2.4537101 | 23  | 4 | 1981–1998 | 0.39 | M-v | 1 | Williams | 31262 | 1998 BS <sub>1</sub> |
| 1998 BU <sub>1</sub> | 14.0 | 0.15 | 19971218 | 35.26381  | 324.59249 | 102.65527 | 14.34662 | 0.1392069 | 2.5960893 | 20  | 2 | 1995–1998 | 0.51 | M-v | 5 | Williams | 31262 | 1998 BU <sub>1</sub> |
| 1998 BW <sub>1</sub> | 13.0 | 0.15 | 19971218 | 23.84790  | 277.86553 | 156.83789 | 2.20272  | 0.2246947 | 3.0115148 | 51  | 4 | 1986–1998 | 0.60 | M-v | 2 | Williams | 31262 | 1998 BW <sub>1</sub> |
| 1998 BW <sub>2</sub> | 12.5 | 0.15 | 19971218 | 90.92030  | 267.38416 | 108.94293 | 8.58117  | 0.1074001 | 3.0383193 | 22  | 4 | 1977–1998 | 0.73 | M-v | 3 | Williams | 31263 | 1998 BW <sub>2</sub> |
| 1998 BX <sub>2</sub> | 14.7 | 0.15 | 19980216 | 1.41148   | 179.93530 | 309.97421 | 21.73089 | 0.2666166 | 3.1100671 | 21  | 1 | 43 days   | 0.51 |     |   | Nakano   |       | 1998 BX <sub>2</sub> |
| 1998 BY <sub>2</sub> | 14.5 | 0.15 | 19980127 | 17.03100  | 101.88465 | 4.13710   | 2.92095  | 0.1026017 | 2.2585446 | 19  | 1 | 41 days   | 0.64 |     |   | Williams |       | 1998 BY <sub>2</sub> |
| 1998 BM <sub>3</sub> | 17.0 | 0.15 | 19980127 | 37.35634  | 292.92839 | 154.34306 | 0.49069  | 0.0644514 | 2.2746341 | 9   | 1 | 35 days   | 0.59 |     |   | Williams |       | 1998 BM <sub>3</sub> |
| 1998 BZ <sub>3</sub> | 15.0 | 0.15 | 19980127 | 295.16327 | 286.53703 | 286.48330 | 3.43561  | 0.1531381 | 2.6015713 | 12  | 1 | 38 days   | 0.25 |     |   | Marsden  |       | 1998 BZ <sub>3</sub> |
| 1998 BA <sub>4</sub> | 16.0 | 0.15 | 19980127 | 348.98713 | 13.67072  | 125.14176 | 3.34929  | 0.1162402 | 2.3737020 | 26  | 1 | 36 days   | 0.71 |     |   | Williams |       | 1998 BA <sub>4</sub> |
| 1998 BB <sub>4</sub> | 15.0 | 0.15 | 19980127 | 5.77444   | 344.88671 | 138.21642 | 5.49186  | 0.1755740 | 2.3616238 | 34  | 1 | 38 days   | 0.36 |     |   | Williams |       | 1998 BB <sub>4</sub> |
| 1998 BD <sub>4</sub> | 14.0 | 0.15 | 19971218 | 52.64932  | 93.81037  | 316.41283 | 12.22313 | 0.1596016 | 2.6007380 | 24  | 2 | 1990–1998 | 0.63 | M-v | 5 | Williams | 31263 | 1998 BD <sub>4</sub> |
| 1998 BG <sub>4</sub> | 15.0 | 0.15 | 19971218 | 289.31527 | 184.56690 | 26.29015  | 1.13205  | 0.1478834 | 2.3918070 | 22  | 1 | 113 days  | 0.52 | M-v | 5 | Williams | 31289 | 1998 BG <sub>4</sub> |
| 1998 BH <sub>4</sub> | 15.5 | 0.15 | 19980127 | 331.65237 | 204.03926 | 334.28734 | 2.25303  | 0.2234304 | 2.3621112 | 18  | 1 | 44 days   | 0.36 |     |   | Williams |       | 1998 BH <sub>4</sub> |
| 1998 BJ <sub>4</sub> | 13.0 | 0.15 | 19971218 | 13.27244  | 140.47046 | 314.83493 | 10.56481 | 0.2820602 | 2.7387523 | 23  | 2 | 1996–1998 | 0.62 | M-v | 4 | Williams | 31264 | 1998 BJ <sub>4</sub> |
| 1998 BK <sub>4</sub> | 16.5 | 0.15 | 19971218 | 314.44502 | 74.52044  | 110.56170 | 3.81720  | 0.2133464 | 2.2580171 | 24  | 1 | 90 days   | 0.50 | M-v | 5 | Williams |       | 1998 BK <sub>4</sub> |
| 1998 BM <sub>4</sub> | 15.5 | 0.15 | 19980127 | 17.24479  | 143.01392 | 310.53215 | 14.23910 | 0.1560355 | 3.1216580 | 25  | 1 | 25 days   | 0.32 |     |   | Marsden  |       | 1998 BM <sub>4</sub> |
| 1998 BW <sub>4</sub> | 14.5 | 0.15 | 19980107 | 282.70961 | 325.38359 | 255.50433 | 3.57477  | 0.2222181 | 2.5847206 | 15  | 1 | 13 days   | 0.45 |     |   | Williams |       | 1998 BW <sub>4</sub> |
| 1998 BE <sub>5</sub> | 16.0 | 0.15 | 19980107 | 337.26354 | 282.42256 | 216.41589 | 4.82136  | 0.0710496 | 2.3162186 | 18  | 1 | 57 days   | 0.31 |     |   | Williams |       | 1998 BE <sub>5</sub> |
| 1998 BP <sub>6</sub> | 13.0 | 0.15 | 19980127 | 6.18873   | 340.47042 | 96.57676  | 11.98608 | 0.2327678 | 3.0490072 | 14  | 1 | 29 days   | 0.48 |     |   | Williams |       | 1998 BP <sub>6</sub> |
| 1998 BR <sub>6</sub> | 16.5 | 0.15 | 19980107 | 29.91941  | 306.21873 | 122.76251 | 4.34760  | 0.2702996 | 2.3571771 | 13  | 1 | 55 days   | 0.55 |     |   | Williams |       | 1998 BR <sub>6</sub> |
| 1998 BS <sub>6</sub> | 14.7 | 0.15 | 19980127 | 195.46186 | 152.96781 | 144.52349 | 3.92381  | 0.1321129 | 2.2510221 | 13  | 1 | 24 days   | 0.37 |     |   | Nakano   |       | 1998 BS <sub>6</sub> |
| 1998 BT <sub>6</sub> | 15.5 | 0.15 | 19980127 | 308.66645 | 344.02214 | 207.32589 | 1.41324  | 0.1068897 | 2.4022175 | 20  | 1 | 30 days   | 0.49 |     |   | Williams |       | 1998 BT <sub>6</sub> |
| 1998 BU <sub>6</sub> | 14.5 | 0.15 | 19971218 | 38.94565  | 309.66519 | 122.84151 | 6.57456  | 0.1053185 | 2.2714110 | 13  | 2 | 1974–1998 | 0.26 | M-v | 5 | Williams | 31264 | 1998 BU <sub>6</sub> |
| 1998 BV <sub>6</sub> | 13.0 | 0.15 | 19971218 | 233.34026 | 132.61543 | 127.00429 | 10.38961 | 0.0489361 | 3.1692869 | 20  | 2 | 1993–1998 | 0.34 | M-v | 4 | Williams | 31264 | 1998 BV <sub>6</sub> |
| 1998 BX <sub>6</sub> | 15.5 | 0.15 | 19980127 | 7.59702   | 11.73327  | 111.45238 | 5.26233  | 0.1141541 | 2.2407348 | 16  | 1 | 29 days   | 0.33 |     |   | Williams |       | 1998 BX <sub>6</sub> |
| 1998 BY <sub>6</sub> | 13.5 | 0.15 | 19980127 | 129.65037 | 222.27587 | 135.58848 | 5.35897  | 0.1037711 | 2.7281439 | 10  | 1 | 24 days   | 0.52 |     |   | Nakano   |       | 1998 BY <sub>6</sub> |
| 1998 BZ <sub>6</sub> | 12.9 | 0.15 | 19980127 | 17.37388  | 2.40494   | 119.62814 | 13.43298 | 0.0779483 | 2.7600809 | 10  | 1 | 28 days   | 0.19 |     |   | Nakano   |       | 1998 BZ <sub>6</sub> |
| 1998 BA <sub>7</sub> | 15.0 | 0.15 | 19980127 | 311.33500 | 103.92956 | 97.25499  | 3.27431  | 0.1137297 | 2.4104271 | 22  | 1 | 34 days   | 0.57 |     |   | Williams |       | 1998 BA <sub>7</sub> |
| 1998 BE <sub>7</sub> | 14.5 | 0.15 | 19971218 | 5.21474   | 298.36273 | 103.29384 | 14.44142 | 0.5049896 | 3.0917309 | 54  | 1 | 38 days   | 0.57 | M-v | 6 | Williams |       | 1998 BE <sub>7</sub> |
| 1998 BW <sub>7</sub> | 16.5 | 0.15 | 19980127 | 16.29225  | 38.68079  | 53.36011  | 6.85554  | 0.1822542 | 2.3284586 | 22  | 1 | 30 days   | 0.44 |     |   | Williams |       | 1998 BW <sub>7</sub> |
| 1998 BX <sub>7</sub> | 16.5 | 0.15 | 19971218 | 18.23235  | 271.41761 | 145.17082 | 8.95162  | 0.5032821 | 2.6022705 | 79  | 1 | 39 days   | 0.36 | M-v | 5 | Marsden  |       | 1998 BX <sub>7</sub> |
| 1998 BY <sub>7</sub> | 21.5 | 0.15 | 19971218 | 323.96251 | 88.97934  | 123.12367 | 3.29937  | 0.6028541 | 2.0241183 | 108 | 1 | 30 days   | 0.59 | M-v | 6 | Williams |       | 1998 BY <sub>7</sub> |
| 1998 BZ <sub>7</sub> | 17.5 | 0.15 | 19971218 | 321.52315 | 102.75655 | 112.54642 | 6.48169  | 0.5552061 | 2.0393108 | 201 | 1 | 39 days   | 0.47 | M-v | 5 | Marsden  | 31290 | 1998 BZ <sub>7</sub> |
| 1998 BA <sub>8</sub> | 14.0 | 0.15 | 19971218 | 328.62387 | 78.78713  | 78.55852  | 3.03314  | 0.0135140 | 2.3416228 | 28  | 4 | 1982–1998 | 0.78 | M-v | 4 | Williams | 31264 | 1998 BA <sub>8</sub> |
| 1998 BB <sub>8</sub> | 14.4 | 0.15 | 19980127 | 12.13451  | 350.26150 | 140.09311 | 15.84739 | 0.0601532 | 2.6048140 | 20  | 1 | 47 days   | 0.43 |     |   | Nakano   |       | 1998 BB <sub>8</sub> |
| 1998 BF <sub>8</sub> | 14.3 | 0.15 | 19980127 | 50.17279  | 317.18804 | 135.57082 | 10.40690 | 0.0299316 | 2.9778318 | 14  | 1 | 31 days   | 0.45 |     |   | Nakano   |       | 1998 BF <sub>8</sub> |
| 1998 BG <sub>8</sub> | 13.5 | 0.15 | 19971218 | 79.37771  | 306.50375 | 84.88125  | 3.53596  | 0.1535845 | 2.5250405 | 20  | 3 | 1988–1998 | 0.46 | M-v | 4 | Williams | 31264 | 1998 BG <sub>8</sub> |
| 1998 BH <sub>8</sub> | 11.5 | 0.15 | 19971218 | 212.60354 | 163.63926 | 122.63423 | 11.04841 | 0.1285399 | 2.6738838 | 19  | 2 | 1982–1998 | 0.53 | M-v | 5 | Williams | 31265 | 1998 BH <sub>8</sub> |
| 1998 BJ <sub>8</sub> | 14.2 | 0.15 | 19980127 | 29.67902  | 333.41993 | 129.13897 | 9.38101  | 0.1715977 | 2.9816630 | 14  | 1 | 45 days   | 0.38 |     |   | Nakano   |       | 1998 BJ <sub>8</sub> |

|                       |      |      |          |           |           |           |          |           |           |    |   |           |      |     |   |          |       |                       |
|-----------------------|------|------|----------|-----------|-----------|-----------|----------|-----------|-----------|----|---|-----------|------|-----|---|----------|-------|-----------------------|
| 1998 BK <sub>8</sub>  | 14.5 | 0.15 | 19971218 | 310.08304 | 98.03793  | 84.56233  | 3.56152  | 0.0980601 | 2.2809357 | 26 | 2 | 1995–1998 | 0.47 | M-v | 5 | Williams | 31265 | 1998 BK <sub>8</sub>  |
| 1998 BM <sub>8</sub>  | 15.0 | 0.15 | 19980127 | 356.19785 | 171.89261 | 334.32433 | 12.05334 | 0.1217444 | 2.4124128 | 17 | 1 | 31 days   | 0.48 |     |   | Williams |       | 1998 BM <sub>8</sub>  |
| 1998 BP <sub>8</sub>  | 15.0 | 0.15 | 19980127 | 207.59075 | 301.29295 | 2.14007   | 5.15679  | 0.1645366 | 2.2413487 | 19 | 1 | 32 days   | 0.58 |     |   | Williams |       | 1998 BP <sub>8</sub>  |
| 1998 BS <sub>8</sub>  | 15.2 | 0.15 | 19980127 | 297.05645 | 133.21770 | 87.74698  | 3.15295  | 0.1355146 | 2.4364361 | 11 | 1 | 31 days   | 0.20 |     |   | Nakano   |       | 1998 BS <sub>8</sub>  |
| 1998 BT <sub>8</sub>  | 13.5 | 0.15 | 19980127 | 297.84015 | 236.41889 | 329.94050 | 21.20880 | 0.0459161 | 3.1093486 | 13 | 1 | 32 days   | 0.58 |     |   | Williams |       | 1998 BT <sub>8</sub>  |
| 1998 BW <sub>8</sub>  | 14.0 | 0.15 | 19980127 | 286.10757 | 207.26788 | 15.66258  | 5.07838  | 0.0991575 | 3.1816806 | 21 | 1 | 34 days   | 0.58 |     |   | Williams |       | 1998 BW <sub>8</sub>  |
| 1998 BZ <sub>8</sub>  | 14.0 | 0.15 | 19980127 | 53.18497  | 355.74760 | 77.72099  | 4.78548  | 0.1041078 | 2.6423678 | 18 | 1 | 37 days   | 0.44 |     |   | Williams |       | 1998 BZ <sub>8</sub>  |
| 1998 BG <sub>9</sub>  | 19.5 | 0.15 | 19971218 | 354.24676 | 1.02305   | 115.58873 | 13.01766 | 0.5362276 | 2.5223433 | 94 | 1 | 37 days   | 0.52 | M-v | 5 | Williams |       | 1998 BG <sub>9</sub>  |
| 1998 BJ <sub>9</sub>  | 16.0 | 0.15 | 19980127 | 346.41666 | 217.45154 | 294.30800 | 6.41320  | 0.0657986 | 2.3539121 | 21 | 1 | 32 days   | 0.70 |     |   | Williams |       | 1998 BJ <sub>9</sub>  |
| 1998 BP <sub>9</sub>  | 15.5 | 0.15 | 19971218 | 227.35563 | 37.89791  | 163.41684 | 2.43145  | 0.0432979 | 2.1525048 | 14 | 1 | 59 days   | 0.81 |     |   | Williams |       | 1998 BP <sub>9</sub>  |
| 1998 BJ <sub>10</sub> | 15.5 | 0.15 | 19980127 | 242.11841 | 103.16864 | 143.91456 | 12.61918 | 0.1251387 | 2.6694446 | 13 | 1 | 24 days   | 0.44 |     |   | Williams |       | 1998 BJ <sub>10</sub> |
| 1998 BM <sub>10</sub> | 16.0 | 0.15 | 19980127 | 345.73314 | 44.80725  | 122.97141 | 24.15113 | 0.3704944 | 2.4157213 | 47 | 1 | 32 days   | 0.54 |     |   | Williams |       | 1998 BM <sub>10</sub> |
| 1998 BN <sub>10</sub> | 13.5 | 0.15 | 19980127 | 118.14743 | 237.91671 | 104.38965 | 10.68300 | 0.1366425 | 2.9275263 | 26 | 1 | 31 days   | 0.43 |     |   | Marsden  |       | 1998 BN <sub>10</sub> |
| 1998 BP <sub>10</sub> | 15.5 | 0.15 | 19980127 | 47.58633  | 303.11679 | 120.99686 | 6.75151  | 0.1689944 | 2.3341092 | 28 | 1 | 31 days   | 0.29 |     |   | Marsden  |       | 1998 BP <sub>10</sub> |
| 1998 BR <sub>10</sub> | 14.8 | 0.15 | 19980127 | 24.45784  | 9.35713   | 96.81963  | 3.72371  | 0.1876654 | 2.5656285 | 9  | 1 | 27 days   | 0.48 |     |   | Nakano   |       | 1998 BR <sub>10</sub> |
| 1998 BS <sub>10</sub> | 15.4 | 0.15 | 19980127 | 84.32867  | 268.72759 | 124.79191 | 7.06543  | 0.2262337 | 2.2684619 | 12 | 1 | 27 days   | 0.48 |     |   | Nakano   |       | 1998 BS <sub>10</sub> |
| 1998 BL <sub>11</sub> | 14.5 | 0.15 | 19980107 | 278.56803 | 110.40858 | 98.45428  | 3.23620  | 0.1505924 | 2.4074465 | 21 | 1 | 53 days   | 0.50 |     |   | Marsden  |       | 1998 BL <sub>11</sub> |
| 1998 BB <sub>13</sub> | 13.0 | 0.15 | 19980107 | 79.51885  | 75.37605  | 283.23618 | 8.41498  | 0.2185202 | 2.9740409 | 19 | 1 | 3 days    | 0.72 |     | E | Williams |       | 1998 BB <sub>13</sub> |
| 1998 BQ <sub>13</sub> | 15.5 | 0.15 | 19980127 | 30.16418  | 49.84388  | 34.49785  | 1.37334  | 0.1469057 | 2.2365832 | 16 | 1 | 21 days   | 0.66 |     |   | Williams |       | 1998 BQ <sub>13</sub> |
| 1998 BS <sub>13</sub> | 13.5 | 0.15 | 19980107 | 329.16963 | 254.24040 | 257.47916 | 3.08118  | 0.0447158 | 2.7855700 | 25 | 1 | 51 days   | 0.45 |     |   | Williams |       | 1998 BS <sub>13</sub> |
| 1998 BF <sub>14</sub> | 15.0 | 0.15 | 19980127 | 5.53260   | 344.12270 | 135.83303 | 6.48694  | 0.1435751 | 2.4334067 | 36 | 1 | 29 days   | 0.80 |     |   | Williams |       | 1998 BF <sub>14</sub> |
| 1998 BT <sub>14</sub> | 12.5 | 0.15 | 19971218 | 239.95075 | 316.50731 | 288.05820 | 8.89745  | 0.0607495 | 3.0335962 | 18 | 1 | 66 days   | 0.52 | M-v | 5 | Williams |       | 1998 BT <sub>14</sub> |
| 1998 BU <sub>14</sub> | 14.1 | 0.15 | 19980216 | 31.69268  | 324.72555 | 133.55950 | 7.25874  | 0.0583712 | 2.3308215 | 22 | 1 | 42 days   | 0.45 |     |   | Nakano   |       | 1998 BU <sub>14</sub> |
| 1998 BV <sub>14</sub> | 16.5 | 0.15 | 19980127 | 253.78140 | 178.68709 | 87.13509  | 4.95384  | 0.2104937 | 2.1702674 | 20 | 1 | 24 days   | 0.43 |     |   | Marsden  |       | 1998 BV <sub>14</sub> |
| 1998 BW <sub>14</sub> | 15.5 | 0.15 | 19980127 | 83.86486  | 334.09934 | 71.14617  | 4.52997  | 0.0918073 | 2.7958681 | 16 | 1 | 24 days   | 0.39 |     |   | Marsden  |       | 1998 BW <sub>14</sub> |
| 1998 BE <sub>15</sub> | 14.5 | 0.15 | 19980107 | 37.99831  | 310.75749 | 124.38243 | 13.31825 | 0.0607364 | 2.6541249 | 23 | 1 | 56 days   | 0.54 |     |   | Williams |       | 1998 BE <sub>15</sub> |
| 1998 BM <sub>15</sub> | 13.5 | 0.15 | 19980127 | 184.06752 | 45.97285  | 260.23085 | 2.68604  | 0.0508318 | 3.1491112 | 15 | 1 | 30 days   | 0.32 |     |   | Williams |       | 1998 BM <sub>15</sub> |
| 1998 BS <sub>15</sub> | 13.5 | 0.15 | 19980127 | 36.96738  | 99.33803  | 337.77634 | 6.49919  | 0.1824958 | 2.2654904 | 15 | 1 | 30 days   | 0.24 |     |   | Williams |       | 1998 BS <sub>15</sub> |
| 1998 BT <sub>15</sub> | 14.5 | 0.15 | 19980127 | 20.07283  | 107.08971 | 356.39924 | 6.30827  | 0.1179762 | 2.2927042 | 12 | 1 | 30 days   | 0.22 |     |   | Williams |       | 1998 BT <sub>15</sub> |
| 1998 BN <sub>16</sub> | 12.0 | 0.15 | 19980127 | 6.96121   | 61.33088  | 88.18564  | 14.62563 | 0.0438437 | 3.4002466 | 14 | 1 | 24 days   | 0.16 |     |   | Williams |       | 1998 BN <sub>16</sub> |
| 1998 BP <sub>17</sub> | 17.0 | 0.15 | 19980127 | 319.98394 | 71.86801  | 125.41567 | 3.98644  | 0.1723920 | 2.3351978 | 13 | 1 | 37 days   | 0.22 |     |   | Marsden  |       | 1998 BP <sub>17</sub> |
| 1998 BV <sub>18</sub> | 15.0 | 0.15 | 19980127 | 338.63461 | 128.06537 | 72.34005  | 3.53740  | 0.2504110 | 3.0434935 | 15 | 1 | 39 days   | 0.18 |     |   | Williams |       | 1998 BV <sub>18</sub> |
| 1998 BB <sub>19</sub> | 12.5 | 0.15 | 19980127 | 136.54181 | 331.09650 | 6.47101   | 9.39070  | 0.1742083 | 3.1406825 | 16 | 1 | 29 days   | 0.50 |     |   | Williams |       | 1998 BB <sub>19</sub> |
| 1998 BC <sub>19</sub> | 14.5 | 0.15 | 19980127 | 235.86135 | 194.76493 | 67.71056  | 8.41095  | 0.1334321 | 2.6334267 | 13 | 1 | 32 days   | 0.51 |     |   | Williams |       | 1998 BC <sub>19</sub> |
| 1998 BD <sub>19</sub> | 16.5 | 0.15 | 19980127 | 12.11985  | 95.88386  | 11.44078  | 5.44710  | 0.2158919 | 2.3113227 | 15 | 1 | 32 days   | 0.70 |     |   | Williams |       | 1998 BD <sub>19</sub> |
| 1998 BJ <sub>19</sub> | 14.5 | 0.15 | 19980127 | 283.36916 | 61.84538  | 157.76578 | 2.30756  | 0.0859876 | 2.2219537 | 12 | 1 | 20 days   | 0.16 |     |   | Williams |       | 1998 BJ <sub>19</sub> |
| 1998 BK <sub>19</sub> | 15.5 | 0.15 | 19980127 | 299.25607 | 59.34159  | 135.83585 | 6.67541  | 0.0378201 | 2.2864656 | 20 | 1 | 22 days   | 0.47 |     |   | Williams |       | 1998 BK <sub>19</sub> |
| 1998 BN <sub>19</sub> | 16.0 | 0.15 | 19980127 | 105.66745 | 9.56753   | 5.95345   | 0.25478  | 0.0972717 | 2.5801807 | 12 | 1 | 43 days   | 0.32 |     |   | Williams |       | 1998 BN <sub>19</sub> |
| 1998 BC <sub>22</sub> | 17.0 | 0.15 | 19980107 | 71.99716  | 77.53266  | 302.51257 | 10.45073 | 0.2008565 | 2.6953404 | 14 | 1 | 34 days   | 0.33 |     |   | Williams |       | 1998 BC <sub>22</sub> |
| 1998 BT <sub>23</sub> | 14.0 | 0.15 | 19980127 | 170.76994 | 173.05054 | 146.29024 | 0.41870  | 0.1258528 | 3.2438971 | 12 | 1 | 33 days   | 0.26 |     |   | Williams |       | 1998 BT <sub>23</sub> |
| 1998 BU <sub>23</sub> | 16.0 | 0.15 | 19980127 | 310.61978 | 53.80208  | 131.84741 | 1.37330  | 0.0559380 | 2.5332596 | 15 | 1 | 36 days   | 0.24 |     |   | Williams |       | 1998 BU <sub>23</sub> |
| 1998 BJ <sub>24</sub> | 16.4 | 0.15 | 19980216 | 21.66967  | 347.12795 | 124.67897 | 2.82906  | 0.1058540 | 2.3470320 | 22 | 1 | 27 days   | 0.53 |     |   | Nakano   |       | 1998 BJ <sub>24</sub> |
| 1998 BP <sub>24</sub> | 14.5 | 0.15 | 19980127 | 287.24299 | 279.64638 | 307.86677 | 12.25530 | 0.1990998 | 2.5299911 | 40 | 1 | 36 days   | 0.43 |     |   | Williams |       | 1998 BP <sub>24</sub> |
| 1998 BQ <sub>24</sub> | 13.4 | 0.15 | 19980127 | 350.56935 | 101.52875 | 29.14985  | 3.31653  | 0.1315881 | 2.3112756 | 10 | 1 | 20 days   | 0.35 |     |   | Nakano   |       | 1998 BQ <sub>24</sub> |
| 1998 BR <sub>24</sub> | 15.4 | 0.15 | 19980216 | 9.85506   | 341.93035 | 146.20875 | 3.77425  | 0.2221228 | 2.6158409 | 16 | 1 | 38 days   | 0.55 |     |   | Nakano   |       | 1998 BR <sub>24</sub> |
| 1998 BS <sub>24</sub> | 15.2 | 0.15 | 19980216 | 13.71732  | 348.41658 | 136.45271 | 3.40575  | 0.1567779 | 2.3614863 | 13 | 1 | 38 days   | 0.56 |     |   | Nakano   |       | 1998 BS <sub>24</sub> |
| 1998 BT <sub>24</sub> | 14.7 | 0.15 | 19980216 | 256.56504 | 261.84728 | 357.94326 | 5.40923  | 0.0983131 | 2.2540164 | 16 | 1 | 35 days   | 0.38 |     |   | Nakano   |       | 1998 BT <sub>24</sub> |
| 1998 BU <sub>24</sub> | 15.0 | 0.15 | 19980127 | 31.96994  | 30.90786  | 65.44549  | 3.37858  | 0.1562377 | 2.4516551 | 10 | 1 | 24 days   | 0.94 |     |   | Nakano   |       | 1998 BU <sub>24</sub> |
| 1998 BV <sub>24</sub> | 13.5 | 0.15 | 19980127 | 197.03994 | 233.71868 | 77.03275  | 6.14687  | 0.1615911 | 3.1765735 | 11 | 1 | 25 days   | 0.42 |     |   | Williams |       | 1998 BV <sub>24</sub> |
| 1998 BW <sub>24</sub> | 13.8 | 0.15 | 19980216 | 324.93869 | 70.59487  | 125.74601 | 17.32275 | 0.1836620 | 3.1166831 | 16 | 1 | 37 days   | 0.51 |     |   | Nakano   |       | 1998 BW <sub>24</sub> |
| 1998 BZ <sub>24</sub> | 12.5 | 0.15 | 19971218 | 351.90301 | 354.00319 | 146.21430 | 2.72388  | 0.1531991 | 3.0918210 | 13 | 2 | 1993–1998 | 0.59 | M-v | 5 | Williams | 31266 | 1998 BZ <sub>24</sub> |
| 1998 BB <sub>25</sub> | 13.2 | 0.15 | 19980127 | 294.13767 | 224.44051 | 349.17489 | 5.32062  | 0.0571616 | 2.5351073 | 10 | 1 | 38 days   | 0.50 |     |   | Nakano   |       | 1998 BB <sub>25</sub> |
| 1998 BC <sub>25</sub> | 13.4 | 0.15 | 19980216 | 90.55154  | 52.81431  | 349.46559 | 6.55781  | 0.1172657 | 2.3628698 | 10 | 1 | 38 days   | 0.47 |     |   | Nakano   |       | 1998 BC <sub>25</sub> |

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|                       |      |      |          |           |           |           |          |           |           |    |   |           |      |       |          |                       |
|-----------------------|------|------|----------|-----------|-----------|-----------|----------|-----------|-----------|----|---|-----------|------|-------|----------|-----------------------|
| 1998 BG <sub>25</sub> | 13.1 | 0.15 | 19980216 | 262.13293 | 134.24289 | 120.79382 | 7.63082  | 0.0893982 | 2.6982315 | 10 | 1 | 37 days   | 0.54 |       | Nakano   | 1998 BG <sub>25</sub> |
| 1998 BJ <sub>25</sub> | 15.7 | 0.15 | 19980216 | 13.49712  | 71.71159  | 58.34747  | 2.58075  | 0.1039453 | 2.2523133 | 13 | 1 | 35 days   | 0.36 |       | Nakano   | 1998 BJ <sub>25</sub> |
| 1998 BK <sub>25</sub> | 12.2 | 0.15 | 19980216 | 157.18180 | 255.89944 | 87.28842  | 6.59600  | 0.1449366 | 2.3894297 | 10 | 1 | 35 days   | 0.32 |       | Nakano   | 1998 BK <sub>25</sub> |
| 1998 BN <sub>25</sub> | 14.0 | 0.15 | 19971218 | 177.88547 | 347.60724 | 321.80005 | 1.00443  | 0.0373933 | 2.1534807 | 27 | 2 | 1992–1998 | 0.58 | M-v 5 | Williams | 1998 BN <sub>25</sub> |
| 1998 BQ <sub>25</sub> | 14.5 | 0.15 | 19980127 | 126.47018 | 255.54792 | 84.43293  | 14.58593 | 0.1042411 | 2.6285402 | 26 | 1 | 30 days   | 0.41 |       | Marsden  | 1998 BQ <sub>25</sub> |
| 1998 BR <sub>25</sub> | 16.0 | 0.15 | 19980127 | 306.96682 | 139.24884 | 54.03152  | 0.99503  | 0.1214954 | 2.2947129 | 29 | 1 | 30 days   | 0.31 |       | Marsden  | 1998 BR <sub>25</sub> |
| 1998 BT <sub>25</sub> | 15.0 | 0.15 | 19980127 | 74.95169  | 26.03864  | 19.00772  | 15.49037 | 0.1177897 | 2.5423442 | 23 | 1 | 30 days   | 0.29 |       | Marsden  | 1998 BT <sub>25</sub> |
| 1998 BU <sub>25</sub> | 12.5 | 0.15 | 19971218 | 332.32796 | 14.50015  | 134.60944 | 10.60890 | 0.0508644 | 3.0437583 | 60 | 3 | 1977–1998 | 0.69 | M-v 3 | Williams | 1998 BU <sub>25</sub> |
| 1998 BV <sub>25</sub> | 14.5 | 0.15 | 19980127 | 345.30880 | 9.98398   | 140.50218 | 7.19263  | 0.0516157 | 2.2736840 | 28 | 1 | 34 days   | 0.27 |       | Williams | 1998 BV <sub>25</sub> |
| 1998 BW <sub>25</sub> | 14.0 | 0.15 | 19980107 | 71.77232  | 268.25853 | 120.25105 | 4.63012  | 0.1675939 | 3.0586313 | 11 | 1 | 11 days   | 1.21 |       | Williams | 1998 BW <sub>25</sub> |
| 1998 BX <sub>25</sub> | 12.5 | 0.15 | 19971218 | 21.35948  | 158.97869 | 294.57719 | 11.61735 | 0.0767928 | 2.8905894 | 18 | 2 | 1990–1998 | 0.44 | M-v 4 | Williams | 1998 BX <sub>25</sub> |
| 1998 BY <sub>25</sub> | 14.9 | 0.15 | 19980127 | 292.34303 | 121.35532 | 91.90490  | 7.11700  | 0.0581838 | 2.2183113 | 13 | 1 | 37 days   | 0.55 |       | Nakano   | 1998 BY <sub>25</sub> |
| 1998 BZ <sub>25</sub> | 14.6 | 0.15 | 19980216 | 69.31680  | 332.30559 | 96.77014  | 11.08981 | 0.0686034 | 3.0235028 | 13 | 1 | 36 days   | 0.51 |       | Nakano   | 1998 BZ <sub>25</sub> |
| 1998 BA <sub>26</sub> | 12.9 | 0.15 | 19980216 | 318.04264 | 215.24915 | 351.45400 | 13.22202 | 0.2011789 | 2.6842127 | 10 | 1 | 36 days   | 0.40 |       | Nakano   | 1998 BA <sub>26</sub> |
| 1998 BB <sub>26</sub> | 14.6 | 0.15 | 19980216 | 153.07230 | 281.41595 | 65.29192  | 8.38452  | 0.1381896 | 2.2952387 | 22 | 1 | 36 days   | 0.57 |       | Nakano   | 1998 BB <sub>26</sub> |
| 1998 BM <sub>26</sub> | 13.5 | 0.15 | 19980127 | 161.04103 | 253.58781 | 66.26301  | 13.78919 | 0.1790246 | 2.5811773 | 12 | 1 | 20 days   | 0.49 |       | Williams | 1998 BM <sub>26</sub> |
| 1998 BO <sub>26</sub> | 17.5 | 0.15 | 19980127 | 351.83252 | 197.94587 | 327.09360 | 4.43381  | 0.3948924 | 2.3778283 | 20 | 1 | 28 days   | 0.32 |       | Williams | 1998 BO <sub>26</sub> |
| 1998 BP <sub>26</sub> | 17.5 | 0.15 | 19971218 | 334.83813 | 186.43433 | 331.16730 | 20.23483 | 0.2573956 | 1.7230052 | 94 | 1 | 35 days   | 0.48 | M-v 5 | Marsden  | 1998 BP <sub>26</sub> |
| 1998 BQ <sub>26</sub> | 15.0 | 0.15 | 19980127 | 243.74099 | 167.05874 | 91.60996  | 7.73099  | 0.1595581 | 2.3043493 | 14 | 1 | 18 days   | 0.66 |       | Williams | 1998 BQ <sub>26</sub> |
| 1998 BS <sub>26</sub> | 15.5 | 0.15 | 19980127 | 103.49444 | 238.80453 | 129.92805 | 3.43167  | 0.1056437 | 2.6264288 | 16 | 1 | 11 days   | 0.34 |       | Marsden  | 1998 BS <sub>26</sub> |
| 1998 BT <sub>26</sub> | 13.5 | 0.15 | 19980127 | 312.95997 | 138.99552 | 335.40506 | 15.54778 | 0.0708466 | 3.1704650 | 28 | 1 | 31 days   |      |       | Marsden  | 1998 BT <sub>26</sub> |
| 1998 BU <sub>26</sub> | 16.0 | 0.15 | 19980127 | 312.10318 | 223.04563 | 308.23483 | 7.09974  | 0.0813608 | 2.2323890 | 27 | 1 | 28 days   | 0.44 |       | Marsden  | 1998 BU <sub>26</sub> |
| 1998 BL <sub>27</sub> | 15.5 | 0.15 | 19980127 | 21.48760  | 116.70518 | 349.01853 | 1.21862  | 0.1063972 | 2.8294481 | 15 | 1 | 37 days   | 0.73 |       | Williams | 1998 BL <sub>27</sub> |
| 1998 BP <sub>29</sub> | 14.5 | 0.15 | 19980127 | 96.69936  | 66.29721  | 321.51887 | 7.71822  | 0.0695892 | 3.0845529 | 12 | 1 | 37 days   | 0.39 |       | Williams | 1998 BP <sub>29</sub> |
| 1998 BV <sub>29</sub> | 13.5 | 0.15 | 19980127 | 15.00547  | 322.97606 | 91.99551  | 10.51048 | 0.0991338 | 2.8118559 | 20 | 1 | 31 days   | 0.27 |       | Williams | 1998 BV <sub>29</sub> |
| 1998 BA <sub>30</sub> | 15.5 | 0.15 | 19980127 | 170.75347 | 4.07090   | 313.39451 | 4.24927  | 0.2022294 | 2.2370348 | 10 | 1 | 29 days   | 0.43 |       | Williams | 1998 BA <sub>30</sub> |
| 1998 BD <sub>30</sub> | 14.1 | 0.15 | 19980216 | 333.15951 | 37.66531  | 139.73689 | 2.15426  | 0.1566321 | 2.8902695 | 24 | 1 | 39 days   | 0.60 |       | Nakano   | 1998 BD <sub>30</sub> |
| 1998 BG <sub>30</sub> | 15.5 | 0.15 | 19980127 | 49.46506  | 278.11939 | 145.08769 | 6.26462  | 0.2422889 | 2.4575224 | 10 | 1 | 31 days   | 0.06 |       | Marsden  | 1998 BG <sub>30</sub> |
| 1998 BH <sub>30</sub> | 14.5 | 0.15 | 19980127 | 311.25249 | 262.12360 | 289.95328 | 2.98069  | 0.1267502 | 2.6141238 | 18 | 1 | 31 days   | 1.45 |       | Williams | 1998 BH <sub>30</sub> |
| 1998 BJ <sub>30</sub> | 13.5 | 0.15 | 19980127 | 68.99807  | 134.34942 | 280.35786 | 1.89223  | 0.0724589 | 2.6349347 | 8  | 1 | 17 days   | 0.73 |       | Williams | 1998 BJ <sub>30</sub> |
| 1998 BL <sub>30</sub> | 15.0 | 0.15 | 19980127 | 75.68673  | 73.03541  | 317.29655 | 7.27067  | 0.1920795 | 2.3472330 | 34 | 1 | 27 days   | 0.26 |       | Marsden  | 1998 BL <sub>30</sub> |
| 1998 BM <sub>30</sub> | 14.0 | 0.15 | 19980127 | 290.36314 | 256.60073 | 317.01670 | 8.60332  | 0.1402339 | 2.9981446 | 29 | 1 | 27 days   | 0.31 |       | Marsden  | 1998 BM <sub>30</sub> |
| 1998 BG <sub>31</sub> | 13.5 | 0.15 | 19980127 | 193.40031 | 352.36173 | 309.08831 | 8.84082  | 0.1547528 | 2.5584020 | 18 | 1 | 26 days   | 0.54 |       | Williams | 1998 BG <sub>31</sub> |
| 1998 BZ <sub>31</sub> | 15.0 | 0.15 | 19980107 | 104.59894 | 101.65278 | 241.71600 | 3.09996  | 0.3266793 | 2.4031755 | 9  | 1 | 13 days   | 0.33 |       | Williams | 1998 BZ <sub>31</sub> |
| 1998 BB <sub>32</sub> | 14.5 | 0.15 | 19980127 | 138.97055 | 115.44144 | 223.39681 | 2.73343  | 0.0699118 | 2.7014195 | 12 | 1 | 7 days    | 0.20 |       | Williams | 1998 BB <sub>32</sub> |
| 1998 BZ <sub>32</sub> | 15.0 | 0.15 | 19980127 | 167.22737 | 331.85420 | 354.80727 | 6.81872  | 0.1502275 | 2.3030633 | 15 | 1 | 8 days    | 0.16 |       | Williams | 1998 BZ <sub>32</sub> |
| 1998 BH <sub>33</sub> | 14.0 | 0.15 | 19980216 | 51.08262  | 60.18294  | 7.81357   | 13.43568 | 0.1603948 | 2.5604196 | 12 | 1 | 31 days   | 0.78 |       | Nakano   | 1998 BH <sub>33</sub> |
| 1998 BK <sub>33</sub> | 14.7 | 0.15 | 19980216 | 327.41079 | 93.92159  | 91.07905  | 7.37387  | 0.0524814 | 2.3962663 | 16 | 1 | 41 days   | 0.41 |       | Nakano   | 1998 BK <sub>33</sub> |
| 1998 BL <sub>33</sub> | 14.1 | 0.15 | 19980216 | 349.82817 | 47.43586  | 118.46250 | 14.91698 | 0.2155556 | 3.1702708 | 16 | 1 | 41 days   | 0.62 |       | Nakano   | 1998 BL <sub>33</sub> |
| 1998 BM <sub>33</sub> | 16.0 | 0.15 | 19980127 | 332.71311 | 105.69917 | 77.91307  | 5.79220  | 0.1965358 | 2.5702863 | 16 | 1 | 40 days   | 0.35 |       | Nakano   | 1998 BM <sub>33</sub> |
| 1998 BN <sub>33</sub> | 13.2 | 0.15 | 19980216 | 84.85779  | 356.51249 | 43.99672  | 7.49684  | 0.2121553 | 2.5216464 | 19 | 1 | 38 days   | 0.32 |       | Nakano   | 1998 BN <sub>33</sub> |
| 1998 BP <sub>33</sub> | 14.6 | 0.15 | 19980216 | 45.45657  | 334.03104 | 131.49322 | 10.34078 | 0.1008886 | 2.7551300 | 16 | 1 | 34 days   | 0.43 |       | Nakano   | 1998 BP <sub>33</sub> |
| 1998 BQ <sub>33</sub> | 14.5 | 0.15 | 19980216 | 227.96637 | 223.78983 | 79.38035  | 5.02718  | 0.1564112 | 2.3340648 | 13 | 1 | 34 days   | 0.58 |       | Williams | 1998 BQ <sub>33</sub> |
| 1998 BR <sub>33</sub> | 13.5 | 0.15 | 19971218 | 339.72970 | 144.22714 | 10.77346  | 9.35516  | 0.0515225 | 2.4531115 | 19 | 3 | 1983–1998 | 0.34 | M-v 4 | Williams | 1998 BR <sub>33</sub> |
| 1998 BU <sub>33</sub> | 14.7 | 0.15 | 19980216 | 340.01247 | 80.61489  | 100.92468 | 5.72047  | 0.0447680 | 2.6013942 | 13 | 1 | 34 days   | 0.40 |       | Nakano   | 1998 BU <sub>33</sub> |
| 1998 BV <sub>33</sub> | 13.0 | 0.15 | 19980216 | 125.83810 | 334.92150 | 56.21013  | 5.89070  | 0.0494403 | 3.2155481 | 16 | 1 | 34 days   | 0.51 |       | Williams | 1998 BV <sub>33</sub> |
| 1998 BW <sub>33</sub> | 15.0 | 0.15 | 19980216 | 15.67180  | 141.57783 | 353.13736 | 13.43629 | 0.1872613 | 2.6607056 | 13 | 1 | 34 days   | 0.57 |       | Williams | 1998 BW <sub>33</sub> |
| 1998 BX <sub>33</sub> | 13.3 | 0.15 | 19980216 | 197.21017 | 341.88652 | 345.97146 | 24.50701 | 0.1715506 | 2.3806308 | 11 | 1 | 34 days   | 0.74 |       | Nakano   | 1998 BX <sub>33</sub> |
| 1998 BY <sub>33</sub> | 14.9 | 0.15 | 19980216 | 50.72845  | 22.45529  | 61.71848  | 5.87303  | 0.1598417 | 2.3484135 | 13 | 1 | 34 days   | 0.44 |       | Nakano   | 1998 BY <sub>33</sub> |
| 1998 BZ <sub>33</sub> | 16.5 | 0.15 | 19980127 | 2.98119   | 183.52255 | 307.41615 | 5.24526  | 0.1772702 | 2.3475459 | 26 | 1 | 26 days   | 0.39 |       | Marsden  | 1998 BZ <sub>33</sub> |
| 1998 BB <sub>34</sub> | 13.0 | 0.15 | 19980127 | 134.25427 | 351.00002 | 26.03462  | 5.36846  | 0.0810962 | 2.7605854 | 10 | 1 | 35 days   | 0.47 |       | Nakano   | 1998 BB <sub>34</sub> |
| 1998 BC <sub>35</sub> | 13.5 | 0.15 | 19971218 | 255.41428 | 61.67064  | 108.83459 | 3.19218  | 0.0444165 | 2.9520059 | 18 | 1 | 80 days   | 0.53 | M-v 5 | Williams | 1998 BC <sub>35</sub> |
| 1998 BT <sub>35</sub> | 15.0 | 0.15 | 19980127 | 87.71578  | 49.01490  | 349.46723 | 5.18032  | 0.1664255 | 2.2792862 | 9  | 1 | 29 days   | 0.38 |       | Williams | 1998 BT <sub>35</sub> |

|                       |      |      |          |           |           |           |          |           |           |    |   |           |      |         |          |                            |
|-----------------------|------|------|----------|-----------|-----------|-----------|----------|-----------|-----------|----|---|-----------|------|---------|----------|----------------------------|
| 1998 BH <sub>36</sub> | 15.5 | 0.15 | 19980107 | 257.27086 | 158.86536 | 74.89294  | 8.90247  | 0.1128187 | 2.2490173 | 14 | 1 | 36 days   | 0.36 |         | Marsden  | 1998 BH <sub>36</sub>      |
| 1998 BA <sub>38</sub> | 14.5 | 0.15 | 19980107 | 240.55281 | 120.92294 | 121.75799 | 7.91832  | 0.0897811 | 2.2979429 | 17 | 1 | 39 days   | 0.48 |         | Williams | 1998 BA <sub>38</sub>      |
| 1998 BC <sub>41</sub> | 12.5 | 0.15 | 19980127 | 242.71271 | 340.74328 | 296.03556 | 12.73729 | 0.1449998 | 2.6295921 | 14 | 1 | 41 days   | 0.49 |         | Williams | 1998 BC <sub>41</sub>      |
| 1998 BQ <sub>41</sub> | 13.5 | 0.15 | 19980127 | 306.92397 | 37.42093  | 149.23951 | 13.65528 | 0.0290563 | 2.9740640 | 9  | 1 | 7 days    | 0.19 | E       | Williams | 1998 BQ <sub>41</sub>      |
| 1998 BU <sub>41</sub> | 14.2 | 0.15 | 19980216 | 36.37924  | 152.42990 | 304.76403 | 7.87729  | 0.1591998 | 2.3711439 | 22 | 1 | 32 days   | 0.46 |         | Nakano   | 1998 BU <sub>41</sub>      |
| 1998 BV <sub>41</sub> | 16.5 | 0.15 | 19980127 | 334.97409 | 165.96205 | 1.48394   | 5.63003  | 0.0849142 | 2.4830506 | 20 | 1 | 27 days   |      |         | Marsden  | 1998 BV <sub>41</sub>      |
| 1998 BC <sub>42</sub> | 14.5 | 0.15 | 19980127 | 13.52434  | 5.96844   | 118.27662 | 11.76345 | 0.0177249 | 3.0929813 | 15 | 1 | 25 days   | 0.50 |         | Williams | 1998 BC <sub>42</sub>      |
| 1998 BG <sub>42</sub> | 14.0 | 0.15 | 19971218 | 3.34604   | 51.36110  | 349.62162 | 4.01940  | 0.1533343 | 2.1966387 | 23 | 1 | 109 days  | 0.40 | M-v 7   | Williams | 1998 BG <sub>42</sub>      |
| 1998 BK <sub>42</sub> | 14.5 | 0.15 | 19980127 | 358.71463 | 351.76443 | 84.18759  | 15.15224 | 0.1655995 | 2.4960260 | 16 | 1 | 21 days   | 0.36 |         | Williams | 1998 BK <sub>42</sub>      |
| 1998 BU <sub>43</sub> | 15.0 | 0.15 | 19980127 | 339.38070 | 111.44880 | 47.68724  | 5.59537  | 0.1899334 | 2.3526924 | 16 | 1 | 35 days   | 0.63 |         | Williams | 1998 BU <sub>43</sub>      |
| 1998 BX <sub>43</sub> | 15.0 | 0.15 | 19980107 | 332.21432 | 101.06483 | 61.13989  | 4.64320  | 0.2271308 | 2.7056083 | 9  | 1 | 2 days    | 0.90 | E       | Williams | 1998 BX <sub>43</sub>      |
| 1998 BY <sub>43</sub> | 15.5 | 0.15 | 19980107 | 6.67523   | 15.92388  | 93.59282  | 10.49227 | 0.1836005 | 2.7660978 | 16 | 1 | 34 days   | 1.04 |         | Williams | 1998 BY <sub>43</sub>      |
| 1998 BA <sub>44</sub> | 13.0 | 0.15 | 19980107 | 132.16907 | 9.99822   | 333.13621 | 15.74518 | 0.0739485 | 3.1442146 | 11 | 1 | 34 days   | 1.14 |         | Williams | 1998 BA <sub>44</sub>      |
| 1998 BB <sub>44</sub> | 14.5 | 0.15 | 19980127 | 357.72626 | 39.90967  | 89.19975  | 10.00087 | 0.1296044 | 2.8098523 | 18 | 1 | 34 days   | 1.11 |         | Williams | 1998 BB <sub>44</sub>      |
| 1998 BC <sub>44</sub> | 15.0 | 0.15 | 19971218 | 323.79489 | 76.80880  | 85.47965  | 5.67559  | 0.1704917 | 2.3877760 | 16 | 1 | 89 days   | 0.75 | M-v 5   | Williams | 1998 BC <sub>44</sub>      |
| 1998 BD <sub>44</sub> | 15.5 | 0.15 | 19980127 | 16.52052  | 87.18233  | 18.85253  | 6.18553  | 0.0909423 | 2.3819744 | 20 | 1 | 34 days   | 0.91 |         | Williams | 1998 BD <sub>44</sub>      |
| 1998 BE <sub>44</sub> | 13.5 | 0.15 | 19980127 | 73.64156  | 284.20676 | 105.98326 | 13.88040 | 0.2009059 | 2.6867330 | 18 | 1 | 33 days   | 0.86 |         | Williams | 1998 BE <sub>44</sub>      |
| 1998 BF <sub>44</sub> | 15.5 | 0.15 | 19971218 | 356.75249 | 17.64954  | 99.38904  | 9.56735  | 0.2908184 | 2.7770307 | 13 | 1 | 79 days   | 0.56 | M-v 4   | Williams | 1998 BF <sub>44</sub>      |
| 1998 BQ <sub>45</sub> | 14.0 | 0.15 | 19980127 | 344.08441 | 352.03915 | 157.41212 | 9.90321  | 0.1086057 | 2.7164074 | 15 | 1 | 30 days   | 0.32 |         | Williams | 1998 BQ <sub>45</sub>      |
| 1998 BA <sub>46</sub> | 14.0 | 0.15 | 19980127 | 59.28638  | 120.67654 | 289.26786 | 0.50370  | 0.2017825 | 3.2487236 | 9  | 1 | 33 days   | 0.16 |         | Williams | 1998 BA <sub>46</sub>      |
| 1998 BN <sub>46</sub> | 15.0 | 0.15 | 19980127 | 299.37191 | 87.00915  | 117.25066 | 2.66550  | 0.0953920 | 2.8260799 | 9  | 1 | 3 days    | 0.25 | E       | Williams | 1998 BN <sub>46</sub>      |
| 1998 BB <sub>47</sub> | 13.5 | 0.15 | 19980127 | 48.48101  | 316.74016 | 110.37925 | 14.21601 | 0.1478456 | 2.6855004 | 12 | 1 | 42 days   | 0.14 |         | Williams | 1998 BB <sub>47</sub>      |
| 1998 CA               | 14.5 | 0.15 | 19971218 | 357.37865 | 20.52545  | 95.82131  | 9.39587  | 0.2301166 | 2.5803950 | 36 | 1 | 84 days   | 0.47 | M-v 4   | Williams | 1998 CA                    |
| 1998 CB               | 14.5 | 0.15 | 19980127 | 200.76810 | 195.71553 | 109.10470 | 8.80986  | 0.1436389 | 2.8321262 | 18 | 1 | 25 days   |      |         | Marsden  | 1998 CB                    |
| 1998 CC               | 16.5 | 0.15 | 19980127 | 258.26950 | 184.73154 | 71.36922  | 4.00836  | 0.1511964 | 2.1807689 | 18 | 1 | 25 days   |      |         | Marsden  | 1998 CC                    |
| 1998 CD               | 15.4 | 0.15 | 19980127 | 5.35161   | 74.25595  | 63.45129  | 5.08457  | 0.1072424 | 2.3858128 | 14 | 1 | 29 days   | 0.58 |         | Nakano   | 1998 CD                    |
| 1998 CE               | 14.0 | 0.15 | 19980127 | 41.99769  | 72.45278  | 356.06209 | 1.94522  | 0.0415992 | 2.8604459 | 23 | 1 | 17 days   | 0.31 |         | Marsden  | 1998 CE                    |
| 1998 CF               | 14.5 | 0.15 | 19971218 | 294.44614 | 73.35787  | 108.56740 | 12.24450 | 0.0184391 | 2.8578546 | 28 | 1 | 77 days   | 0.21 | M-v 4 D | Marsden  | 1998 CF                    |
| 1998 CG               | 14.5 | 0.15 | 19980127 | 0.92557   | 305.47476 | 185.66396 | 5.05882  | 0.0640934 | 2.9322520 | 28 | 1 | 17 days   | 0.32 |         | Marsden  | 1998 CG                    |
| 1998 CH               | 14.5 | 0.15 | 19980127 | 5.45386   | 154.99688 | 313.20070 | 5.54308  | 0.0305744 | 2.7730195 | 17 | 1 | 16 days   | 0.48 |         | Marsden  | 1998 CH                    |
| 1998 CL               | 15.5 | 0.15 | 19980216 | 70.78652  | 277.17908 | 126.28046 | 3.77325  | 0.2067923 | 2.3584333 | 24 | 1 | 35 days   | 0.52 |         | Nakano   | 1998 CL                    |
| 1998 CM               | 15.0 | 0.15 | 19980127 | 82.36593  | 35.08869  | 344.26730 | 6.38491  | 0.2752330 | 2.5250045 | 18 | 1 | 15 days   | 0.32 |         | Marsden  | 1998 CM                    |
| 1998 CN               | 13.5 | 0.15 | 19980216 | 80.81968  | 85.98823  | 310.59654 | 11.68029 | 0.2096232 | 3.1572544 | 24 | 1 | 30 days   | 0.30 |         | Marsden  | 1998 CN                    |
| 1998 CO               | 15.5 | 0.15 | 19980216 | 327.80104 | 33.94404  | 147.39723 | 7.34744  | 0.0963090 | 2.2485949 | 22 | 1 | 30 days   | 0.23 |         | Marsden  | 1998 CO                    |
| 1998 CP               | 15.5 | 0.15 | 19980127 | 100.86857 | 50.44208  | 328.45037 | 2.69707  | 0.1841551 | 2.3114054 | 20 | 1 | 17 days   | 0.28 |         | Marsden  | 1998 CP                    |
| 1998 CQ               | 15.5 | 0.15 | 19980216 | 359.36666 | 143.59541 | 0.76822   | 6.15517  | 0.0674184 | 2.7255410 | 22 | 1 | 24 days   | 0.67 |         | Marsden  | 1998 CQ                    |
| 1998 CS               | 15.1 | 0.15 | 19980216 | 226.73410 | 307.22583 | 326.10848 | 12.86037 | 0.0379957 | 2.6030673 | 20 | 1 | 34 days   | 0.26 |         | Nakano   | 1998 CS                    |
| 1998 CT               | 16.0 | 0.15 | 19980127 | 37.79587  | 341.00179 | 92.38410  | 7.03338  | 0.0888757 | 2.6618237 | 10 | 1 | 13 days   | 0.50 | E       | Marsden  | 1998 CT                    |
| 1998 CU               | 15.0 | 0.15 | 19980107 | 329.38194 | 218.82872 | 301.54094 | 12.38271 | 0.1971815 | 2.6740677 | 22 | 1 | 42 days   | 0.46 |         | Marsden  | 1998 CU                    |
| 1998 CV               | 15.5 | 0.15 | 19980127 | 343.06384 | 359.84206 | 150.65444 | 6.47649  | 0.2308109 | 2.5846173 | 16 | 1 | 14 days   | 0.18 |         | Marsden  | 1998 CV                    |
| 1998 CW               | 15.5 | 0.15 | 19980127 | 47.97355  | 226.49112 | 212.18360 | 4.64594  | 0.1384665 | 2.7257951 | 18 | 1 | 16 days   | 0.35 |         | Marsden  | 1998 CW                    |
| 1998 CX               | 14.5 | 0.15 | 19980127 | 140.66320 | 103.61402 | 254.36346 | 5.00777  | 0.0310997 | 2.7341961 | 15 | 1 | 14 days   | 0.31 |         | Marsden  | 1998 CX                    |
| 1998 CY               | 14.5 | 0.15 | 19980216 | 298.28193 | 337.99059 | 244.39139 | 4.19850  | 0.1435115 | 2.4367755 | 21 | 1 | 29 days   | 0.16 |         | Marsden  | 1998 CY                    |
| 1998 CB <sub>1</sub>  | 14.0 | 0.15 | 19980127 | 101.22815 | 231.93898 | 155.45293 | 27.16163 | 0.1905037 | 3.1726067 | 13 | 1 | 15 days   | 0.28 |         | Marsden  | 1998 CB <sub>1</sub>       |
| 1998 CC <sub>1</sub>  | 13.5 | 0.15 | 19971218 | 157.69391 | 180.11230 | 140.95102 | 9.95155  | 0.1464685 | 2.7837533 | 30 | 2 | 1990–1998 | 0.54 | M-v 4   | Williams | 31267 1998 CC <sub>1</sub> |
| 1998 CD <sub>1</sub>  | 14.0 | 0.15 | 19980127 | 20.60242  | 43.28151  | 54.51665  | 5.13102  | 0.1860298 | 2.4700388 | 12 | 1 | 20 days   | 0.15 |         | Williams | 1998 CD <sub>1</sub>       |
| 1998 CG <sub>1</sub>  | 13.0 | 0.15 | 19980127 | 70.63374  | 12.35620  | 69.60745  | 11.05916 | 0.0585062 | 2.9795530 | 9  | 1 | 20 days   | 0.24 |         | Williams | 1998 CG <sub>1</sub>       |
| 1998 CK <sub>1</sub>  | 14.5 | 0.15 | 19980216 | 288.72786 | 142.45073 | 94.15397  | 6.31634  | 0.2327961 | 2.3539173 | 28 | 1 | 27 days   | 0.35 |         | Marsden  | 1998 CK <sub>1</sub>       |
| 1998 CM <sub>1</sub>  | 16.5 | 0.15 | 19980127 | 48.60577  | 110.74854 | 328.33747 | 19.88726 | 0.0679900 | 1.8902438 | 9  | 1 | 11 days   | 0.54 |         | Williams | 1998 CM <sub>1</sub>       |
| 1998 CN <sub>1</sub>  | 13.0 | 0.15 | 19971218 | 287.88853 | 181.43489 | 24.22879  | 5.25266  | 0.0514297 | 2.7411332 | 29 | 3 | 1989–1998 | 0.43 | M-v 5   | Williams | 31267 1998 CN <sub>1</sub> |
| 1998 CP <sub>1</sub>  | 15.0 | 0.15 | 19980216 | 148.54804 | 170.52998 | 173.59777 | 2.97923  | 0.1742524 | 2.2040835 | 22 | 1 | 27 days   | 0.30 |         | Marsden  | 1998 CP <sub>1</sub>       |
| 1998 CQ <sub>1</sub>  | 16.0 | 0.15 | 19980216 | 345.31055 | 112.58112 | 48.24921  | 10.91133 | 0.1108021 | 2.4344334 | 10 | 1 | 20 days   | 0.90 |         | Williams | 1998 CQ <sub>1</sub>       |
| 1998 CS <sub>1</sub>  | 17.5 | 0.15 | 19980127 | 326.96816 | 97.13471  | 111.19439 | 7.80651  | 0.5789838 | 1.4945795 | 58 | 1 | 11 days   | 0.66 |         | Marsden  | 1998 CS <sub>1</sub>       |

|                      |      |      |          |           |           |           |          |           |           |    |   |          |      |       |          |                      |
|----------------------|------|------|----------|-----------|-----------|-----------|----------|-----------|-----------|----|---|----------|------|-------|----------|----------------------|
| 1998 CT <sub>1</sub> | 14.5 | 0.15 | 19980127 | 14.28856  | 166.39517 | 310.77865 | 17.21753 | 0.0747830 | 2.9073318 | 15 | 1 | 21 days  | 0.87 |       | Williams | 1998 CT <sub>1</sub> |
| 1998 CW <sub>1</sub> | 15.5 | 0.15 | 19971218 | 36.43356  | 335.52100 | 107.38332 | 6.57329  | 0.0633040 | 2.3110357 | 24 | 1 | 88 days  | 0.28 | M-v 4 | Williams | 1998 CW <sub>1</sub> |
| 1998 CX <sub>1</sub> | 15.0 | 0.15 | 19980216 | 353.08717 | 88.70466  | 53.79090  | 5.41233  | 0.0724919 | 2.3122210 | 15 | 1 | 18 days  | 0.23 |       | Williams | 1998 CX <sub>1</sub> |
| 1998 CD <sub>2</sub> | 14.0 | 0.15 | 19980127 | 116.63021 | 220.48037 | 143.36712 | 14.13517 | 0.1155365 | 2.6002149 | 28 | 1 | 36 days  | 0.41 |       | Williams | 1998 CD <sub>2</sub> |
| 1998 CE <sub>2</sub> | 15.5 | 0.15 | 19980216 | 266.58038 | 323.03175 | 294.04856 | 4.73650  | 0.2478374 | 2.2542422 | 23 | 1 | 20 days  | 0.40 |       | Williams | 1998 CE <sub>2</sub> |
| 1998 CJ <sub>2</sub> | 13.5 | 0.15 | 19980127 | 7.30251   | 141.95268 | 344.13464 | 10.01562 | 0.1719445 | 3.1439414 | 15 | 1 | 24 days  | 0.23 |       | Williams | 1998 CJ <sub>2</sub> |
| 1998 CL <sub>2</sub> | 14.0 | 0.15 | 19980216 | 15.86518  | 315.00402 | 107.77067 | 5.61475  | 0.1113425 | 2.2251570 | 14 | 1 | 11 days  | 0.48 |       | Williams | 1998 CL <sub>2</sub> |
| 1998 CM <sub>2</sub> | 14.0 | 0.15 | 19980216 | 64.13268  | 232.90275 | 139.84257 | 3.07587  | 0.0526763 | 2.0518740 | 13 | 1 | 11 days  | 0.42 |       | Williams | 1998 CM <sub>2</sub> |
| 1998 CO <sub>2</sub> | 14.0 | 0.15 | 19980216 | 334.88323 | 223.02442 | 245.78000 | 11.27454 | 0.1034562 | 2.5756631 | 11 | 1 | 7 days   | 0.39 |       | Williams | 1998 CO <sub>2</sub> |
| 1998 CP <sub>2</sub> | 13.5 | 0.15 | 19980216 | 306.19079 | 27.95413  | 181.64014 | 2.03261  | 0.1752676 | 2.3198364 | 12 | 1 | 10 days  | 0.63 |       | Williams | 1998 CP <sub>2</sub> |
| 1998 CQ <sub>2</sub> | 14.7 | 0.15 | 19980308 | 324.19310 | 257.01510 | 311.27005 | 1.90209  | 0.1157859 | 2.3977685 | 10 | 1 | 28 days  | 0.25 |       | Nakano   | 1998 CQ <sub>2</sub> |
| 1998 CS <sub>2</sub> | 13.0 | 0.15 | 19971218 | 29.67406  | 290.20675 | 97.28983  | 6.81829  | 0.0795178 | 2.8680338 | 25 | 1 | 111 days | 0.74 | M-v 5 | Williams | 1998 CS <sub>2</sub> |
| 1998 CT <sub>2</sub> | 14.0 | 0.15 | 19980216 | 93.88331  | 212.12583 | 191.55431 | 4.61075  | 0.1085318 | 3.2392042 | 15 | 1 | 16 days  | 0.45 |       | Williams | 1998 CT <sub>2</sub> |
| 1998 CW <sub>2</sub> | 15.0 | 0.15 | 19980216 | 285.91712 | 99.46047  | 133.94549 | 3.39267  | 0.0575540 | 2.3921259 | 12 | 1 | 26 days  | 0.77 |       | Williams | 1998 CW <sub>2</sub> |
| 1998 CH <sub>3</sub> | 15.5 | 0.15 | 19980216 | 22.64746  | 108.09089 | 1.32863   | 2.40282  | 0.3187482 | 3.1862607 | 9  | 1 | 23 days  | 0.40 |       | Williams | 1998 CH <sub>3</sub> |
| 1998 CK <sub>3</sub> | 14.5 | 0.15 | 19980216 | 292.37625 | 235.00321 | 1.78811   | 2.30896  | 0.1374786 | 2.4518824 | 12 | 1 | 27 days  | 1.41 |       | Williams | 1998 CK <sub>3</sub> |
| 1998 CO <sub>3</sub> | 14.5 | 0.15 | 19980127 | 225.98959 | 311.12103 | 349.70213 | 4.32933  | 0.2374493 | 2.2636701 | 9  | 1 | 18 days  | 0.83 |       | Williams | 1998 CO <sub>3</sub> |
| 1998 CS <sub>3</sub> | 15.5 | 0.15 | 19980127 | 39.12073  | 288.62700 | 152.42926 | 4.45509  | 0.2836313 | 2.4517505 | 9  | 1 | 10 days  | 0.56 | E     | Marsden  | 1998 CS <sub>3</sub> |
| 1998 CW <sub>3</sub> | 14.0 | 0.15 | 19980127 | 343.91560 | 37.01368  | 133.22066 | 5.86113  | 0.1610925 | 2.5929405 | 12 | 1 | 17 days  | 1.02 |       | Williams | 1998 CW <sub>3</sub> |
| 1998 CY <sub>3</sub> | 12.5 | 0.15 | 19980127 | 64.70348  | 266.99858 | 150.49265 | 12.06472 | 0.2583531 | 2.8661961 | 9  | 1 | 10 days  | 0.38 |       | Marsden  | 1998 CY <sub>3</sub> |
| 1998 CB <sub>4</sub> | 15.5 | 0.15 | 19980216 | 295.15008 | 181.72214 | 47.07709  | 1.93886  | 0.1288507 | 2.1692171 | 13 | 1 | 12 days  | 0.56 |       | Marsden  | 1998 CB <sub>4</sub> |
| 1998 CC <sub>4</sub> | 14.0 | 0.15 | 19980127 | 76.27708  | 95.63213  | 311.93882 | 9.21157  | 0.0881862 | 2.9860900 | 12 | 1 | 28 days  | 0.62 |       | Williams | 1998 CC <sub>4</sub> |
| 1998 CD <sub>4</sub> | 13.5 | 0.15 | 19980216 | 20.12058  | 343.16537 | 124.52612 | 16.09363 | 0.0670584 | 2.6122428 | 9  | 1 | 13 days  | 0.14 |       | Williams | 1998 CD <sub>4</sub> |
| 1998 CE <sub>4</sub> | 14.0 | 0.15 | 19980216 | 128.02997 | 300.61067 | 57.71610  | 4.66414  | 0.1952415 | 2.3271874 | 9  | 1 | 10 days  | 0.17 |       | Williams | 1998 CE <sub>4</sub> |
| 1998 CY <sub>4</sub> | 15.0 | 0.15 | 19980216 | 76.40179  | 229.99088 | 204.63641 | 1.18641  | 0.0161363 | 2.9193075 | 12 | 1 | 21 days  | 0.37 |       | Williams | 1998 CY <sub>4</sub> |
| 1998 DB              | 16.0 | 0.15 | 19980127 | 274.72664 | 139.45249 | 101.22138 | 2.10482  | 0.1658305 | 2.2143805 | 12 | 1 | 34 days  | 0.61 |       | Williams | 1998 DB              |
| 1998 DC              | 15.5 | 0.15 | 19980216 | 335.79447 | 343.83923 | 200.36340 | 4.10615  | 0.0699829 | 2.3608141 | 21 | 1 | 14 days  | 0.32 |       | Williams | 1998 DC              |
| 1998 DD              | 14.0 | 0.15 | 19980216 | 3.22878   | 91.55291  | 59.23072  | 7.30395  | 0.2116342 | 2.3399003 | 18 | 1 | 20 days  | 0.13 |       | Williams | 1998 DD              |
| 1998 DE              | 15.5 | 0.15 | 19980216 | 3.59413   | 152.39377 | 349.00200 | 3.58222  | 0.2179689 | 2.6998749 | 20 | 1 | 8 days   | 0.65 |       | Williams | 1998 DE              |
| 1998 DG              | 17.5 | 0.15 | 19980216 | 339.93219 | 120.05899 | 52.82092  | 2.80796  | 0.1724708 | 2.3709731 | 17 | 1 | 6 days   | 0.30 |       | Marsden  | 1998 DG              |
| 1998 DH              | 15.5 | 0.15 | 19980216 | 177.20616 | 333.61332 | 351.57317 | 7.97913  | 0.2099761 | 2.4332555 | 20 | 1 | 6 days   | 0.38 |       | Marsden  | 1998 DH              |
| 1998 DJ              | 15.0 | 0.15 | 19980216 | 141.95823 | 332.24708 | 17.43352  | 4.88446  | 0.1993664 | 2.7671230 | 13 | 1 | 4 days   | 0.66 | E     | Marsden  | 1998 DJ              |
| 1998 DK              | 16.5 | 0.15 | 19980216 | 214.54200 | 117.10756 | 190.09372 | 3.45503  | 0.1838214 | 2.1609459 | 13 | 1 | 4 days   | 0.71 | E     | Marsden  | 1998 DK              |
| 1998 DL              | 15.0 | 0.15 | 19980216 | 82.90062  | 277.20139 | 133.94418 | 27.34526 | 0.0917406 | 3.2316565 | 17 | 1 | 8 days   | 0.42 | E     | Marsden  | 1998 DL              |
| 1998 DN              | 14.5 | 0.15 | 19980216 | 46.67879  | 323.99254 | 128.67133 | 17.83704 | 0.1011299 | 2.9276648 | 19 | 1 | 11 days  | 0.61 |       | Williams | 1998 DN              |
| 1998 DO              | 14.5 | 0.15 | 19980216 | 79.07094  | 250.73983 | 160.66864 | 13.29748 | 0.1649492 | 2.7816995 | 12 | 1 | 11 days  | 0.56 |       | Williams | 1998 DO              |
| 1998 DS              | 16.0 | 0.15 | 19980216 | 256.04430 | 188.09469 | 74.89216  | 3.76825  | 0.1448353 | 2.3428559 | 20 | 1 | 9 days   | 0.24 |       | Marsden  | 1998 DS              |
| 1998 DT              | 13.5 | 0.15 | 19980216 | 195.77638 | 56.58520  | 268.92819 | 0.92297  | 0.2369570 | 2.9485739 | 18 | 1 | 8 days   | 0.40 |       | Williams | 1998 DT              |
| 1998 DU              | 15.0 | 0.15 | 19980127 | 73.97421  | 110.53789 | 309.70588 | 18.06564 | 0.0914997 | 1.9515868 | 19 | 1 | 31 days  | 0.78 |       | Williams | 1998 DU              |
| 1998 DV              | 15.0 | 0.15 | 19980216 | 354.87108 | 147.91106 | 338.56650 | 4.38788  | 0.2207728 | 2.6209429 | 18 | 1 | 8 days   | 0.23 |       | Marsden  | 1998 DV              |
| 1998 DX              | 14.0 | 0.15 | 19980216 | 312.97464 | 112.15113 | 84.71033  | 6.27443  | 0.2943160 | 2.9910685 | 18 | 1 | 8 days   | 0.51 | E     | Williams | 1998 DX              |
| 1998 DY              | 15.0 | 0.15 | 19980216 | 259.45635 | 279.61503 | 319.35734 | 3.89062  | 0.0539484 | 2.6262498 | 12 | 1 | 8 days   | 0.27 |       | Marsden  | 1998 DY              |
| 1998 DA <sub>1</sub> | 16.0 | 0.15 | 19980216 | 14.96332  | 345.60896 | 131.22871 | 6.25405  | 0.1019540 | 2.2887833 | 16 | 1 | 8 days   | 0.26 |       | Marsden  | 1998 DA <sub>1</sub> |
| 1998 DB <sub>1</sub> | 15.0 | 0.15 | 19980216 | 22.08580  | 34.59681  | 69.34024  | 2.27590  | 0.1206231 | 3.1701044 | 9  | 1 | 3 days   | 0.42 | E     | Marsden  | 1998 DB <sub>1</sub> |
| 1998 DC <sub>1</sub> | 15.0 | 0.15 | 19980216 | 17.35703  | 134.07131 | 345.13813 | 13.20621 | 0.1579060 | 3.1469626 | 17 | 1 | 6 days   | 0.34 |       | Marsden  | 1998 DC <sub>1</sub> |
| 1998 DD <sub>1</sub> | 16.0 | 0.15 | 19980216 | 341.07430 | 221.47492 | 310.67345 | 1.41744  | 0.2295912 | 2.8244827 | 14 | 1 | 8 days   | 0.61 | E     | Marsden  | 1998 DD <sub>1</sub> |
| 1998 DE <sub>1</sub> | 16.5 | 0.15 | 19980216 | 336.87832 | 275.68628 | 259.97411 | 3.93619  | 0.1349052 | 2.3673445 | 13 | 1 | 8 days   | 0.33 |       | Marsden  | 1998 DE <sub>1</sub> |
| 1998 DF <sub>1</sub> | 15.5 | 0.15 | 19980216 | 77.16120  | 195.19567 | 224.20631 | 4.18350  | 0.0755145 | 2.4171635 | 13 | 1 | 8 days   | 0.40 |       | Marsden  | 1998 DF <sub>1</sub> |
| 1998 DG <sub>1</sub> | 15.0 | 0.15 | 19980216 | 38.47937  | 54.16604  | 12.38844  | 16.66766 | 0.3331797 | 3.1546980 | 15 | 1 | 8 days   | 0.17 |       | Marsden  | 1998 DG <sub>1</sub> |
| 1998 DH <sub>1</sub> | 14.5 | 0.15 | 19980216 | 113.86082 | 53.86302  | 328.65606 | 2.63664  | 0.0718458 | 2.8823814 | 18 | 1 | 8 days   | 0.56 | E     | Marsden  | 1998 DH <sub>1</sub> |
| 1998 DK <sub>1</sub> | 14.5 | 0.15 | 19980216 | 266.90468 | 261.85327 | 358.48464 | 2.82247  | 0.0628899 | 2.1787856 | 17 | 1 | 8 days   | 0.69 | E     | Williams | 1998 DK <sub>1</sub> |
| 1998 DL <sub>1</sub> | 13.5 | 0.15 | 19980216 | 52.91559  | 255.10688 | 182.34348 | 11.99332 | 0.1676431 | 2.4116454 | 18 | 1 | 5 days   | 0.55 |       | Williams | 1998 DL <sub>1</sub> |
| 1998 DM <sub>1</sub> | 15.5 | 0.15 | 19980216 | 229.97438 | 129.02152 | 173.05921 | 2.41038  | 0.2414530 | 2.2837995 | 14 | 1 | 8 days   | 0.76 | E     | Williams | 1998 DM <sub>1</sub> |

|                      |      |      |          |           |           |           |          |           |           |    |   |          |      |       |          |                      |
|----------------------|------|------|----------|-----------|-----------|-----------|----------|-----------|-----------|----|---|----------|------|-------|----------|----------------------|
| 1998 DN <sub>1</sub> | 12.5 | 0.15 | 19980216 | 255.48945 | 184.42237 | 83.86056  | 2.26266  | 0.1585592 | 3.1495044 | 10 | 1 | 8 days   | 0.37 |       | Williams | 1998 DN <sub>1</sub> |
| 1998 DO <sub>1</sub> | 15.0 | 0.15 | 19980216 | 305.90825 | 116.05958 | 73.04060  | 4.73461  | 0.1167580 | 2.6348687 | 18 | 1 | 7 days   | 0.27 |       | Marsden  | 1998 DO <sub>1</sub> |
| 1998 DQ <sub>1</sub> | 16.0 | 0.15 | 19980216 | 330.42062 | 54.61679  | 120.76542 | 2.04687  | 0.1527424 | 2.3012509 | 15 | 1 | 6 days   | 0.27 |       | Marsden  | 1998 DQ <sub>1</sub> |
| 1998 DR <sub>1</sub> | 15.0 | 0.15 | 19980216 | 84.52270  | 255.87328 | 150.38506 | 2.61851  | 0.0853959 | 2.8649746 | 16 | 1 | 11 days  | 0.55 |       | Marsden  | 1998 DR <sub>1</sub> |
| 1998 DS <sub>1</sub> | 15.5 | 0.15 | 19980216 | 69.26207  | 170.29839 | 251.91821 | 2.73201  | 0.2143224 | 2.7019283 | 9  | 1 | 6 days   | 0.32 |       | Marsden  | 1998 DS <sub>1</sub> |
| 1998 DT <sub>1</sub> | 14.0 | 0.15 | 19980216 | 106.11116 | 250.84277 | 141.25927 | 2.98667  | 0.0465253 | 3.3679719 | 14 | 1 | 3 days   | 0.51 | E     | Marsden  | 1998 DT <sub>1</sub> |
| 1998 DU <sub>1</sub> | 17.0 | 0.15 | 19980216 | 333.97222 | 134.45733 | 50.21939  | 3.61812  | 0.1464262 | 2.3201213 | 13 | 1 | 6 days   | 0.39 |       | Marsden  | 1998 DU <sub>1</sub> |
| 1998 DV <sub>1</sub> | 12.5 | 0.15 | 19971218 | 74.33700  | 69.82164  | 310.89272 | 12.03873 | 0.1990873 | 2.5974214 | 20 | 1 | 63 days  | 0.75 | M-v 7 | Williams | 1998 DV <sub>1</sub> |
| 1998 DW <sub>1</sub> | 14.5 | 0.15 | 19980216 | 143.23932 | 258.08449 | 92.19675  | 6.83253  | 0.1967369 | 2.3861308 | 7  | 1 | 6 days   | 0.46 | E     | Williams | 1998 DW <sub>1</sub> |
| 1998 DX <sub>1</sub> | 15.0 | 0.15 | 19980216 | 69.47010  | 311.26812 | 114.20014 | 10.50878 | 0.0954026 | 2.4514581 | 9  | 1 | 8 days   | 0.48 |       | Williams | 1998 DX <sub>1</sub> |
| 1998 DY <sub>1</sub> | 15.5 | 0.15 | 19980216 | 316.04587 | 76.25493  | 121.31448 | 13.94419 | 0.0921196 | 2.7920328 | 7  | 1 | 5 days   | 0.34 |       | Williams | 1998 DY <sub>1</sub> |
| 1998 DA <sub>2</sub> | 15.0 | 0.15 | 19980127 | 220.05338 | 247.75762 | 22.98604  | 6.08023  | 0.1814377 | 2.2758633 | 16 | 1 | 33 days  | 0.45 |       | Williams | 1998 DA <sub>2</sub> |
| 1998 DC <sub>2</sub> | 13.5 | 0.15 | 19980216 | 81.88234  | 9.33530   | 29.88358  | 4.50227  | 0.1875069 | 3.9910586 | 17 | 1 | 8 days   | 0.40 | E     | Marsden  | 1998 DC <sub>2</sub> |
| 1998 DD <sub>2</sub> | 17.0 | 0.15 | 19980216 | 20.47298  | 117.78743 | 348.18715 | 8.05999  | 0.2919267 | 2.9867910 | 12 | 1 | 6 days   | 0.44 | E     | Marsden  | 1998 DD <sub>2</sub> |
| 1998 DE <sub>2</sub> | 17.5 | 0.15 | 19980216 | 331.37824 | 352.66287 | 189.46254 | 5.38865  | 0.1975181 | 2.4296944 | 8  | 1 | 11 days  | 0.22 |       | Williams | 1998 DE <sub>2</sub> |
| 1998 DN <sub>2</sub> | 14.5 | 0.15 | 19980216 | 144.73391 | 3.10820   | 10.62764  | 26.48565 | 0.0874724 | 2.6448323 | 9  | 1 | 6 days   | 0.12 |       | Williams | 1998 DN <sub>2</sub> |
| 1998 DS <sub>2</sub> | 14.5 | 0.15 | 19980216 | 23.63454  | 308.30832 | 98.94151  | 7.54992  | 0.2082545 | 2.3923691 | 10 | 1 | 11 days  | 0.33 |       | Williams | 1998 DS <sub>2</sub> |
| 1998 DU <sub>2</sub> | 14.0 | 0.15 | 19980216 | 49.40301  | 340.07648 | 100.51760 | 10.17256 | 0.2650916 | 2.5265122 | 9  | 1 | 7 days   | 0.14 |       | Williams | 1998 DU <sub>2</sub> |
| 1998 DX <sub>2</sub> | 15.0 | 0.15 | 19980216 | 35.52348  | 58.28509  | 40.09220  | 10.03547 | 0.2682038 | 2.7731185 | 15 | 1 | 12 days  | 0.24 |       | Williams | 1998 DX <sub>2</sub> |
| 1998 DZ <sub>2</sub> | 11.5 | 0.15 | 19971218 | 47.13469  | 275.55768 | 86.02675  | 15.89339 | 0.1425531 | 2.5700008 | 35 | 1 | 122 days | 0.22 | M-v 3 | Williams | 1998 DZ <sub>2</sub> |
| 1998 DA <sub>3</sub> | 15.5 | 0.15 | 19980127 | 51.28216  | 307.29062 | 130.03350 | 5.35348  | 0.1482655 | 2.3855251 | 22 | 1 | 49 days  | 0.44 |       | Williams | 1998 DA <sub>3</sub> |
| 1998 DB <sub>3</sub> | 15.5 | 0.15 | 19980216 | 323.73476 | 55.10026  | 132.47252 | 5.55989  | 0.0214792 | 2.3347148 | 9  | 1 | 7 days   | 0.31 |       | Marsden  | 1998 DB <sub>3</sub> |
| 1998 DC <sub>3</sub> | 15.0 | 0.15 | 19980216 | 319.46706 | 63.16371  | 139.13882 | 9.52275  | 0.1376903 | 2.9819710 | 9  | 1 | 7 days   | 0.85 | E     | Marsden  | 1998 DC <sub>3</sub> |
| 1998 DF <sub>3</sub> | 14.5 | 0.15 | 19980216 | 177.22584 | 201.56247 | 107.14447 | 15.56987 | 0.1166356 | 2.5187643 | 9  | 1 | 2 days   | 0.29 | E     | Williams | 1998 DF <sub>3</sub> |
| 1998 DG <sub>3</sub> | 15.5 | 0.15 | 19980216 | 31.53456  | 96.94357  | 341.90595 | 7.98085  | 0.2551404 | 2.3848753 | 9  | 1 | 2 days   | 0.10 |       | Williams | 1998 DG <sub>3</sub> |
| 1998 DR <sub>3</sub> | 15.5 | 0.15 | 19980216 | 28.56580  | 184.74490 | 269.75978 | 7.90284  | 0.2356715 | 2.7611021 | 9  | 1 | 2 days   | 0.20 | E     | Williams | 1998 DR <sub>3</sub> |
| 1998 DT <sub>3</sub> | 15.0 | 0.15 | 19980216 | 95.81970  | 227.02469 | 161.71358 | 4.90657  | 0.1284028 | 2.4192638 | 12 | 1 | 4 days   | 0.85 | E     | Williams | 1998 DT <sub>3</sub> |
| 1998 DQ <sub>4</sub> | 15.0 | 0.15 | 19980216 | 186.90237 | 162.61739 | 158.20399 | 10.47358 | 0.1297532 | 2.3513429 | 9  | 1 | 2 days   | 0.18 | E     | Williams | 1998 DQ <sub>4</sub> |
| 1998 DS <sub>4</sub> | 14.5 | 0.15 | 19980216 | 110.77640 | 241.52599 | 151.88222 | 14.39389 | 0.0177932 | 3.0368617 | 9  | 1 | 4 days   | 0.23 | E     | Williams | 1998 DS <sub>4</sub> |
| 1998 DT <sub>4</sub> | 16.0 | 0.15 | 19980216 | 66.29242  | 283.24980 | 146.67702 | 7.08524  | 0.0883271 | 2.4028717 | 9  | 1 | 5 days   | 0.21 |       | Williams | 1998 DT <sub>4</sub> |
| 1998 DY <sub>4</sub> | 15.0 | 0.15 | 19980216 | 212.41723 | 158.89293 | 141.72511 | 7.74178  | 0.1272922 | 2.1939540 | 9  | 1 | 5 days   | 0.21 | E     | Williams | 1998 DY <sub>4</sub> |
| 1998 DE <sub>5</sub> | 15.0 | 0.15 | 19980216 | 160.02121 | 328.90429 | 9.04231   | 5.19096  | 0.2453552 | 2.5065485 | 9  | 1 | 5 days   | 0.17 |       | Williams | 1998 DE <sub>5</sub> |
| 1998 DH <sub>5</sub> | 14.5 | 0.15 | 19980216 | 349.58172 | 64.30619  | 94.01241  | 9.55420  | 0.0822588 | 3.1396014 | 11 | 1 | 4 days   | 0.48 |       | Williams | 1998 DH <sub>5</sub> |
| 1998 DJ <sub>5</sub> | 14.0 | 0.15 | 19980216 | 223.73033 | 180.17596 | 113.44691 | 12.58951 | 0.1534430 | 2.5834851 | 10 | 1 | 4 days   | 0.33 |       | Williams | 1998 DJ <sub>5</sub> |
| 1998 DB <sub>6</sub> | 14.0 | 0.15 | 19980216 | 66.32717  | 87.94967  | 335.02985 | 10.91299 | 0.2073782 | 2.8921184 | 9  | 1 | 5 days   | 0.19 | E     | Williams | 1998 DB <sub>6</sub> |
| 1998 DU <sub>6</sub> | 16.0 | 0.15 | 19980216 | 234.45119 | 70.68453  | 201.52361 | 5.63081  | 0.0985252 | 2.2439351 | 9  | 1 | 11 days  | 0.10 |       | Williams | 1998 DU <sub>6</sub> |
| 1998 DV <sub>6</sub> | 15.5 | 0.15 | 19980216 | 186.76907 | 69.30825  | 243.67354 | 5.39523  | 0.1424217 | 2.4370056 | 12 | 1 | 14 days  | 0.21 |       | Williams | 1998 DV <sub>6</sub> |
| 1998 DY <sub>6</sub> | 16.0 | 0.15 | 19980216 | 266.59132 | 316.39433 | 280.97506 | 9.02801  | 0.0487921 | 3.1398960 | 9  | 1 | 13 days  | 0.19 |       | Williams | 1998 DY <sub>6</sub> |
| 1998 DB <sub>7</sub> | 16.0 | 0.15 | 19980216 | 137.48285 | 155.01839 | 197.13461 | 5.78503  | 0.1353999 | 2.4352113 | 12 | 1 | 14 days  | 0.29 |       | Williams | 1998 DB <sub>7</sub> |
| 1998 DD <sub>7</sub> | 15.0 | 0.15 | 19980216 | 209.10032 | 131.53862 | 159.60612 | 14.44381 | 0.0347027 | 3.1028200 | 11 | 1 | 14 days  | 0.28 |       | Williams | 1998 DD <sub>7</sub> |
| 1998 DM <sub>7</sub> | 15.0 | 0.15 | 19980216 | 325.76185 | 205.22260 | 352.64337 | 4.32513  | 0.1411228 | 2.7251752 | 9  | 1 | 7 days   | 0.06 |       | Williams | 1998 DM <sub>7</sub> |
| 1998 DO <sub>7</sub> | 17.0 | 0.15 | 19980216 | 234.04299 | 250.70695 | 44.79465  | 1.87439  | 0.1874538 | 2.1943570 | 9  | 1 | 8 days   | 0.13 |       | Williams | 1998 DO <sub>7</sub> |
| 1998 DP <sub>7</sub> | 17.5 | 0.15 | 19980216 | 8.45215   | 8.29344   | 134.29841 | 4.78101  | 0.1586593 | 2.7551225 | 8  | 1 | 10 days  | 0.21 |       | Williams | 1998 DP <sub>7</sub> |
| 1998 DQ <sub>7</sub> | 15.5 | 0.15 | 19980216 | 55.85132  | 181.79419 | 255.72478 | 5.28330  | 0.2322969 | 2.3755138 | 9  | 1 | 2 days   | 0.09 |       | Williams | 1998 DQ <sub>7</sub> |
| 1998 DR <sub>7</sub> | 16.0 | 0.15 | 19980216 | 79.36330  | 21.32446  | 53.72951  | 4.19815  | 0.0966527 | 2.2106408 | 9  | 1 | 2 days   | 0.16 | E     | Williams | 1998 DR <sub>7</sub> |
| 1998 DS <sub>7</sub> | 16.0 | 0.15 | 19980216 | 39.89681  | 293.92732 | 154.33581 | 26.89900 | 0.1493537 | 1.9056970 | 12 | 1 | 4 days   | 0.17 |       | Williams | 1998 DS <sub>7</sub> |
| 1998 DU <sub>7</sub> | 12.5 | 0.15 | 19980216 | 61.68584  | 344.05636 | 91.22578  | 12.25702 | 0.1004594 | 2.9993010 | 18 | 1 | 8 days   | 0.77 |       | Williams | 1998 DU <sub>7</sub> |
| 1998 DV <sub>7</sub> | 14.0 | 0.15 | 19980216 | 7.01843   | 47.98045  | 83.60566  | 3.19083  | 0.0928726 | 3.0896762 | 12 | 1 | 12 days  | 0.34 |       | Williams | 1998 DV <sub>7</sub> |
| 1998 DE <sub>8</sub> | 14.5 | 0.15 | 19980216 | 343.62207 | 129.01080 | 34.53735  | 5.9762   | 0.1285576 | 2.7237751 | 12 | 1 | 29 days  | 0.34 |       | Williams | 1998 DE <sub>8</sub> |
| 1998 DF <sub>8</sub> | 15.5 | 0.15 | 19980216 | 312.90506 | 136.10396 | 57.67072  | 4.00858  | 0.0487149 | 2.1792833 | 12 | 1 | 28 days  | 0.19 |       | Williams | 1998 DF <sub>8</sub> |
| 1998 DG <sub>8</sub> | 15.0 | 0.15 | 19980216 | 342.91611 | 227.48884 | 306.28222 | 3.20036  | 0.0189348 | 2.7842470 | 9  | 1 | 9 days   | 0.43 | E     | Williams | 1998 DG <sub>8</sub> |
| 1998 DH <sub>8</sub> | 16.5 | 0.15 | 19980216 | 319.65306 | 250.63037 | 319.72585 | 4.22707  | 0.1752830 | 2.3964378 | 9  | 1 | 9 days   | 0.46 |       | Williams | 1998 DH <sub>8</sub> |
| 1998 DJ <sub>8</sub> | 16.0 | 0.15 | 19980216 | 9.74987   | 202.30538 | 299.84989 | 1.32276  | 0.1219409 | 2.3830622 | 12 | 1 | 9 days   | 0.31 |       | Williams | 1998 DJ <sub>8</sub> |

|                       |      |      |          |           |           |           |          |           |           |    |   |         |      |            |                       |
|-----------------------|------|------|----------|-----------|-----------|-----------|----------|-----------|-----------|----|---|---------|------|------------|-----------------------|
| 1998 DK <sub>8</sub>  | 15.0 | 0.15 | 19980216 | 40.59633  | 254.78605 | 217.34875 | 3.72827  | 0.0615848 | 2.7521076 | 12 | 1 | 12 days | 0.27 | Williams   | 1998 DK <sub>8</sub>  |
| 1998 DN <sub>8</sub>  | 12.5 | 0.15 | 19980216 | 191.40074 | 15.47464  | 315.60704 | 8.44330  | 0.1440230 | 3.0412672 | 15 | 1 | 9 days  | 0.24 | Williams   | 1998 DN <sub>8</sub>  |
| 1998 DO <sub>8</sub>  | 14.5 | 0.15 | 19980216 | 206.89508 | 8.43894   | 307.74293 | 5.57547  | 0.1041500 | 2.4490121 | 18 | 1 | 15 days | 0.38 | Williams   | 1998 DO <sub>8</sub>  |
| 1998 DQ <sub>8</sub>  | 15.0 | 0.15 | 19980216 | 23.61031  | 58.75773  | 72.41020  | 9.64091  | 0.0822722 | 2.7380015 | 12 | 1 | 9 days  | 0.21 | Williams   | 1998 DQ <sub>8</sub>  |
| 1998 DS <sub>8</sub>  | 12.5 | 0.15 | 19980216 | 159.27702 | 146.47344 | 121.88923 | 2.97525  | 0.2305478 | 2.4328909 | 10 | 1 | 7 days  | 0.47 | E Williams | 1998 DS <sub>8</sub>  |
| 1998 DT <sub>8</sub>  | 18.5 | 0.15 | 19980216 | 333.28384 | 49.60005  | 144.53845 | 5.28872  | 0.2365168 | 2.3028734 | 9  | 1 | 5 days  | 0.21 | Williams   | 1998 DT <sub>8</sub>  |
| 1998 DU <sub>8</sub>  | 17.0 | 0.15 | 19980216 | 85.19953  | 268.74335 | 149.58743 | 15.16869 | 0.0802664 | 2.7163757 | 9  | 1 | 5 days  | 0.33 | E Williams | 1998 DU <sub>8</sub>  |
| 1998 DV <sub>8</sub>  | 17.5 | 0.15 | 19980216 | 258.47810 | 138.90452 | 127.54894 | 2.86543  | 0.1149129 | 2.4225495 | 9  | 1 | 5 days  | 0.20 | E Williams | 1998 DV <sub>8</sub>  |
| 1998 DW <sub>8</sub>  | 15.0 | 0.15 | 19980216 | 352.13771 | 23.89343  | 140.60959 | 5.45260  | 0.2070905 | 3.1439211 | 12 | 1 | 9 days  | 0.14 | Williams   | 1998 DW <sub>8</sub>  |
| 1998 DX <sub>8</sub>  | 17.0 | 0.15 | 19980216 | 262.08531 | 183.03607 | 78.34752  | 1.28059  | 0.1001827 | 2.3454265 | 9  | 1 | 9 days  | 0.22 | Williams   | 1998 DX <sub>8</sub>  |
| 1998 DY <sub>8</sub>  | 16.5 | 0.15 | 19980216 | 312.05821 | 183.21043 | 31.16834  | 1.81938  | 0.1412186 | 3.0318587 | 9  | 1 | 7 days  | 0.12 | Williams   | 1998 DY <sub>8</sub>  |
| 1998 DA <sub>9</sub>  | 17.0 | 0.15 | 19980216 | 43.31399  | 332.38505 | 133.19849 | 4.29215  | 0.0523135 | 2.3411547 | 9  | 1 | 5 days  | 0.15 | E Williams | 1998 DA <sub>9</sub>  |
| 1998 DB <sub>9</sub>  | 16.0 | 0.15 | 19980216 | 286.16461 | 239.65757 | 357.87639 | 5.12612  | 0.0854009 | 2.7919392 | 9  | 1 | 7 days  | 0.11 | Williams   | 1998 DB <sub>9</sub>  |
| 1998 DP <sub>9</sub>  | 13.5 | 0.15 | 19980216 | 297.72281 | 160.59985 | 77.33661  | 11.46573 | 0.0712269 | 2.9233798 | 12 | 1 | 2 days  | 0.20 | Williams   | 1998 DP <sub>9</sub>  |
| 1998 DR <sub>9</sub>  | 16.5 | 0.15 | 19980216 | 144.67846 | 347.24111 | 7.81690   | 6.93895  | 0.0672633 | 2.3152675 | 12 | 1 | 5 days  | 0.69 | Marsden    | 1998 DR <sub>9</sub>  |
| 1998 DT <sub>9</sub>  | 16.0 | 0.15 | 19980216 | 179.75540 | 1.42919   | 344.86860 | 1.97389  | 0.0955308 | 2.1420151 | 19 | 1 | 3 days  | 0.58 | E Williams | 1998 DT <sub>9</sub>  |
| 1998 DU <sub>9</sub>  | 19.0 | 0.15 | 19980216 | 352.36290 | 283.87527 | 248.04485 | 4.93616  | 0.3282773 | 2.0239567 | 18 | 1 | 3 days  | 0.29 | Williams   | 1998 DU <sub>9</sub>  |
| 1998 DV <sub>9</sub>  | 18.0 | 0.15 | 19980216 | 356.59461 | 0.56641   | 130.58041 | 8.66936  | 0.4323002 | 1.7398829 | 30 | 1 | 11 days | 0.61 | Williams   | 1998 DV <sub>9</sub>  |
| 1998 DY <sub>9</sub>  | 13.5 | 0.15 | 19980216 | 327.58510 | 235.47150 | 303.15171 | 3.00958  | 0.1108682 | 2.2096898 | 8  | 1 | 3 days  | 0.32 | E Williams | 1998 DY <sub>9</sub>  |
| 1998 DD <sub>10</sub> | 14.5 | 0.15 | 19980216 | 77.98675  | 170.74961 | 265.97103 | 5.70921  | 0.0364386 | 2.2374678 | 9  | 1 | 5 days  | 0.10 | Williams   | 1998 DD <sub>10</sub> |
| 1998 DG <sub>10</sub> | 15.0 | 0.15 | 19980216 | 109.08811 | 209.69655 | 189.13455 | 4.34062  | 0.1103592 | 2.2797353 | 9  | 1 | 5 days  | 0.15 | Williams   | 1998 DG <sub>10</sub> |
| 1998 DJ <sub>10</sub> | 14.0 | 0.15 | 19980216 | 40.96377  | 111.10937 | 348.49280 | 1.85090  | 0.2681486 | 3.0250226 | 12 | 1 | 5 days  | 0.20 | Williams   | 1998 DJ <sub>10</sub> |
| 1998 DN <sub>10</sub> | 14.0 | 0.15 | 19980216 | 132.80022 | 201.01843 | 153.37275 | 15.54073 | 0.2868980 | 2.5958467 | 9  | 1 | 3 days  | 0.35 | E Williams | 1998 DN <sub>10</sub> |
| 1998 DS <sub>10</sub> | 16.5 | 0.15 | 19980216 | 36.02949  | 347.62681 | 103.88030 | 3.01062  | 0.3254720 | 2.2763487 | 27 | 1 | 6 days  | 0.34 | Marsden    | 1998 DS <sub>10</sub> |
| 1998 DU <sub>10</sub> | 13.5 | 0.15 | 19980216 | 93.10336  | 324.22438 | 45.15272  | 8.89999  | 0.1206813 | 3.1053611 | 17 | 1 | 10 days | 0.43 | Williams   | 1998 DU <sub>10</sub> |
| 1998 DW <sub>10</sub> | 13.5 | 0.15 | 19980216 | 81.87561  | 21.15488  | 47.16143  | 10.33766 | 0.0745093 | 2.9781838 | 15 | 1 | 28 days | 0.45 | Williams   | 1998 DW <sub>10</sub> |
| 1998 DY <sub>10</sub> | 14.0 | 0.15 | 19980216 | 117.16508 | 341.65060 | 26.38873  | 5.23278  | 0.1690793 | 2.7427937 | 12 | 1 | 23 days | 0.39 | Williams   | 1998 DY <sub>10</sub> |
| 1998 DZ <sub>10</sub> | 14.5 | 0.15 | 19980216 | 211.54019 | 295.86175 | 0.40512   | 6.99861  | 0.1222408 | 2.2450921 | 12 | 1 | 13 days | 0.32 | Williams   | 1998 DZ <sub>10</sub> |
| 1998 DC <sub>11</sub> | 15.0 | 0.15 | 19980216 | 144.86138 | 192.55528 | 170.14973 | 5.24842  | 0.1445102 | 2.2947741 | 12 | 1 | 9 days  | 0.29 | Williams   | 1998 DC <sub>11</sub> |
| 1998 DD <sub>11</sub> | 15.0 | 0.15 | 19980216 | 309.85069 | 77.66895  | 144.69801 | 9.26494  | 0.1763282 | 2.6964506 | 17 | 1 | 11 days | 0.90 | Williams   | 1998 DD <sub>11</sub> |
| 1998 DE <sub>11</sub> | 14.5 | 0.15 | 19980216 | 109.29233 | 152.45418 | 226.73196 | 2.98447  | 0.2113881 | 2.2224443 | 9  | 1 | 2 days  | 0.11 | Williams   | 1998 DE <sub>11</sub> |
| 1998 DF <sub>11</sub> | 17.5 | 0.15 | 19980216 | 15.27043  | 152.03801 | 329.82506 | 30.86350 | 0.2644836 | 1.8548061 | 47 | 1 | 6 days  | 0.74 | Marsden    | 1998 DF <sub>11</sub> |
| 1998 DG <sub>11</sub> | 14.5 | 0.15 | 19980216 | 272.28397 | 206.47697 | 58.49875  | 3.39132  | 0.1728682 | 3.1902318 | 13 | 1 | 14 days | 0.50 | Williams   | 1998 DG <sub>11</sub> |
| 1998 DH <sub>11</sub> | 15.0 | 0.15 | 19980216 | 97.19692  | 291.68432 | 137.90006 | 24.48708 | 0.0091536 | 1.9380137 | 9  | 1 | 2 days  | 0.14 | E Williams | 1998 DH <sub>11</sub> |
| 1998 DJ <sub>11</sub> | 11.5 | 0.15 | 19980216 | 137.55955 | 57.22967  | 327.49594 | 4.49304  | 0.0355125 | 3.9347100 | 15 | 1 | 5 days  | 0.33 | E Williams | 1998 DJ <sub>11</sub> |
| 1998 DM <sub>11</sub> | 16.0 | 0.15 | 19980216 | 291.03708 | 68.95221  | 142.21147 | 25.15475 | 0.0496517 | 1.8081369 | 9  | 1 | 3 days  | 0.15 | Williams   | 1998 DM <sub>11</sub> |
| 1998 DR <sub>11</sub> | 15.0 | 0.15 | 19980216 | 269.49531 | 131.06507 | 133.85870 | 2.77838  | 0.1013132 | 2.8438773 | 9  | 1 | 3 days  | 0.39 | E Williams | 1998 DR <sub>11</sub> |
| 1998 DT <sub>11</sub> | 15.0 | 0.15 | 19980216 | 4.41336   | 7.17496   | 145.28307 | 4.28550  | 0.1870221 | 2.4497183 | 9  | 1 | 3 days  | 0.11 | Williams   | 1998 DT <sub>11</sub> |
| 1998 DX <sub>11</sub> | 27.0 | 0.15 | 19980216 | 1.60388   | 162.18039 | 335.00538 | 6.53578  | 0.6060907 | 2.5023181 | 16 | 1 | 3 days  | 1.40 | Williams   | 1998 DX <sub>11</sub> |
| 1998 DY <sub>11</sub> | 14.5 | 0.15 | 19980216 | 21.37821  | 5.68576   | 114.60042 | 12.91354 | 0.1023536 | 2.6672799 | 8  | 1 | 4 days  | 0.19 | E Williams | 1998 DY <sub>11</sub> |
| 1998 DB <sub>12</sub> | 16.5 | 0.15 | 19980216 | 224.10485 | 184.45812 | 137.37230 | 4.18869  | 0.2436260 | 2.2895599 | 8  | 1 | 8 days  | 0.13 | Williams   | 1998 DB <sub>12</sub> |
| 1998 DC <sub>12</sub> | 16.0 | 0.15 | 19980216 | 140.91808 | 290.41399 | 87.37557  | 2.33119  | 0.1976496 | 2.4143368 | 8  | 1 | 8 days  | 0.17 | Williams   | 1998 DC <sub>12</sub> |
| 1998 DD <sub>12</sub> | 15.5 | 0.15 | 19980216 | 73.70854  | 291.98587 | 152.30379 | 7.09781  | 0.0971082 | 2.4220608 | 8  | 1 | 8 days  | 0.19 | Williams   | 1998 DD <sub>12</sub> |
| 1998 DF <sub>12</sub> | 16.5 | 0.15 | 19980216 | 50.34619  | 343.76685 | 114.20091 | 3.12279  | 0.1954108 | 2.3788399 | 11 | 1 | 8 days  | 0.19 | Williams   | 1998 DF <sub>12</sub> |
| 1998 DG <sub>12</sub> | 16.0 | 0.15 | 19980216 | 197.86278 | 191.52115 | 149.09888 | 7.49265  | 0.2062325 | 2.3826052 | 8  | 1 | 8 days  | 0.17 | Williams   | 1998 DG <sub>12</sub> |
| 1998 DH <sub>12</sub> | 17.5 | 0.15 | 19980216 | 292.78820 | 149.26957 | 103.23167 | 3.26629  | 0.1349619 | 2.4456956 | 8  | 1 | 8 days  | 0.14 | Williams   | 1998 DH <sub>12</sub> |
| 1998 DJ <sub>12</sub> | 16.0 | 0.15 | 19980216 | 340.74962 | 177.56184 | 16.64651  | 7.22500  | 0.1316988 | 2.5235484 | 11 | 1 | 9 days  | 0.16 | Williams   | 1998 DJ <sub>12</sub> |
| 1998 DK <sub>12</sub> | 16.5 | 0.15 | 19980216 | 101.63923 | 281.03712 | 128.31692 | 4.90540  | 0.2128440 | 2.5885252 | 8  | 1 | 8 days  | 0.37 | Williams   | 1998 DK <sub>12</sub> |
| 1998 DL <sub>12</sub> | 17.5 | 0.15 | 19980216 | 283.76706 | 160.91424 | 99.68402  | 3.34180  | 0.1201245 | 2.4023777 | 8  | 1 | 8 days  | 0.14 | Williams   | 1998 DL <sub>12</sub> |
| 1998 DM <sub>12</sub> | 17.5 | 0.15 | 19980216 | 341.47564 | 50.23594  | 140.56269 | 5.82564  | 0.0961707 | 2.2514892 | 8  | 1 | 8 days  | 0.18 | Williams   | 1998 DM <sub>12</sub> |
| 1998 DN <sub>12</sub> | 16.0 | 0.15 | 19980216 | 95.19845  | 326.03402 | 97.71003  | 3.65442  | 0.1252843 | 2.6335804 | 8  | 1 | 8 days  | 0.16 | Williams   | 1998 DN <sub>12</sub> |
| 1998 DO <sub>12</sub> | 16.5 | 0.15 | 19980216 | 2.58227   | 350.45780 | 145.73574 | 6.61118  | 0.1577141 | 2.6218157 | 9  | 1 | 6 days  | 0.13 | Williams   | 1998 DO <sub>12</sub> |
| 1998 DP <sub>12</sub> | 16.0 | 0.15 | 19980216 | 18.79795  | 322.14389 | 152.27611 | 1.60167  | 0.1270093 | 3.0844536 | 9  | 1 | 6 days  | 0.17 | E Williams | 1998 DP <sub>12</sub> |

|                       |      |      |          |           |           |           |          |           |           |    |   |         |      |            |                       |
|-----------------------|------|------|----------|-----------|-----------|-----------|----------|-----------|-----------|----|---|---------|------|------------|-----------------------|
| 1998 DQ <sub>12</sub> | 16.0 | 0.15 | 19980216 | 355.56988 | 354.10490 | 152.65170 | 1.28986  | 0.1452347 | 2.3884908 | 9  | 1 | 6 days  | 0.60 | E Williams | 1998 DQ <sub>12</sub> |
| 1998 DV <sub>12</sub> | 14.0 | 0.15 | 19980216 | 81.40109  | 280.35503 | 121.21508 | 12.79762 | 0.1283352 | 2.4806822 | 6  | 1 | 2 days  | 0.14 | E Marsden  | 1998 DV <sub>12</sub> |
| 1998 DY <sub>12</sub> | 13.5 | 0.15 | 19980216 | 293.80060 | 147.83293 | 108.54863 | 5.90820  | 0.1247224 | 3.2489146 | 8  | 1 | 1 days  | 0.28 | E Williams | 1998 DY <sub>12</sub> |
| 1998 DZ <sub>12</sub> | 13.5 | 0.15 | 19980216 | 220.89363 | 314.27323 | 355.54686 | 11.02945 | 0.0903085 | 2.5308227 | 12 | 1 | 8 days  | 0.51 | E Williams | 1998 DZ <sub>12</sub> |
| 1998 DA <sub>13</sub> | 19.5 | 0.15 | 19980216 | 4.68429   | 342.90399 | 148.81757 | 7.24228  | 0.3162314 | 2.0136307 | 21 | 1 | 10 days | 0.67 | Williams   | 1998 DA <sub>13</sub> |
| 1998 DB <sub>13</sub> | 14.7 | 0.15 | 19980308 | 91.48490  | 199.77991 | 207.24444 | 3.93800  | 0.1548515 | 3.0809025 | 11 | 1 | 11 days | 0.33 | Nakano     | 1998 DB <sub>13</sub> |
| 1998 DP <sub>13</sub> | 15.5 | 0.15 | 19980216 | 289.03606 | 282.34639 | 342.29391 | 26.18954 | 0.2727666 | 2.5446767 | 12 | 1 | 7 days  | 0.69 | Williams   | 1998 DP <sub>13</sub> |
| 1998 DL <sub>14</sub> | 15.5 | 0.15 | 19980216 | 327.17731 | 176.50443 | 16.77445  | 2.76195  | 0.1524368 | 2.4033201 | 6  | 1 | 5 days  | 0.30 | Marsden    | 1998 DL <sub>14</sub> |
| 1998 DG <sub>16</sub> | 20.0 | 0.15 | 19980308 | 200.91522 | 356.90762 | 344.45216 | 16.15239 | 0.3566739 | 0.8971570 | 21 | 1 | 3 days  | 0.98 | Nakano     | 1998 DG <sub>16</sub> |
| 1998 DM <sub>16</sub> | 16.5 | 0.15 | 19980216 | 140.38688 | 108.77404 | 235.54754 | 5.14174  | 0.2101503 | 2.3411503 | 8  | 1 | 9 days  | 0.33 | Williams   | 1998 DM <sub>16</sub> |
| 1998 DP <sub>16</sub> | 15.5 | 0.15 | 19980216 | 106.35605 | 139.13736 | 237.91247 | 4.60616  | 0.1475236 | 2.4750146 | 9  | 1 | 9 days  | 0.30 | Williams   | 1998 DP <sub>16</sub> |
| 1998 DS <sub>16</sub> | 17.5 | 0.15 | 19980216 | 9.56827   | 210.56814 | 275.66625 | 4.94670  | 0.2003495 | 2.5914682 | 9  | 1 | 9 days  | 0.10 | Williams   | 1998 DS <sub>16</sub> |
| 1998 DB <sub>17</sub> | 14.0 | 0.15 | 19980216 | 63.55959  | 247.52889 | 158.12635 | 16.92175 | 0.2317262 | 3.1481838 | 9  | 1 | 8 days  | 0.13 | Williams   | 1998 DB <sub>17</sub> |
| 1998 DF <sub>17</sub> | 16.0 | 0.15 | 19980216 | 282.66745 | 6.73837   | 211.14666 | 5.57524  | 0.0320457 | 2.7729161 | 9  | 1 | 8 days  | 0.12 | Williams   | 1998 DF <sub>17</sub> |
| 1998 DG <sub>17</sub> | 15.0 | 0.15 | 19980216 | 138.94094 | 90.89725  | 259.02843 | 6.18410  | 0.1272221 | 2.5387564 | 9  | 1 | 8 days  | 0.14 | Williams   | 1998 DG <sub>17</sub> |
| 1998 DM <sub>17</sub> | 15.0 | 0.15 | 19980216 | 140.89944 | 99.20962  | 257.05524 | 5.60775  | 0.0271011 | 3.1297084 | 9  | 1 | 8 days  | 0.37 | E Williams | 1998 DM <sub>17</sub> |
| 1998 DN <sub>17</sub> | 14.5 | 0.15 | 19980216 | 58.27826  | 256.39232 | 163.86507 | 11.82048 | 0.1945088 | 2.7225875 | 8  | 1 | 8 days  | 0.05 | Williams   | 1998 DN <sub>17</sub> |
| 1998 DO <sub>17</sub> | 16.5 | 0.15 | 19980216 | 101.67582 | 203.63908 | 183.87843 | 6.24744  | 0.1094183 | 2.2453220 | 9  | 1 | 8 days  | 0.15 | Williams   | 1998 DO <sub>17</sub> |
| 1998 DU <sub>17</sub> | 16.5 | 0.15 | 19980216 | 103.33805 | 355.67171 | 48.69618  | 3.28927  | 0.2409056 | 2.7136411 | 8  | 1 | 9 days  | 0.19 | Williams   | 1998 DU <sub>17</sub> |
| 1998 DD <sub>18</sub> | 16.0 | 0.15 | 19980216 | 239.60419 | 166.59406 | 141.47923 | 6.20272  | 0.1836312 | 2.2656649 | 8  | 1 | 8 days  | 0.11 | Williams   | 1998 DD <sub>18</sub> |
| 1998 DF <sub>18</sub> | 18.0 | 0.15 | 19980216 | 334.95651 | 64.26729  | 134.40298 | 4.79822  | 0.0976188 | 2.2039268 | 8  | 1 | 8 days  | 0.12 | Williams   | 1998 DF <sub>18</sub> |
| 1998 DX <sub>18</sub> | 16.5 | 0.15 | 19980216 | 331.36581 | 176.93791 | 9.67715   | 2.51994  | 0.0922776 | 2.7799966 | 9  | 1 | 8 days  | 0.19 | Williams   | 1998 DX <sub>18</sub> |
| 1998 DA <sub>19</sub> | 17.0 | 0.15 | 19980216 | 71.12604  | 50.99452  | 11.37746  | 2.59923  | 0.1674367 | 2.6266020 | 9  | 1 | 8 days  | 0.18 | Williams   | 1998 DA <sub>19</sub> |
| 1998 DE <sub>19</sub> | 18.0 | 0.15 | 19980216 | 67.59801  | 300.44608 | 123.94568 | 3.03412  | 0.1854037 | 2.4586662 | 9  | 1 | 8 days  | 0.15 | Williams   | 1998 DE <sub>19</sub> |
| 1998 DG <sub>19</sub> | 15.0 | 0.15 | 19980216 | 119.11261 | 271.63478 | 119.15447 | 3.30079  | 0.0403886 | 2.7756671 | 9  | 1 | 8 days  | 0.50 | E Williams | 1998 DG <sub>19</sub> |
| 1998 DH <sub>19</sub> | 17.0 | 0.15 | 19980216 | 203.80333 | 321.17837 | 353.96923 | 6.52847  | 0.1243208 | 2.3579215 | 9  | 1 | 8 days  | 0.16 | Williams   | 1998 DH <sub>19</sub> |
| 1998 DJ <sub>19</sub> | 17.5 | 0.15 | 19980216 | 66.88520  | 81.39974  | 353.95773 | 6.46298  | 0.1014450 | 2.3721143 | 8  | 1 | 8 days  | 0.29 | Williams   | 1998 DJ <sub>19</sub> |
| 1998 DT <sub>19</sub> | 16.0 | 0.15 | 19980216 | 19.17262  | 140.51491 | 2.63941   | 17.51286 | 0.1657825 | 3.1189344 | 9  | 1 | 6 days  | 0.36 | Williams   | 1998 DT <sub>19</sub> |
| 1998 DU <sub>19</sub> | 16.5 | 0.15 | 19980216 | 93.95797  | 36.18785  | 16.34571  | 9.28306  | 0.2397203 | 2.5351988 | 9  | 1 | 6 days  | 0.17 | E Williams | 1998 DU <sub>19</sub> |
| 1998 DB <sub>20</sub> | 14.5 | 0.15 | 19980216 | 167.00977 | 186.54146 | 137.83158 | 7.34915  | 0.2521849 | 2.2698130 | 12 | 1 | 3 days  | 0.19 | E Williams | 1998 DB <sub>20</sub> |
| 1998 DF <sub>20</sub> | 14.5 | 0.15 | 19980216 | 110.75831 | 233.93419 | 169.36319 | 13.41891 | 0.1669115 | 2.6476948 | 15 | 1 | 10 days | 0.62 | Williams   | 1998 DF <sub>20</sub> |
| 1998 DG <sub>20</sub> | 14.0 | 0.15 | 19980216 | 294.72352 | 164.15817 | 95.44366  | 8.54013  | 0.1073455 | 2.4736835 | 15 | 1 | 7 days  | 0.30 | Williams   | 1998 DG <sub>20</sub> |
| 1998 DJ <sub>20</sub> | 14.5 | 0.15 | 19980216 | 251.64076 | 277.65805 | 357.44124 | 5.70941  | 0.1131635 | 2.2320909 | 12 | 1 | 4 days  | 0.58 | E Williams | 1998 DJ <sub>20</sub> |
| 1998 DK <sub>20</sub> | 15.0 | 0.15 | 19980216 | 36.39878  | 72.03852  | 29.42859  | 2.24195  | 0.1966633 | 2.4050058 | 9  | 1 | 4 days  | 0.41 | Williams   | 1998 DK <sub>20</sub> |
| 1998 DN <sub>20</sub> | 12.5 | 0.15 | 19980216 | 108.40711 | 273.30320 | 123.50200 | 12.16806 | 0.2854737 | 2.6338457 | 10 | 1 | 9 days  | 0.37 | Williams   | 1998 DN <sub>20</sub> |
| 1998 DO <sub>20</sub> | 14.0 | 0.15 | 19980216 | 2.13626   | 172.02451 | 333.12724 | 13.22053 | 0.0249910 | 2.6333731 | 10 | 1 | 6 days  | 0.40 | E Williams | 1998 DO <sub>20</sub> |
| 1998 DP <sub>20</sub> | 13.5 | 0.15 | 19980216 | 17.52898  | 284.79602 | 130.39277 | 2.10532  | 0.2289401 | 2.5391251 | 12 | 1 | 6 days  | 0.25 | Williams   | 1998 DP <sub>20</sub> |
| 1998 DS <sub>20</sub> | 15.0 | 0.15 | 19980216 | 340.05885 | 26.52727  | 175.38366 | 14.95578 | 0.1269315 | 3.1968486 | 6  | 1 | 4 days  | 0.10 | Marsden    | 1998 DS <sub>20</sub> |
| 1998 DV <sub>20</sub> | 20.5 | 0.15 | 19980216 | 23.70898  | 261.30727 | 150.82346 | 19.65291 | 0.6069515 | 1.9770214 | 11 | 1 | 10 days | 0.52 | Williams   | 1998 DV <sub>20</sub> |
| 1998 DD <sub>21</sub> | 17.0 | 0.15 | 19980216 | 242.24313 | 149.77150 | 130.41132 | 2.74357  | 0.0956306 | 2.5161965 | 9  | 1 | 8 days  | 0.15 | E Williams | 1998 DD <sub>21</sub> |
| 1998 DP <sub>21</sub> | 17.5 | 0.15 | 19980216 | 72.01960  | 302.00913 | 130.77491 | 3.50077  | 0.0832530 | 2.7257582 | 9  | 1 | 8 days  | 0.31 | E Williams | 1998 DP <sub>21</sub> |
| 1998 DY <sub>21</sub> | 17.0 | 0.15 | 19980216 | 346.68371 | 186.53577 | 346.88566 | 8.20689  | 0.1833359 | 2.7387341 | 9  | 1 | 11 days | 0.14 | Williams   | 1998 DY <sub>21</sub> |
| 1998 DA <sub>22</sub> | 16.0 | 0.15 | 19980216 | 175.99333 | 185.91993 | 150.39604 | 13.95150 | 0.2438702 | 2.5649897 | 8  | 1 | 8 days  | 0.20 | E Williams | 1998 DA <sub>22</sub> |
| 1998 DF <sub>22</sub> | 15.0 | 0.15 | 19980216 | 77.58107  | 63.01094  | 359.48446 | 3.23240  | 0.1153105 | 2.7032617 | 9  | 1 | 7 days  | 0.24 | E Williams | 1998 DF <sub>22</sub> |
| 1998 DP <sub>22</sub> | 16.0 | 0.15 | 19980216 | 72.83561  | 82.35948  | 317.82725 | 10.67618 | 0.2257871 | 2.7053831 | 9  | 1 | 8 days  | 0.31 | Williams   | 1998 DP <sub>22</sub> |
| 1998 DQ <sub>22</sub> | 16.0 | 0.15 | 19980216 | 296.06175 | 257.19389 | 310.27849 | 2.79404  | 0.0406595 | 2.5968230 | 9  | 1 | 8 days  | 0.14 | Williams   | 1998 DQ <sub>22</sub> |
| 1998 DR <sub>22</sub> | 17.5 | 0.15 | 19980216 | 12.63947  | 161.51531 | 320.32642 | 8.78468  | 0.1669531 | 2.7654660 | 9  | 1 | 8 days  | 0.24 | Williams   | 1998 DR <sub>22</sub> |
| 1998 DT <sub>22</sub> | 16.5 | 0.15 | 19980216 | 207.87190 | 338.94000 | 317.93386 | 6.11169  | 0.1121624 | 2.3993686 | 9  | 1 | 8 days  | 0.50 | Williams   | 1998 DT <sub>22</sub> |
| 1998 DV <sub>22</sub> | 16.5 | 0.15 | 19980216 | 262.80009 | 332.94274 | 284.04088 | 0.44834  | 0.1835257 | 2.5162575 | 8  | 1 | 6 days  | 0.27 | E Williams | 1998 DV <sub>22</sub> |
| 1998 DW <sub>22</sub> | 16.0 | 0.15 | 19980216 | 96.54592  | 58.60831  | 319.31154 | 7.17102  | 0.2391249 | 2.5645165 | 9  | 1 | 8 days  | 0.12 | Williams   | 1998 DW <sub>22</sub> |
| 1998 DZ <sub>22</sub> | 14.5 | 0.15 | 19980127 | 49.90392  | 119.92309 | 322.29320 | 8.47604  | 0.0480576 | 2.9752675 | 12 | 1 | 35 days | 0.10 | Williams   | 1998 DZ <sub>22</sub> |
| 1998 DB <sub>23</sub> | 15.0 | 0.15 | 19980216 | 111.49431 | 50.45364  | 323.64275 | 13.43813 | 0.1577386 | 2.6456061 | 9  | 1 | 8 days  | 0.13 | Williams   | 1998 DB <sub>23</sub> |
| 1998 DD <sub>23</sub> | 16.0 | 0.15 | 19980216 | 120.65488 | 49.08045  | 326.76440 | 3.00907  | 0.0505799 | 2.7652811 | 9  | 1 | 8 days  | 0.17 | E Williams | 1998 DD <sub>23</sub> |

|                       |      |      |          |           |           |           |          |           |           |     |   |           |      |     |          |                       |                |
|-----------------------|------|------|----------|-----------|-----------|-----------|----------|-----------|-----------|-----|---|-----------|------|-----|----------|-----------------------|----------------|
| 1998 DF <sub>23</sub> | 17.5 | 0.15 | 19980216 | 291.07743 | 94.79834  | 139.89626 | 3.24767  | 0.2079121 | 2.6436841 | 9   | 1 | 6 days    | 0.31 | E   | Williams | 1998 DF <sub>23</sub> |                |
| 1998 DG <sub>23</sub> | 16.5 | 0.15 | 19980216 | 26.02081  | 133.31343 | 328.59831 | 5.88490  | 0.2206889 | 2.6143867 | 12  | 1 | 8 days    | 0.34 |     | Williams | 1998 DG <sub>23</sub> |                |
| 1998 DH <sub>23</sub> | 17.5 | 0.15 | 19980216 | 290.11910 | 238.05807 | 336.57243 | 1.64130  | 0.0259000 | 2.5924670 | 9   | 1 | 6 days    | 0.28 | E   | Williams | 1998 DH <sub>23</sub> |                |
| 1998 DK <sub>23</sub> | 14.0 | 0.15 | 19980127 | 292.32055 | 263.02044 | 320.37358 | 9.02536  | 0.2108454 | 2.7513502 | 18  | 1 | 40 days   | 0.39 |     | Williams | 1998 DK <sub>23</sub> |                |
| 1998 DL <sub>23</sub> | 16.0 | 0.15 | 19980216 | 349.82724 | 223.75484 | 302.03722 | 5.42006  | 0.1332030 | 2.6897498 | 9   | 1 | 3 days    | 0.45 | E   | Williams | 1998 DL <sub>23</sub> |                |
| 1998 DM <sub>23</sub> | 15.5 | 0.15 | 19980216 | 297.98495 | 278.40452 | 297.43697 | 5.22601  | 0.1565290 | 2.5378215 | 11  | 1 | 7 days    | 0.55 |     | Williams | 1998 DM <sub>23</sub> |                |
| 1998 DN <sub>23</sub> | 17.0 | 0.15 | 19980216 | 331.83456 | 41.95631  | 184.99761 | 2.56223  | 0.2261031 | 2.3230836 | 9   | 1 | 4 days    | 0.14 |     | Williams | 1998 DN <sub>23</sub> |                |
| 1998 DO <sub>23</sub> | 16.5 | 0.15 | 19980216 | 112.22483 | 54.21529  | 10.39738  | 19.87947 | 0.0857486 | 1.9178038 | 12  | 1 | 7 days    | 0.19 |     | Williams | 1998 DO <sub>23</sub> |                |
| 1998 DP <sub>23</sub> | 14.0 | 0.15 | 19980216 | 199.91558 | 340.57328 | 317.05310 | 10.35129 | 0.0954509 | 3.0259531 | 9   | 1 | 3 days    | 0.24 | E   | Williams | 1998 DP <sub>23</sub> |                |
| 1998 DQ <sub>23</sub> | 17.0 | 0.15 | 19980216 | 83.44559  | 84.03072  | 10.25291  | 21.54228 | 0.0560661 | 1.8950090 | 9   | 1 | 3 days    | 0.17 |     | Williams | 1998 DQ <sub>23</sub> |                |
| 1998 DY <sub>23</sub> | 14.5 | 0.15 | 19980216 | 305.76682 | 55.73618  | 145.13332 | 10.88026 | 0.0854093 | 3.0156904 | 7   | 1 | 11 days   | 0.33 |     | Marsden  | 1998 DY <sub>23</sub> |                |
| 1998 DZ <sub>23</sub> | 14.0 | 0.15 | 19980127 | 15.23129  | 275.79376 | 207.31164 | 8.05408  | 0.1857468 | 2.7924864 | 9   | 1 | 36 days   | 0.66 |     | Williams | 1998 DZ <sub>23</sub> |                |
| 1998 DA <sub>24</sub> | 13.3 | 0.15 | 19980308 | 354.03326 | 337.59150 | 189.79683 | 11.31351 | 0.1483544 | 2.6186323 | 10  | 1 | 17 days   | 0.26 |     | Nakano   | 1998 DA <sub>24</sub> |                |
| 1998 DB <sub>24</sub> | 15.3 | 0.15 | 19980308 | 275.43389 | 297.79033 | 314.09527 | 17.13336 | 0.0563544 | 1.9605757 | 10  | 1 | 17 days   | 0.39 |     | Nakano   | 1998 DB <sub>24</sub> |                |
| 1998 DG <sub>24</sub> | 16.5 | 0.15 | 19980216 | 264.23616 | 123.87681 | 144.16938 | 5.98440  | 0.1776656 | 2.3712243 | 9   | 1 | 10 days   | 0.19 |     | Williams | 1998 DG <sub>24</sub> |                |
| 1998 DH <sub>24</sub> | 15.0 | 0.15 | 19980216 | 114.56660 | 239.20590 | 147.94864 | 10.89804 | 0.1275482 | 2.7325106 | 9   | 1 | 10 days   | 0.13 |     | Williams | 1998 DH <sub>24</sub> |                |
| 1998 DJ <sub>24</sub> | 15.0 | 0.15 | 19980216 | 67.96146  | 277.12604 | 150.02155 | 13.38037 | 0.1665920 | 2.5623417 | 9   | 1 | 10 days   | 0.23 |     | Williams | 1998 DJ <sub>24</sub> |                |
| 1998 DM <sub>24</sub> | 15.0 | 0.15 | 19980216 | 92.41580  | 256.50258 | 145.04754 | 8.67235  | 0.1873892 | 2.5598919 | 9   | 1 | 10 days   | 0.09 |     | Williams | 1998 DM <sub>24</sub> |                |
| 1998 DN <sub>24</sub> | 16.5 | 0.15 | 19980216 | 98.26944  | 254.46540 | 146.21258 | 10.35832 | 0.1494446 | 2.6082372 | 9   | 1 | 10 days   | 0.16 |     | Williams | 1998 DN <sub>24</sub> |                |
| 1998 DS <sub>25</sub> | 15.5 | 0.15 | 19980216 | 171.30167 | 244.84060 | 96.09841  | 2.48164  | 0.2211637 | 2.4138081 | 9   | 1 | 9 days    | 0.08 |     | Williams | 1998 DS <sub>25</sub> |                |
| 1998 DZ <sub>25</sub> | 17.0 | 0.15 | 19980216 | 149.95756 | 335.29472 | 22.76529  | 3.23793  | 0.1493998 | 2.6911089 | 9   | 1 | 9 days    | 0.13 |     | Williams | 1998 DZ <sub>25</sub> |                |
| 1998 DD <sub>26</sub> | 16.5 | 0.15 | 19980216 | 173.53396 | 229.33797 | 111.82349 | 3.26113  | 0.0774007 | 2.8664985 | 9   | 1 | 9 days    | 0.17 |     | Williams | 1998 DD <sub>26</sub> |                |
| 1998 DO <sub>27</sub> | 15.5 | 0.15 | 19980216 | 327.51948 | 82.80963  | 110.82915 | 2.85738  | 0.0993704 | 2.6502361 | 10  | 1 | 4 days    | 0.45 |     | Williams | 1998 DO <sub>27</sub> |                |
| 1998 DB <sub>28</sub> | 16.5 | 0.15 | 19980216 | 24.74711  | 240.81303 | 224.38370 | 4.26377  | 0.1661701 | 2.3040053 | 9   | 1 | 8 days    | 0.18 |     | Williams | 1998 DB <sub>28</sub> |                |
| 1998 DH <sub>28</sub> | 16.5 | 0.15 | 19980216 | 96.54507  | 278.60501 | 142.99420 | 4.91150  | 0.0917774 | 2.2460679 | 7   | 1 | 8 days    | 0.09 |     | Williams | 1998 DH <sub>28</sub> |                |
| 1998 DC <sub>30</sub> | 16.5 | 0.15 | 19980216 | 241.76968 | 92.26097  | 185.86144 | 6.93844  | 0.2562374 | 2.2063133 | 18  | 1 | 10 days   | 0.37 |     | Williams | 1998 DC <sub>30</sub> |                |
| 1998 DO <sub>31</sub> | 15.0 | 0.15 | 19980216 | 32.24351  | 111.07737 | 345.92569 | 11.81928 | 0.1634408 | 2.6279117 | 9   | 1 | 7 days    | 0.19 |     | Williams | 1998 DO <sub>31</sub> |                |
| 1998 DW <sub>31</sub> | 15.8 | 0.15 | 19980216 | 29.06247  | 165.10410 | 313.87997 | 5.64721  | 0.1547848 | 2.2739512 | 7   | 1 | 5 days    | 0.97 |     | Nakano   | 1998 DW <sub>31</sub> |                |
| 1998 DE <sub>32</sub> | 15.0 | 0.15 | 19980216 | 336.94127 | 4.67320   | 178.74121 | 3.42604  | 0.0899684 | 2.7058625 | 9   | 1 | 9 days    | 0.22 |     | Williams | 1998 DE <sub>32</sub> |                |
| 1998 DG <sub>32</sub> | 14.0 | 0.15 | 19980216 | 346.62161 | 227.29558 | 235.97933 | 4.96699  | 0.2727848 | 3.0066460 | 13  | 1 | 11 days   | 0.43 |     | Williams | 1998 DG <sub>32</sub> |                |
| 1998 DJ <sub>32</sub> | 13.5 | 0.15 | 19980216 | 337.01174 | 265.27579 | 196.32592 | 1.97312  | 0.0366121 | 2.7325850 | 9   | 1 | 5 days    | 0.18 | E   | Williams | 1998 DJ <sub>32</sub> |                |
| 1998 EC               | 12.1 | 0.15 | 19980308 | 175.41348 | 253.30082 | 98.37901  | 16.81501 | 0.2039639 | 2.5438623 | 6   | 1 | 7 days    | 0.44 |     | Nakano   | 1998 EC               |                |
| 1998 ED               | 14.5 | 0.15 | 19980216 | 248.98836 | 266.05812 | 33.22892  | 13.43459 | 0.1869314 | 2.5553837 | 9   | 1 | 10 days   | 0.28 |     | Williams | 1998 ED               |                |
| 1998 EE               | 13.0 | 0.15 | 19980216 | 258.56450 | 223.57960 | 53.51203  | 10.63248 | 0.0397112 | 3.0065224 | 9   | 1 | 10 days   | 0.40 | E   | Williams | 1998 EE               |                |
| 1998 EY <sub>2</sub>  | 13.5 | 0.15 | 19980216 | 226.30139 | 277.10650 | 21.36743  | 7.64609  | 0.1863913 | 2.2819140 | 9   | 1 | 7 days    | 0.29 |     | Williams | 1998 EY <sub>2</sub>  |                |
| 1998 EA <sub>3</sub>  | 16.5 | 0.15 | 19980216 | 18.12487  | 67.91405  | 56.88068  | 5.03439  | 0.1853687 | 2.5469331 | 12  | 1 | 6 days    | 0.44 |     | Williams | 1998 EA <sub>3</sub>  |                |
| 1998 EC <sub>3</sub>  | 16.5 | 0.15 | 19980216 | 314.93451 | 128.48168 | 128.74315 | 8.52574  | 0.5147446 | 2.1360610 | 114 | 1 | 7 days    | 0.59 |     | Williams | 1998 EC <sub>3</sub>  |                |
| 1998 ED <sub>3</sub>  | 14.0 | 0.15 | 19980216 | 40.63211  | 26.02031  | 104.69066 | 7.05087  | 0.1362680 | 2.5630226 | 8   | 1 | 2 days    | 0.10 |     | Marsden  | 1998 ED <sub>3</sub>  |                |
| 1998 EE <sub>3</sub>  | 27.0 | 0.15 | 19980216 | 345.68500 | 224.59790 | 341.18898 | 6.28238  | 0.5881696 | 2.2111189 | 12  | 1 | 3 days    | 0.79 |     | Williams | 1998 EE <sub>3</sub>  |                |
| 1998 ES <sub>3</sub>  | 13.5 | 0.15 | 19980216 | 331.38735 | 185.30292 | 21.23804  | 13.50758 | 0.0978091 | 2.6154480 | 9   | 1 | 8 days    | 0.26 | E   | Williams | 1998 ES <sub>3</sub>  |                |
| 1998 ET <sub>3</sub>  | 15.5 | 0.15 | 19980216 | 301.45846 | 134.44014 | 114.82174 | 7.18844  | 0.1900499 | 2.2772612 | 9   | 1 | 8 days    | 0.24 |     | Williams | 1998 ET <sub>3</sub>  |                |
| 1998 EU <sub>3</sub>  | 16.2 | 0.15 | 19980308 | 9.10505   | 112.31609 | 46.36909  | 4.90504  | 0.2234905 | 1.9277590 | 9   | 1 | 5 days    | 0.27 |     | Nakano   | 1998 EU <sub>3</sub>  |                |
| 1998 EP <sub>4</sub>  | 21.5 | 0.15 | 19980216 | 310.16148 | 265.97172 | 353.15402 | 7.27416  | 0.4454086 | 1.5711927 | 15  | 1 | 3 days    | 0.34 |     | Williams | 1998 EP <sub>4</sub>  |                |
| 1998 EL <sub>5</sub>  | 15.0 | 0.15 | 19980216 | 85.92071  | 328.93541 | 127.34246 | 7.13021  | 0.0549459 | 2.3479208 | 9   | 1 | 4 days    | 0.07 |     | Williams | 1998 EL <sub>5</sub>  |                |
| 1998 EN <sub>5</sub>  | 16.5 | 0.15 | 19980216 | 273.80076 | 174.14180 | 105.49124 | 6.61855  | 0.0530156 | 2.1871170 | 9   | 1 | 4 days    | 0.19 | E   | Williams | 1998 EN <sub>5</sub>  |                |
| 1998 EF <sub>6</sub>  | 13.9 | 0.15 | 19980308 | 296.37128 | 282.96516 | 323.72027 | 23.46961 | 0.2201077 | 2.3150305 | 9   | 1 | 5 days    | 0.49 | E   | Nakano   | 1998 EF <sub>6</sub>  |                |
| 1998 EW <sub>7</sub>  | 15.5 | 0.15 | 19980216 | 27.11297  | 281.30960 | 198.44751 | 4.49928  | 0.1516022 | 2.4154547 | 9   | 1 | 6 days    | 0.23 |     | Williams | 1998 EW <sub>7</sub>  |                |
| 1998 EX <sub>7</sub>  | 14.0 | 0.15 | 19980216 | 84.11713  | 164.97212 | 250.76071 | 2.99437  | 0.1538389 | 2.2792740 | 9   | 1 | 6 days    | 0.14 |     | Williams | 1998 EX <sub>7</sub>  |                |
| 1998 EC <sub>8</sub>  | 13.5 | 0.15 | 19980216 | 261.93268 | 136.90933 | 137.07544 | 3.39021  | 0.0106930 | 2.9130277 | 9   | 1 | 6 days    | 0.28 | E   | Williams | 1998 EC <sub>8</sub>  |                |
| 1998 ED <sub>8</sub>  | 13.5 | 0.15 | 19980216 | 48.43203  | 354.07947 | 127.60812 | 2.62222  | 0.0366760 | 2.6896391 | 12  | 1 | 6 days    | 0.25 |     | Williams | 1998 ED <sub>8</sub>  |                |
| 1998 EP <sub>8</sub>  | 19.0 | 0.15 | 19980216 | 96.76433  | 228.25994 | 169.86441 | 18.86519 | 0.2295748 | 1.6785968 | 12  | 1 | 5 days    | 0.30 |     | Williams | 1998 EP <sub>8</sub>  |                |
| 2508 P-L              | 15.5 | 0.15 | 19971218 | 167.59718 | 350.92671 | 10.19656  | 6.37736  | 0.2498931 | 2.3320702 | 17  | 4 | 1951–1998 | 0.64 | M-v | 3        | Williams              | 22495 2508 P-L |
| 2563 P-L              | 12.5 | 0.15 | 19971218 | 276.53332 | 112.65962 | 150.44617 | 1.72334  | 0.1402962 | 3.2041005 | 37  | 8 | 1954–1998 | 0.80 | M-v | 1        | Williams              | 28891 2563 P-L |

|          |      |      |          |           |           |           |          |           |           |    |   |           |      |     |   |          |       |          |
|----------|------|------|----------|-----------|-----------|-----------|----------|-----------|-----------|----|---|-----------|------|-----|---|----------|-------|----------|
| 2604 P-L | 14.5 | 0.15 | 19971218 | 278.59864 | 226.40566 | 8.12523   | 3.04115  | 0.1899591 | 2.3327154 | 33 | 6 | 1950-1998 | 0.86 | M-v | 2 | Williams | 28619 | 2604 P-L |
| 2665 P-L | 16.5 | 0.15 | 19971218 | 221.45684 | 160.38526 | 171.14996 | 3.95706  | 0.2580301 | 2.4755020 | 17 | 2 | 1960-1995 | 0.85 | M-v | 5 | Williams | 25969 | 2665 P-L |
| 2763 P-L | 15.0 | 0.15 | 19971218 | 56.10660  | 343.97308 | 98.10083  | 2.07638  | 0.0591998 | 2.9530304 | 17 | 3 | 1960-1998 | 0.47 | M-v | 4 | Williams | 20514 | 2763 P-L |
| 3078 P-L | 14.5 | 0.15 | 19971218 | 308.54265 | 245.86945 | 295.29498 | 5.22167  | 0.0935557 | 2.3496633 | 24 | 5 | 1950-1998 | 0.62 | M-v | 2 | Williams | 30914 | 3078 P-L |
| 4014 P-L | 14.5 | 0.15 | 19971218 | 75.89318  | 68.30295  | 344.41290 | 5.95261  | 0.1413600 | 2.2126213 | 16 | 4 | 1960-1998 | 0.55 | M-v | 2 | Williams | 22821 | 4014 P-L |
| 4030 P-L | 13.5 | 0.15 | 19971218 | 76.95971  | 68.36160  | 292.71500 | 2.74968  | 0.0924291 | 2.7415818 | 26 | 5 | 1960-1998 | 0.63 | M-v | 2 | Williams | 29141 | 4030 P-L |
| 4068 P-L | 14.5 | 0.15 | 19971218 | 109.02508 | 51.73381  | 340.46826 | 3.18987  | 0.0714774 | 2.2057958 | 37 | 4 | 1960-1998 | 0.82 | M-v | 1 | Williams | 22971 | 4068 P-L |
| 4087 P-L | 15.0 | 0.15 | 19971218 | 46.99079  | 155.44978 | 2.93212   | 2.03017  | 0.1141859 | 2.4805793 | 36 | 5 | 1960-1997 | 0.74 | M-v | 1 | Williams | 28892 | 4087 P-L |
| 4152 P-L | 13.0 | 0.15 | 19971218 | 231.53477 | 99.00529  | 190.15745 | 12.76516 | 0.2268303 | 2.9102922 | 22 | 4 | 1960-1998 | 0.52 | M-v | 1 | Williams | 26423 | 4152 P-L |
| 4545 P-L | 13.5 | 0.15 | 19971218 | 211.24410 | 81.54456  | 199.35568 | 1.38110  | 0.0279145 | 2.9464881 | 23 | 3 | 1960-1998 | 0.38 | M-v | 4 | Marsden  | 31294 | 4545 P-L |
| 6055 P-L | 16.5 | 0.15 | 19971218 | 81.48826  | 76.78581  | 327.29161 | 1.87275  | 0.2131914 | 2.3551927 | 40 | 5 | 1960-1998 | 0.49 | M-v | 1 | Williams | 27732 | 6055 P-L |
| 6114 P-L | 14.0 | 0.15 | 19971218 | 295.57184 | 222.79718 | 348.51665 | 12.82583 | 0.1428992 | 2.6919723 | 33 | 3 | 1960-1998 | 0.46 | M-v | 3 | Williams | 31294 | 6114 P-L |
| 6543 P-L | 13.0 | 0.15 | 19971218 | 227.86179 | 250.34472 | 82.28425  | 2.08994  | 0.1745602 | 3.1724044 | 39 | 7 | 1954-1998 | 0.64 | M-v | 1 | Williams | 29321 | 6543 P-L |
| 6584 P-L | 14.0 | 0.15 | 19971218 | 318.11912 | 167.17657 | 29.97431  | 3.40263  | 0.0316897 | 2.6909556 | 19 | 3 | 1960-1998 | 0.56 | M-v | 4 | Williams | 23986 | 6584 P-L |
| 6673 P-L | 12.5 | 0.15 | 19971218 | 94.01089  | 212.62063 | 170.20591 | 21.99278 | 0.0211524 | 3.2601043 | 10 | 3 | 1960-1997 | 0.43 | M-v | 4 | Williams | 31294 | 6673 P-L |
| 7607 P-L | 15.5 | 0.15 | 19971218 | 39.49234  | 340.58238 | 99.40990  | 3.40677  | 0.2060359 | 2.3617389 | 12 | 3 | 1960-1998 | 0.75 | M-v | 4 | Williams | 22274 | 7607 P-L |
| 9057 P-L | 15.0 | 0.15 | 19971218 | 291.83267 | 270.45473 | 312.91990 | 3.28017  | 0.1086254 | 2.3321829 | 26 | 4 | 1960-1998 | 0.61 | M-v | 3 | Williams | 28620 | 9057 P-L |
| 1188 T-1 | 14.0 | 0.15 | 19971218 | 284.25307 | 240.77403 | 350.84293 | 6.19746  | 0.1314471 | 2.2557683 | 25 | 4 | 1971-1998 | 0.63 | M-v | 1 | Williams | 28620 | 1188 T-1 |
| 1198 T-1 | 14.5 | 0.15 | 19971218 | 355.84509 | 198.04969 | 314.32768 | 4.05917  | 0.1138812 | 3.0920477 | 22 | 3 | 1971-1998 | 0.87 | M-v | 4 | Williams | 19878 | 1198 T-1 |
| 2149 T-1 | 12.5 | 0.15 | 19971218 | 20.74959  | 99.85335  | 4.18944   | 7.30158  | 0.1002391 | 3.1090484 | 31 | 3 | 1971-1998 | 0.69 | M-v | 4 | Williams | 31294 | 2149 T-1 |
| 2186 T-1 | 12.5 | 0.15 | 19971218 | 351.89971 | 143.15609 | 6.17200   | 12.61980 | 0.1174134 | 3.0970074 | 18 | 4 | 1955-1997 | 0.67 | M-v | 2 | Williams | 31268 | 2186 T-1 |
| 2245 T-1 | 14.5 | 0.15 | 19971218 | 64.31651  | 9.02680   | 68.14300  | 3.35406  | 0.1483095 | 2.4589751 | 30 | 6 | 1950-1998 | 0.89 | M-v | 1 | Williams | 28892 | 2245 T-1 |
| 3196 T-1 | 13.0 | 0.15 | 19971218 | 303.82139 | 315.26650 | 242.54329 | 1.82769  | 0.1497463 | 2.7481552 | 29 | 7 | 1955-1998 | 0.77 | M-v | 1 | Williams | 23791 | 3196 T-1 |
| 3233 T-1 | 14.5 | 0.15 | 19971218 | 24.15899  | 91.44052  | 3.85525   | 7.32098  | 0.1343504 | 2.7529777 | 30 | 5 | 1971-1998 | 0.82 | M-v | 1 | Williams | 31294 | 3233 T-1 |
| 3286 T-1 | 14.5 | 0.15 | 19971218 | 11.31922  | 128.82358 | 6.97341   | 13.20131 | 0.1243801 | 2.7341914 | 36 | 3 | 1971-1998 | 1.12 | M-v | 4 | Williams | 21602 | 3286 T-1 |
| 3297 T-1 | 13.5 | 0.15 | 19971218 | 305.54750 | 24.16131  | 179.20178 | 2.06705  | 0.1302659 | 3.1099623 | 32 | 3 | 1971-1998 | 1.06 | M-v | 4 | Williams | 31294 | 3297 T-1 |
| 4155 T-1 | 14.0 | 0.15 | 19971218 | 68.33496  | 20.39814  | 72.53491  | 3.04897  | 0.0398938 | 2.7245327 | 25 | 4 | 1971-1998 | 0.75 | M-v | 4 | Williams | 29668 | 4155 T-1 |
| 4194 T-1 | 14.5 | 0.15 | 19971218 | 150.65513 | 164.24642 | 160.43451 | 6.64654  | 0.1177551 | 2.2779612 | 27 | 3 | 1971-1998 | 0.99 | M-v | 4 | Williams | 31268 | 4194 T-1 |
| 4283 T-1 | 14.5 | 0.15 | 19971218 | 61.74402  | 46.94074  | 28.27268  | 7.80349  | 0.1073623 | 2.2549561 | 16 | 4 | 1971-1998 | 1.02 | M-v | 2 | Williams | 22972 | 4283 T-1 |
| 1052 T-2 | 14.5 | 0.15 | 19971218 | 203.19221 | 280.03524 | 2.62895   | 0.71661  | 0.1506221 | 3.1266063 | 22 | 2 | 1973-1995 | 0.88 | M-v | 5 | Williams | 25970 | 1052 T-2 |
| 1079 T-2 | 13.5 | 0.15 | 19971218 | 177.95767 | 311.00584 | 7.07775   | 1.87405  | 0.1306509 | 2.7210666 | 33 | 6 | 1951-1998 | 0.74 | M-v | 2 | Williams | 29668 | 1079 T-2 |
| 1152 T-2 | 14.5 | 0.15 | 19971218 | 224.76305 | 275.48768 | 13.48216  | 4.88715  | 0.1951299 | 2.4099293 | 31 | 3 | 1973-1998 | 1.03 | M-v | 3 | Williams | 21808 | 1152 T-2 |
| 1175 T-2 | 15.5 | 0.15 | 19971218 | 312.03379 | 337.05002 | 226.39261 | 0.80699  | 0.1359861 | 2.4198482 | 24 | 3 | 1973-1998 | 0.91 | M-v | 5 | Williams | 28620 | 1175 T-2 |
| 1279 T-2 | 15.5 | 0.15 | 19971218 | 70.96172  | 213.78210 | 173.53743 | 1.32625  | 0.1665353 | 2.2367258 | 35 | 3 | 1973-1998 | 0.90 | M-v | 4 | Williams | 31294 | 1279 T-2 |
| 1298 T-2 | 15.0 | 0.15 | 19971218 | 349.52241 | 322.17691 | 171.57628 | 5.40475  | 0.0717137 | 2.2223363 | 42 | 5 | 1973-1998 | 0.77 | M-v | 2 | Williams | 31294 | 1298 T-2 |
| 1304 T-2 | 13.0 | 0.15 | 19971218 | 176.38596 | 144.99648 | 228.35156 | 1.08144  | 0.1458340 | 3.0639350 | 40 | 4 | 1973-1998 | 0.93 | M-v | 2 | Williams | 22087 | 1304 T-2 |
| 1324 T-2 | 14.0 | 0.15 | 19971218 | 324.99543 | 248.70531 | 19.99068  | 4.91424  | 0.1282548 | 2.3605245 | 40 | 6 | 1954-1997 | 0.93 | M-v | 1 | Williams | 29142 | 1324 T-2 |
| 1335 T-2 | 14.0 | 0.15 | 19971218 | 56.44412  | 283.71691 | 177.84460 | 0.65423  | 0.1492309 | 3.1242794 | 35 | 5 | 1973-1995 | 0.99 | M-v | 1 | Marsden  | 26193 | 1335 T-2 |
| 2045 T-2 | 12.5 | 0.15 | 19971218 | 264.74789 | 260.34167 | 3.79419   | 12.65185 | 0.1526834 | 2.6869396 | 39 | 5 | 1973-1998 | 0.96 | M-v | 2 | Williams | 27939 | 2045 T-2 |
| 2076 T-2 | 16.0 | 0.15 | 19971218 | 352.81821 | 60.59663  | 180.80990 | 2.96063  | 0.1022716 | 2.1538429 | 34 | 4 | 1973-1996 | 0.92 | M-v | 2 | Williams | 29321 | 2076 T-2 |
| 2097 T-2 | 15.5 | 0.15 | 19971218 | 59.15543  | 161.27601 | 350.96011 | 6.75681  | 0.0558918 | 2.3897059 | 33 | 3 | 1973-1997 | 0.90 | M-v | 4 | Williams | 29321 | 2097 T-2 |
| 2200 T-2 | 15.5 | 0.15 | 19971218 | 210.32039 | 308.43808 | 336.37865 | 0.31590  | 0.1221715 | 2.4311374 | 31 | 4 | 1973-1998 | 0.72 | M-v | 1 | Williams | 29314 | 2200 T-2 |
| 2275 T-2 | 13.5 | 0.15 | 19971218 | 17.30753  | 328.06611 | 173.15713 | 2.95827  | 0.2312870 | 3.1385411 | 24 | 2 | 1973-1995 | 0.88 | M-v | 6 | Williams | 30095 | 2275 T-2 |
| 3176 T-2 | 15.0 | 0.15 | 19971218 | 26.10343  | 104.35175 | 25.93045  | 4.16509  | 0.0587272 | 2.4260653 | 32 | 4 | 1973-1998 | 0.91 | M-v | 3 | Williams | 31295 | 3176 T-2 |
| 3270 T-2 | 14.5 | 0.15 | 19971218 | 79.80501  | 65.12421  | 72.69065  | 3.34620  | 0.1365779 | 2.3884281 | 25 | 3 | 1973-1997 | 0.86 | M-v | 4 | Williams | 29321 | 3270 T-2 |
| 3327 T-2 | 13.5 | 0.15 | 19971218 | 52.37412  | 324.02014 | 81.18613  | 3.21434  | 0.1788027 | 3.1913919 | 26 | 5 | 1973-1998 | 0.68 | M-v | 3 | Williams | 31295 | 3327 T-2 |
| 4283 T-2 | 13.5 | 0.15 | 19971218 | 341.92339 | 11.22540  | 111.26203 | 2.49620  | 0.1566807 | 3.1988929 | 34 | 3 | 1973-1998 | 0.62 | M-v | 5 | Williams | 31295 | 4283 T-2 |
| 5061 T-2 | 14.5 | 0.15 | 19971218 | 158.38896 | 27.50584  | 303.88503 | 6.10081  | 0.2367518 | 2.2086800 | 23 | 3 | 1973-1998 | 0.87 | M-v | 4 | Williams | 15258 | 5061 T-2 |
| 1107 T-3 | 13.0 | 0.15 | 19971218 | 96.92383  | 66.54430  | 241.51584 | 13.00804 | 0.1525926 | 2.8848826 | 29 | 3 | 1977-1998 | 0.91 | M-v | 4 | Williams | 31132 | 1107 T-3 |
| 2191 T-3 | 16.0 | 0.15 | 19971218 | 83.74368  | 114.80263 | 343.00371 | 3.93873  | 0.1088569 | 2.7529878 | 20 | 2 | 1977-1995 | 0.91 | M-v | 6 | Williams | 30095 | 2191 T-3 |
| 2480 T-3 | 13.5 | 0.15 | 19971218 | 297.22438 | 236.48446 | 354.16989 | 8.10135  | 0.1300809 | 2.4014142 | 34 | 7 | 1955-1998 | 0.96 | M-v | 2 | Williams | 31295 | 2480 T-3 |
| 3134 T-3 | 15.0 | 0.15 | 19971218 | 190.91499 | 130.46370 | 188.56949 | 3.66772  | 0.1961698 | 2.1485263 | 37 | 7 | 1977-1998 | 0.86 | M-v | 2 | Williams | 29669 | 3134 T-3 |
| 3474 T-3 | 15.0 | 0.15 | 19971218 | 308.65642 | 140.64325 | 59.73615  | 3.21538  | 0.1618129 | 2.4191089 | 21 | 6 | 1953-1998 | 0.86 | M-v | 2 | Williams | 28088 | 3474 T-3 |

1998 MAR. 13

M.P.C. 31437

|          |      |      |          |           |           |           |         |           |           |    |   |           |      |     |   |          |       |          |
|----------|------|------|----------|-----------|-----------|-----------|---------|-----------|-----------|----|---|-----------|------|-----|---|----------|-------|----------|
| 3502 T-3 | 16.5 | 0.15 | 19971218 | 342.74237 | 108.85723 | 45.95433  | 1.64747 | 0.0414028 | 2.1684423 | 16 | 3 | 1977–1998 | 0.71 | M-v | 5 | Williams | 12802 | 3502 T-3 |
| 3526 T-3 | 16.0 | 0.15 | 19971218 | 235.35185 | 272.90898 | 8.05587   | 2.29569 | 0.2066014 | 2.3945161 | 24 | 3 | 1977–1998 | 0.97 | M-v | 5 | Williams | 27939 | 3526 T-3 |
| 5016 T-3 | 13.5 | 0.15 | 19971218 | 336.33820 | 53.09391  | 139.66790 | 9.87175 | 0.1348485 | 2.7549064 | 29 | 9 | 1976–1998 | 0.95 | M-v | 2 | Williams | 21978 | 5016 T-3 |
| 5122 T-3 | 15.0 | 0.15 | 19971218 | 256.71345 | 192.58322 | 112.38754 | 6.94680 | 0.2475313 | 2.3570728 | 25 | 3 | 1977–1998 | 0.82 | M-v | 4 | Williams | 23681 | 5122 T-3 |

1996 FP<sub>1</sub> = 1996 FW<sub>23</sub> (S. Nakano)  
 1996 GU = 1996 GW (S. Nakano)  
 1996 GR<sub>15</sub> = 1996 HW<sub>26</sub> (S. Nakano)  
 1996 HF<sub>14</sub> = 1996 KS<sub>6</sub> (S. Nakano)  
 1996 LO<sub>1</sub> = 1996 MH (S. Nakano)  
 1996 NW<sub>3</sub> = 1996 PV<sub>7</sub> (S. Nakano)  
 1996 OF<sub>2</sub> = 1996 ON<sub>2</sub> (S. Nakano)  
 1996 PB<sub>8</sub> = 1996 NR<sub>3</sub> (S. Nakano)  
 1996 RW<sub>15</sub> = 1996 TW<sub>60</sub> (S. Nakano)  
 1996 RJ<sub>30</sub> = 1996 RC<sub>28</sub> (S. Nakano)  
 1996 TC<sub>7</sub> = 1996 TV<sub>11</sub> (S. Nakano)  
 1996 TG<sub>16</sub> = 1996 UF<sub>2</sub> (S. Nakano)  
 1997 ND<sub>3</sub> = 1997 OS<sub>1</sub> (S. Nakano)  
 1997 RR<sub>5</sub> = 1997 SK<sub>5</sub> (S. Nakano)  
 1997 RD<sub>8</sub> = 1997 RE<sub>6</sub> (S. Nakano)  
 1997 SY<sub>3</sub> = 1997 RT<sub>6</sub> (S. Nakano)  
 1997 SO<sub>33</sub> = 1997 YV<sub>1</sub> (G. V. Williams)  
 1997 YO<sub>8</sub> = 1998 AF<sub>3</sub> (G. V. Williams)  
 1998 CF = 1997 XP<sub>3</sub> (B. G. Marsden)

|            |          |          |        |        |      |     |      |
|------------|----------|----------|--------|--------|------|-----|------|
| 1998 06 06 | 09 23.67 | +17 50.8 | 40.914 | 40.457 | 62.6 | 1.3 | 23.3 |
| 1998 06 16 | 09 24.32 | +17 47.6 | 41.062 | 40.462 | 53.2 | 1.2 | 23.3 |
| 1998 06 26 | 09 25.09 | +17 43.9 | 41.193 | 40.466 | 43.9 | 1.0 | 23.3 |
| 1998 07 06 | 09 25.96 | +17 39.7 | 41.304 | 40.471 | 34.6 | 0.8 | 23.3 |

| 1998 EC <sub>3</sub> |    | $a, e, i = 2.14, 0.51, 9$ |                 |          |       | Elements <i>MPC</i> 31435 |        |
|----------------------|----|---------------------------|-----------------|----------|-------|---------------------------|--------|
| Date                 | TT | $\alpha_{2000}$           | $\delta_{2000}$ | $\Delta$ | $r$   | $\epsilon$                | $\phi$ |
| 1998 03 08           |    | 10 18.40                  | +21 36.1        | 0.718    | 1.682 | 158.8                     | 12.3   |
| 1998 03 13           |    | 10 10.99                  | +23 00.5        | 0.702    | 1.647 | 152.1                     | 16.4   |
| 1998 03 18           |    | 10 03.85                  | +24 18.0        | 0.690    | 1.612 | 145.4                     | 20.5   |
| 1998 03 23           |    | 09 57.31                  | +25 26.4        | 0.683    | 1.576 | 138.9                     | 24.6   |
| 1998 03 28           |    | 09 51.67                  | +26 24.3        | 0.679    | 1.541 | 132.6                     | 28.5   |
| 1998 04 02           |    | 09 47.19                  | +27 11.2        | 0.678    | 1.506 | 126.6                     | 32.2   |
| 1998 04 07           |    | 09 44.07                  | +27 47.1        | 0.679    | 1.471 | 121.0                     | 35.7   |
| 1998 04 12           |    | 09 42.38                  | +28 12.3        | 0.681    | 1.436 | 115.7                     | 39.0   |
| 1998 04 17           |    | 09 42.18                  | +28 27.7        | 0.684    | 1.401 | 110.8                     | 42.0   |
| 1998 04 22           |    | 09 43.47                  | +28 33.7        | 0.686    | 1.367 | 106.3                     | 44.9   |
| 1998 04 27           |    | 09 46.21                  | +28 30.9        | 0.688    | 1.334 | 102.2                     | 47.5   |
| 1998 05 02           |    | 09 50.36                  | +28 19.7        | 0.689    | 1.301 | 98.4                      | 50.0   |
| 1998 05 07           |    | 09 55.84                  | +28 00.5        | 0.688    | 1.269 | 94.9                      | 52.4   |
| 1998 05 12           |    | 10 02.57                  | +27 33.5        | 0.685    | 1.238 | 91.8                      | 54.6   |
| 1998 05 17           |    | 10 10.46                  | +26 58.7        | 0.680    | 1.209 | 89.0                      | 56.8   |
| 1998 05 22           |    | 10 19.45                  | +26 15.9        | 0.674    | 1.181 | 86.5                      | 58.8   |
| 1998 05 27           |    | 10 29.48                  | +25 24.7        | 0.665    | 1.155 | 84.2                      | 60.8   |
| 1998 06 01           |    | 10 40.50                  | +24 24.7        | 0.654    | 1.130 | 82.3                      | 62.7   |
| 1998 06 06           |    | 10 52.47                  | +23 15.4        | 0.641    | 1.108 | 80.6                      | 64.6   |
| 1998 06 11           |    | 11 05.34                  | +21 56.2        | 0.626    | 1.089 | 79.3                      | 66.4   |
| 1998 06 16           |    | 11 19.10                  | +20 26.1        | 0.610    | 1.072 | 78.2                      | 68.0   |
| 1998 06 21           |    | 11 33.76                  | +18 44.2        | 0.592    | 1.058 | 77.4                      | 69.5   |
| 1998 06 26           |    | 11 49.35                  | +16 49.2        | 0.573    | 1.048 | 76.9                      | 70.9   |
| 1998 07 01           |    | 12 05.92                  | +14 40.2        | 0.554    | 1.041 | 76.8                      | 72.0   |
| 1998 07 06           |    | 12 23.53                  | +12 15.9        | 0.534    | 1.037 | 77.0                      | 72.8   |
| 1998 07 11           |    | 12 42.23                  | +09 35.4        | 0.516    | 1.037 | 77.6                      | 73.3   |
| 1998 07 16           |    | 13 02.13                  | +06 38.3        | 0.498    | 1.040 | 78.7                      | 73.3   |
| 1998 07 21           |    | 13 23.34                  | +03 24.5        | 0.483    | 1.047 | 80.1                      | 72.9   |
| 1998 07 26           |    | 13 45.94                  | −00 04.2        | 0.471    | 1.057 | 81.9                      | 72.0   |
| 1998 07 31           |    | 14 10.00                  | −03 44.6        | 0.462    | 1.071 | 84.0                      | 70.6   |
| 1998 08 05           |    | 14 35.49                  | −07 31.3        | 0.457    | 1.087 | 86.5                      | 68.7   |
| 1998 08 10           |    | 15 02.28                  | −11 17.1        | 0.458    | 1.106 | 89.2                      | 66.4   |
| 1998 08 15           |    | 15 30.15                  | −14 53.6        | 0.464    | 1.128 | 91.9                      | 63.8   |
| 1998 08 20           |    | 15 58.77                  | −18 12.3        | 0.477    | 1.152 | 94.5                      | 61.1   |
| 1998 08 25           |    | 16 27.71                  | −21 06.3        | 0.495    | 1.178 | 96.9                      | 58.4   |
| 1998 08 30           |    | 16 56.49                  | −23 31.2        | 0.520    | 1.206 | 99.0                      | 55.8   |
| 1998 09 04           |    | 17 24.62                  | −25 25.2        | 0.550    | 1.235 | 100.7                     | 53.3   |
| 1998 09 09           |    | 17 51.68                  | −26 49.2        | 0.586    | 1.266 | 102.0                     | 51.1   |
| 1998 09 14           |    | 18 17.37                  | −27 45.9        | 0.626    | 1.298 | 102.8                     | 49.1   |
| 1998 09 19           |    | 18 41.54                  | −28 18.6        | 0.672    | 1.330 | 103.2                     | 47.3   |
| 1998 09 24           |    | 19 04.15                  | −28 31.3        | 0.722    | 1.364 | 103.3                     | 45.7   |

## EPHEMERIDES

| 1997 CR <sub>29</sub> |    | $a, e, i = 44.79, 0.07, 19$ |                 |          |        | Elements <i>MPC</i> 31393 |        |
|-----------------------|----|-----------------------------|-----------------|----------|--------|---------------------------|--------|
| Date                  | TT | $\alpha_{2000}$             | $\delta_{2000}$ | $\Delta$ | $r$    | $\epsilon$                | $\phi$ |
| 1998 03 08            |    | 09 17.27                    | +19 14.4        | 40.731   | 41.580 | 148.4                     | 0.7    |
| 1998 03 18            |    | 09 16.63                    | +19 17.6        | 40.831   | 41.580 | 138.3                     | 0.9    |
| 1998 03 28            |    | 09 16.10                    | +19 20.1        | 40.954   | 41.580 | 128.3                     | 1.1    |
| 1998 04 07            |    | 09 15.70                    | +19 22.0        | 41.096   | 41.580 | 118.4                     | 1.2    |
| 1998 04 17            |    | 09 15.44                    | +19 23.1        | 41.251   | 41.581 | 108.5                     | 1.3    |
| 1998 04 27            |    | 09 15.35                    | +19 23.5        | 41.416   | 41.581 | 98.8                      | 1.4    |
| 1998 05 07            |    | 09 15.41                    | +19 23.1        | 41.585   | 41.581 | 89.1                      | 1.4    |
| 1998 05 17            |    | 09 15.64                    | +19 22.1        | 41.754   | 41.581 | 79.5                      | 1.4    |
| 1998 05 27            |    | 09 16.02                    | +19 20.3        | 41.917   | 41.582 | 70.0                      | 1.3    |
| 1998 06 06            |    | 09 16.55                    | +19 18.0        | 42.071   | 41.582 | 60.6                      | 1.2    |
| 1998 06 16            |    | 09 17.21                    | +19 15.1        | 42.211   | 41.582 | 51.2                      | 1.1    |
| 1998 06 26            |    | 09 17.99                    | +19 11.7        | 42.334   | 41.582 | 41.9                      | 0.9    |
| 1998 07 06            |    | 09 18.87                    | +19 08.0        | 42.436   | 41.583 | 32.6                      | 0.8    |

  

| 1997 CV <sub>29</sub> |    | $a, e, i = 43.39, 0.18, 8$ |                 |          |        | Elements <i>MPC</i> 31393 |        |
|-----------------------|----|----------------------------|-----------------|----------|--------|---------------------------|--------|
| Date                  | TT | $\alpha_{2000}$            | $\delta_{2000}$ | $\Delta$ | $r$    | $\epsilon$                | $\phi$ |
| 1998 03 08            |    | 09 24.67                   | +17 48.3        | 39.547   | 40.414 | 150.6                     | 0.7    |
| 1998 03 18            |    | 09 23.99                   | +17 51.4        | 39.646   | 40.419 | 140.5                     | 0.9    |
| 1998 03 28            |    | 09 23.43                   | +17 53.9        | 39.769   | 40.424 | 130.4                     | 1.1    |
| 1998 04 07            |    | 09 22.99                   | +17 55.7        | 39.912   | 40.428 | 120.5                     | 1.2    |
| 1998 04 17            |    | 09 22.71                   | +17 56.8        | 40.069   | 40.433 | 110.6                     | 1.3    |
| 1998 04 27            |    | 09 22.58                   | +17 57.1        | 40.237   | 40.438 | 100.8                     | 1.4    |
| 1998 05 07            |    | 09 22.61                   | +17 56.6        | 40.410   | 40.443 | 91.1                      | 1.4    |
| 1998 05 17            |    | 09 22.81                   | +17 55.4        | 40.584   | 40.447 | 81.5                      | 1.4    |
| 1998 05 27            |    | 09 23.17                   | +17 53.4        | 40.753   | 40.452 | 72.0                      | 1.4    |

|            |          |          |       |       |       |      |      |
|------------|----------|----------|-------|-------|-------|------|------|
| 1998 09 29 | 19 25.20 | -28 27.5 | 0.775 | 1.398 | 103.0 | 44.3 | 18.4 |
| 1998 10 04 | 19 44.79 | -28 10.6 | 0.833 | 1.432 | 102.4 | 43.0 | 18.5 |
| 1998 10 09 | 20 03.00 | -27 43.1 | 0.893 | 1.467 | 101.5 | 41.8 | 18.7 |
| 1998 10 14 | 20 19.99 | -27 07.4 | 0.957 | 1.502 | 100.4 | 40.8 | 18.9 |
| 1998 10 19 | 20 35.89 | -26 25.1 | 1.024 | 1.538 | 99.1  | 39.8 | 19.1 |
| 1998 10 24 | 20 50.84 | -25 37.6 | 1.093 | 1.573 | 97.6  | 38.8 | 19.2 |
| 1998 10 29 | 21 04.94 | -24 46.2 | 1.165 | 1.608 | 96.0  | 37.9 | 19.4 |
| 1998 11 03 | 21 18.31 | -23 51.6 | 1.239 | 1.643 | 94.2  | 37.0 | 19.5 |
| 1998 11 08 | 21 31.02 | -22 54.5 | 1.315 | 1.679 | 92.3  | 36.1 | 19.7 |
| 1998 11 13 | 21 43.17 | -21 55.6 | 1.393 | 1.714 | 90.3  | 35.3 | 19.8 |
| 1998 11 18 | 21 54.82 | -20 55.2 | 1.473 | 1.748 | 88.2  | 34.4 | 20.0 |
| 1998 11 23 | 22 06.05 | -19 53.7 | 1.554 | 1.783 | 86.0  | 33.5 | 20.1 |
| 1998 11 28 | 22 16.90 | -18 51.3 | 1.636 | 1.817 | 83.8  | 32.7 | 20.2 |
| 1998 12 03 | 22 27.42 | -17 48.4 | 1.720 | 1.851 | 81.5  | 31.8 | 20.4 |
| 1998 12 08 | 22 37.64 | -16 45.2 | 1.804 | 1.885 | 79.1  | 30.9 | 20.5 |
| 1998 12 13 | 22 47.60 | -15 41.7 | 1.888 | 1.918 | 76.7  | 30.0 | 20.6 |
| 1998 12 18 | 22 57.33 | -14 38.1 | 1.973 | 1.951 | 74.2  | 29.0 | 20.7 |
| 1998 12 23 | 23 06.85 | -13 34.6 | 2.058 | 1.983 | 71.7  | 28.1 | 20.8 |
| 1998 12 28 | 23 16.20 | -12 31.3 | 2.144 | 2.015 | 69.1  | 27.1 | 20.9 |
| 1999 01 02 | 23 25.39 | -11 28.3 | 2.228 | 2.047 | 66.6  | 26.2 | 21.0 |

| 1997 CQ <sub>29</sub> |                 | $a, e, i = 44.38, 0.07, 3$ |          |        |            | Elements <i>MPC</i> 31393 |      |
|-----------------------|-----------------|----------------------------|----------|--------|------------|---------------------------|------|
| Date TT               | $\alpha_{2000}$ | $\delta_{2000}$            | $\Delta$ | $r$    | $\epsilon$ | $\phi$                    | $V$  |
| 1998 03 08            | 10 34.40        | +10 17.6                   | 40.170   | 41.145 | 169.1      | 0.3                       | 22.7 |
| 1998 03 18            | 10 33.66        | +10 22.1                   | 40.215   | 41.145 | 158.9      | 0.5                       | 22.7 |
| 1998 03 28            | 10 32.96        | +10 26.1                   | 40.287   | 41.144 | 148.8      | 0.7                       | 22.7 |
| 1998 04 07            | 10 32.36        | +10 29.6                   | 40.385   | 41.144 | 138.8      | 0.9                       | 22.7 |
| 1998 04 17            | 10 31.86        | +10 32.4                   | 40.506   | 41.144 | 128.9      | 1.1                       | 22.8 |
| 1998 04 27            | 10 31.48        | +10 34.5                   | 40.645   | 41.143 | 119.0      | 1.2                       | 22.8 |
| 1998 05 07            | 10 31.24        | +10 35.7                   | 40.799   | 41.143 | 109.3      | 1.3                       | 22.8 |
| 1998 05 17            | 10 31.15        | +10 36.0                   | 40.962   | 41.142 | 99.6       | 1.4                       | 22.8 |
| 1998 05 27            | 10 31.20        | +10 35.5                   | 41.130   | 41.142 | 90.0       | 1.4                       | 22.8 |
| 1998 06 06            | 10 31.41        | +10 34.1                   | 41.297   | 41.142 | 80.5       | 1.4                       | 22.8 |
| 1998 06 16            | 10 31.76        | +10 31.8                   | 41.461   | 41.141 | 71.0       | 1.3                       | 22.8 |
| 1998 06 26            | 10 32.25        | +10 28.8                   | 41.615   | 41.141 | 61.6       | 1.2                       | 22.8 |
| 1998 07 06            | 10 32.87        | +10 25.0                   | 41.755   | 41.140 | 52.2       | 1.1                       | 22.8 |
| 1998 07 16            | 10 33.61        | +10 20.6                   | 41.879   | 41.140 | 42.9       | 1.0                       | 22.8 |
| 1998 07 26            | 10 34.44        | +10 15.6                   | 41.982   | 41.140 | 33.6       | 0.8                       | 22.8 |

| 1998 EP <sub>8</sub> |                 | $a, e, i = 1.68, 0.23, 19$ |          |       |            | Elements <i>MPC</i> 31435 |      |
|----------------------|-----------------|----------------------------|----------|-------|------------|---------------------------|------|
| Date TT              | $\alpha_{2000}$ | $\delta_{2000}$            | $\Delta$ | $r$   | $\epsilon$ | $\phi$                    | $V$  |
| 1998 03 08           | 11 07.58        | +03 18.6                   | 0.864    | 1.857 | 177.8      | 1.2                       | 20.2 |
| 1998 03 13           | 11 02.01        | +05 15.0                   | 0.879    | 1.869 | 172.3      | 4.1                       | 20.4 |
| 1998 03 18           | 10 56.84        | +07 05.7                   | 0.900    | 1.880 | 165.5      | 7.6                       | 20.7 |
| 1998 03 23           | 10 52.26        | +08 48.0                   | 0.928    | 1.892 | 158.8      | 11.0                      | 20.9 |
| 1998 03 28           | 10 48.43        | +10 20.0                   | 0.962    | 1.903 | 152.3      | 14.1                      | 21.1 |

| 1998 EP <sub>4</sub> |                 | $a, e, i = 1.57, 0.45, 7$ |          |       |            | Elements <i>MPC</i> 31435 |      |
|----------------------|-----------------|---------------------------|----------|-------|------------|---------------------------|------|
| Date TT              | $\alpha_{2000}$ | $\delta_{2000}$           | $\Delta$ | $r$   | $\epsilon$ | $\phi$                    | $V$  |
| 1998 03 08           | 12 11.12        | +00 38.0                  | 0.262    | 1.248 | 164.9      | 12.0                      | 19.8 |
| 1998 03 13           | 12 06.00        | -01 17.4                  | 0.222    | 1.214 | 170.3      | 7.9                       | 19.2 |
| 1998 03 18           | 11 58.09        | -03 56.2                  | 0.185    | 1.180 | 174.5      | 4.6                       | 18.6 |
| 1998 03 23           | 11 46.13        | -07 43.2                  | 0.151    | 1.146 | 171.2      | 7.6                       | 18.2 |
| 1998 03 28           | 11 27.65        | -13 21.4                  | 0.120    | 1.113 | 162.1      | 16.0                      | 18.0 |

|            |          |          |       |       |       |       |      |
|------------|----------|----------|-------|-------|-------|-------|------|
| 1998 04 02 | 10 57.22 | -22 01.8 | 0.094 | 1.081 | 148.8 | 28.6  | 17.8 |
| 1998 04 07 | 10 01.05 | -35 00.2 | 0.074 | 1.050 | 129.6 | 47.2  | 17.7 |
| 1998 04 12 | 08 06.68 | -49 24.6 | 0.066 | 1.020 | 103.9 | 72.5  | 18.2 |
| 1998 04 17 | 05 17.90 | -52 56.6 | 0.071 | 0.992 | 78.4  | 97.5  | 19.3 |
| 1998 04 22 | 03 25.26 | -45 55.1 | 0.088 | 0.966 | 61.2  | 114.2 | 20.6 |
| 1998 04 27 | 02 30.95 | -38 15.3 | 0.111 | 0.942 | 52.1  | 122.6 | 21.6 |

| 1998 DG <sub>16</sub> |                 | $a, e, i = 0.90, 0.36, 16$ |          |       |            | Elements <i>MPC</i> 31434 |      |
|-----------------------|-----------------|----------------------------|----------|-------|------------|---------------------------|------|
| Date TT               | $\alpha_{2000}$ | $\delta_{2000}$            | $\Delta$ | $r$   | $\epsilon$ | $\phi$                    | $V$  |
| 1998 03 08            | 12 25.20        | -14 39.6                   | 0.233    | 1.206 | 153.4      | 21.6                      | 18.3 |
| 1998 03 13            | 11 55.99        | -17 31.7                   | 0.217    | 1.198 | 158.5      | 17.7                      | 18.0 |
| 1998 03 18            | 11 21.63        | -20 07.3                   | 0.207    | 1.189 | 157.7      | 18.5                      | 17.9 |
| 1998 03 23            | 10 44.36        | -22 06.2                   | 0.204    | 1.178 | 150.6      | 24.5                      | 18.0 |
| 1998 03 28            | 10 07.52        | -23 16.8                   | 0.207    | 1.166 | 140.7      | 32.8                      | 18.3 |
| 1998 04 02            | 09 34.17        | -23 42.6                   | 0.216    | 1.151 | 130.5      | 41.3                      | 18.6 |
| 1998 04 07            | 09 05.97        | -23 37.0                   | 0.228    | 1.135 | 120.9      | 49.2                      | 18.9 |
| 1998 04 12            | 08 43.10        | -23 14.3                   | 0.243    | 1.117 | 112.1      | 56.2                      | 19.2 |
| 1998 04 17            | 08 24.89        | -22 44.9                   | 0.259    | 1.097 | 104.3      | 62.4                      | 19.5 |
| 1998 04 22            | 08 10.40        | -22 14.8                   | 0.275    | 1.075 | 97.3       | 68.0                      | 19.7 |
| 1998 04 27            | 07 58.72        | -21 46.7                   | 0.291    | 1.052 | 90.9       | 73.0                      | 20.0 |
| 1998 05 02            | 07 48.98        | -21 21.5                   | 0.305    | 1.027 | 85.0       | 77.8                      | 20.2 |
| 1998 05 07            | 07 40.41        | -20 58.3                   | 0.318    | 1.000 | 79.4       | 82.4                      | 20.4 |
| 1998 05 12            | 07 32.33        | -20 34.4                   | 0.328    | 0.972 | 74.0       | 87.1                      | 20.6 |
| 1998 05 17            | 07 24.19        | -20 06.5                   | 0.337    | 0.942 | 68.7       | 91.9                      | 20.8 |
| 1998 05 22            | 07 15.52        | -19 29.7                   | 0.344    | 0.911 | 63.3       | 97.0                      | 21.0 |

| (7604) 1995 QY <sub>2</sub> |                 | $a, e, i = 3.12, 0.57, 20$ |          |       |            | Elements <i>MPC</i> 29602 |      |
|-----------------------------|-----------------|----------------------------|----------|-------|------------|---------------------------|------|
| Date TT                     | $\alpha_{2000}$ | $\delta_{2000}$            | $\Delta$ | $r$   | $\epsilon$ | $\phi$                    | $V$  |
| 1998 03 08                  | 15 33.84        | +03 21.8                   | 4.216    | 4.722 | 115.0      | 11.0                      | 20.9 |
| 1998 03 18                  | 15 32.44        | +04 16.3                   | 4.105    | 4.738 | 124.3      | 10.0                      | 20.8 |
| 1998 03 28                  | 15 29.58        | +05 13.0                   | 4.010    | 4.753 | 133.5      | 8.8                       | 20.7 |
| 1998 04 07                  | 15 25.34        | +06 09.2                   | 3.937    | 4.767 | 142.2      | 7.4                       | 20.6 |
| 1998 04 17                  | 15 19.96        | +07 01.7                   | 3.888    | 4.781 | 149.6      | 6.1                       | 20.5 |
| 1998 04 27                  | 15 13.74        | +07 47.6                   | 3.867    | 4.794 | 154.3      | 5.2                       | 20.5 |
| 1998 05 07                  | 15 07.06        | +08 23.9                   | 3.874    | 4.806 | 154.7      | 5.1                       | 20.5 |
| 1998 05 17                  | 15 00.35        | +08 48.7                   | 3.910    | 4.818 | 150.7      | 5.9                       | 20.5 |
| 1998 05 27                  | 14 54.03        | +09 00.9                   | 3.973    | 4.828 | 143.9      | 7.1                       | 20.6 |
| 1998 06 06                  | 14 48.47        | +09 00.3                   | 4.060    | 4.838 | 135.7      | 8.4                       | 20.7 |
| 1998 06 16                  | 14 43.94        | +08 47.7                   | 4.169    | 4.848 | 126.9      | 9.6                       | 20.9 |
| 1998 06 26                  | 14 40.62        | +08 24.5                   | 4.295    | 4.856 | 118.0      | 10.6                      | 21.0 |

| 1992 JB    |                 | $a, e, i = 1.56, 0.36, 16$ |          |       |            | Elements <i>MPC</i> 28615 |      |
|------------|-----------------|----------------------------|----------|-------|------------|---------------------------|------|
| Date TT    | $\alpha_{2000}$ | $\delta_{2000}$            | $\Delta$ | $r$   | $\epsilon$ | $\phi$                    | $V$  |
| 1998 03 08 | 18 44.81        | -19 45.8                   | 1.132    | 1.174 | 66.7       | 51.0                      | 20.5 |
| 1998 03 18 | 19 12.05        | -16 38.2                   | 1.129    | 1.224 | 70.0       | 49.8                      | 20.6 |
| 1998 03 28 | 19 35.95        | -13 20.3                   | 1.121    | 1.275 | 73.8       | 48.7                      | 20.6 |
| 1998 04 07 | 19 56.59        | -09 56.3                   | 1.105    | 1.328 | 78.0       | 47.5                      | 20.6 |
| 1998 04 17 | 20 14.02        | -06 29.6                   | 1.084    | 1.381 | 82.7       | 46.1                      | 20.6 |
| 1998 04 27 | 20 28.20        | -03 02.9                   | 1.057    | 1.434 | 88.0       | 44.5                      | 20.6 |
| 1998 05 07 | 20 38.93        | +00 20.6                   | 1.026    | 1.486 | 93.8       | 42.6                      | 20.6 |
| 1998 05 17 | 20 45.99        | +03 37.5                   | 0.993    | 1.537 | 100.2      | 40.4                      | 20.5 |
| 1998 05 27 | 20 49.01        | +06 43.2                   | 0.958    | 1.587 | 107.2      | 37.6                      | 20.4 |
| 1998 06 06 | 20 47.64        | +09 30.7                   | 0.925    | 1.634 | 114.7      | 34.3                      | 20.3 |
| 1998 06 16 | 20 41.74        | +11 50.8                   | 0.898    | 1.680 | 122.7      | 30.6                      | 20.2 |

|            |          |          |       |       |       |      |      |
|------------|----------|----------|-------|-------|-------|------|------|
| 1998 06 26 | 20 31.45 | +13 32.5 | 0.878 | 1.724 | 130.8 | 26.5 | 20.1 |
| 1998 07 06 | 20 17.64 | +14 24.0 | 0.872 | 1.766 | 138.3 | 22.5 | 20.0 |
| 1998 07 16 | 20 01.96 | +14 18.9 | 0.882 | 1.805 | 143.9 | 19.4 | 20.0 |
| 1998 07 26 | 19 46.45 | +13 18.6 | 0.910 | 1.842 | 146.1 | 17.9 | 20.1 |
| 1998 08 05 | 19 33.16 | +11 33.8 | 0.958 | 1.877 | 144.3 | 18.4 | 20.2 |
| 1998 08 15 | 19 23.45 | +09 21.6 | 1.024 | 1.910 | 139.3 | 20.2 | 20.5 |
| 1998 08 25 | 19 17.88 | +06 58.2 | 1.108 | 1.940 | 132.5 | 22.6 | 20.7 |
| 1998 09 04 | 19 16.45 | +04 37.0 | 1.206 | 1.968 | 125.2 | 24.8 | 21.0 |

| 1994 PN    |          | $a, e, i = 2.37, 0.54, 46$ |                 |          |       | Elements <i>MPC</i> 29619 |        |     |
|------------|----------|----------------------------|-----------------|----------|-------|---------------------------|--------|-----|
| Date       | TT       | $\alpha_{2000}$            | $\delta_{2000}$ | $\Delta$ | $r$   | $\epsilon$                | $\phi$ | $V$ |
| 1998 03 08 | 19 53.43 | -03 33.1                   | 2.060           | 1.608    | 49.8  | 28.1                      | 19.3   |     |
| 1998 03 18 | 20 20.50 | -04 26.4                   | 1.928           | 1.537    | 52.4  | 30.8                      | 19.2   |     |
| 1998 03 28 | 20 49.43 | -05 24.4                   | 1.796           | 1.467    | 54.8  | 33.7                      | 19.0   |     |
| 1998 04 07 | 21 20.73 | -06 29.9                   | 1.667           | 1.399    | 56.9  | 36.8                      | 18.8   |     |
| 1998 04 17 | 21 55.05 | -07 45.1                   | 1.543           | 1.334    | 58.7  | 40.0                      | 18.7   |     |
| 1998 04 27 | 22 33.09 | -09 10.3                   | 1.431           | 1.274    | 60.1  | 43.2                      | 18.5   |     |
| 1998 05 07 | 23 15.42 | -10 43.4                   | 1.334           | 1.219    | 60.9  | 46.3                      | 18.3   |     |
| 1998 05 17 | 00 02.25 | -12 17.0                   | 1.259           | 1.172    | 61.0  | 49.0                      | 18.2   |     |
| 1998 05 27 | 00 52.93 | -13 39.3                   | 1.211           | 1.134    | 60.5  | 51.1                      | 18.1   |     |
| 1998 06 06 | 01 45.70 | -14 36.7                   | 1.194           | 1.107    | 59.5  | 52.2                      | 18.0   |     |
| 1998 06 16 | 02 38.05 | -15 00.2                   | 1.207           | 1.093    | 58.1  | 52.1                      | 18.0   |     |
| 1998 06 26 | 03 27.52 | -14 50.0                   | 1.246           | 1.092    | 56.6  | 51.0                      | 18.1   |     |
| 1998 07 06 | 04 12.47 | -14 14.2                   | 1.303           | 1.104    | 55.2  | 49.1                      | 18.1   |     |
| 1998 07 16 | 04 52.35 | -13 23.5                   | 1.371           | 1.129    | 54.0  | 46.8                      | 18.2   |     |
| 1998 07 26 | 05 27.35 | -12 27.5                   | 1.440           | 1.165    | 53.3  | 44.3                      | 18.3   |     |
| 1998 08 05 | 05 57.98 | -11 32.9                   | 1.506           | 1.211    | 53.2  | 42.1                      | 18.4   |     |
| 1998 08 15 | 06 24.84 | -10 43.1                   | 1.562           | 1.264    | 53.9  | 40.3                      | 18.6   |     |
| 1998 08 25 | 06 48.43 | -09 59.9                   | 1.605           | 1.324    | 55.3  | 38.9                      | 18.7   |     |
| 1998 09 04 | 07 09.10 | -09 23.0                   | 1.634           | 1.388    | 57.7  | 37.9                      | 18.8   |     |
| 1998 09 14 | 07 27.14 | -08 51.0                   | 1.647           | 1.456    | 61.0  | 37.2                      | 18.9   |     |
| 1998 09 24 | 07 42.65 | -08 22.2                   | 1.643           | 1.526    | 65.3  | 36.7                      | 19.0   |     |
| 1998 10 04 | 07 55.62 | -07 53.3                   | 1.623           | 1.597    | 70.5  | 36.2                      | 19.0   |     |
| 1998 10 14 | 08 05.97 | -07 20.9                   | 1.588           | 1.668    | 76.6  | 35.6                      | 19.1   |     |
| 1998 10 24 | 08 13.47 | -06 40.3                   | 1.541           | 1.740    | 83.7  | 34.6                      | 19.1   |     |
| 1998 11 03 | 08 17.79 | -05 45.7                   | 1.483           | 1.811    | 91.9  | 33.2                      | 19.0   |     |
| 1998 11 13 | 08 18.57 | -04 30.5                   | 1.420           | 1.882    | 101.2 | 31.0                      | 19.0   |     |
| 1998 11 23 | 08 15.37 | -02 47.2                   | 1.356           | 1.952    | 111.8 | 28.0                      | 18.9   |     |
| 1998 12 03 | 08 07.93 | -00 28.7                   | 1.300           | 2.021    | 123.7 | 23.9                      | 18.7   |     |
| 1998 12 13 | 07 56.30 | +02 28.5                   | 1.258           | 2.088    | 136.9 | 18.8                      | 18.6   |     |
| 1998 12 23 | 07 41.11 | +06 00.7                   | 1.241           | 2.155    | 150.9 | 12.8                      | 18.4   |     |
| 1999 01 02 | 07 23.75 | +09 54.9                   | 1.256           | 2.219    | 164.5 | 6.8                       | 18.2   |     |
| 1999 01 12 | 07 06.18 | +13 50.4                   | 1.308           | 2.283    | 170.0 | 4.3                       | 18.3   |     |
| 1999 01 22 | 06 50.34 | +17 28.0                   | 1.396           | 2.345    | 159.8 | 8.3                       | 18.7   |     |
| 1999 02 01 | 06 37.76 | +20 35.8                   | 1.518           | 2.405    | 147.1 | 12.9                      | 19.1   |     |
| 1999 02 11 | 06 29.11 | +23 11.0                   | 1.666           | 2.464    | 134.9 | 16.5                      | 19.5   |     |
| 1999 02 21 | 06 24.47 | +25 16.5                   | 1.836           | 2.521    | 123.6 | 19.1                      | 19.8   |     |
| 1999 03 03 | 06 23.54 | +26 57.1                   | 2.020           | 2.577    | 113.2 | 20.7                      | 20.1   |     |
| 1999 03 13 | 06 25.80 | +28 17.8                   | 2.213           | 2.631    | 103.7 | 21.5                      | 20.4   |     |
| 1999 03 23 | 06 30.72 | +29 22.5                   | 2.410           | 2.684    | 94.8  | 21.7                      | 20.6   |     |
| 1999 04 02 | 06 37.84 | +30 14.0                   | 2.609           | 2.735    | 86.4  | 21.4                      | 20.8   |     |
| 1999 04 12 | 06 46.71 | +30 54.5                   | 2.804           | 2.784    | 78.5  | 20.7                      | 21.0   |     |

| 1989 OB    |          | $a, e, i = 2.69, 0.56, 8$ |                 |          |       | Elements <i>MPC</i> 24737 |        |     |
|------------|----------|---------------------------|-----------------|----------|-------|---------------------------|--------|-----|
| Date       | TT       | $\alpha_{2000}$           | $\delta_{2000}$ | $\Delta$ | $r$   | $\epsilon$                | $\phi$ | $V$ |
| 1998 03 18 | 19 45.99 | -24 01.4                  | 2.175           | 1.941    | 63.2  | 27.2                      | 20.3   |     |
| 1998 03 28 | 20 10.88 | -22 32.4                  | 2.015           | 1.870    | 67.2  | 29.5                      | 20.2   |     |
| 1998 04 07 | 20 36.33 | -20 42.4                  | 1.859           | 1.799    | 70.9  | 31.7                      | 20.0   |     |
| 1998 04 17 | 21 02.42 | -18 29.2                  | 1.708           | 1.728    | 74.1  | 34.0                      | 19.8   |     |
| 1998 04 27 | 21 29.27 | -15 50.4                  | 1.564           | 1.658    | 77.0  | 36.2                      | 19.5   |     |
| 1998 05 07 | 21 57.00 | -12 43.7                  | 1.430           | 1.590    | 79.3  | 38.6                      | 19.3   |     |
| 1998 05 17 | 22 25.81 | -09 06.8                  | 1.306           | 1.523    | 81.1  | 41.0                      | 19.1   |     |
| 1998 05 27 | 22 55.93 | -04 58.9                  | 1.196           | 1.459    | 82.2  | 43.5                      | 18.9   |     |
| 1998 06 06 | 23 27.59 | -00 20.9                  | 1.100           | 1.399    | 82.7  | 46.0                      | 18.7   |     |
| 1998 06 16 | 00 01.05 | +04 42.5                  | 1.020           | 1.343    | 82.6  | 48.6                      | 18.5   |     |
| 1998 06 26 | 00 36.53 | +10 02.1                  | 0.956           | 1.294    | 81.9  | 51.1                      | 18.4   |     |
| 1998 07 06 | 01 14.11 | +15 23.5                  | 0.909           | 1.253    | 80.9  | 53.3                      | 18.2   |     |
| 1998 07 16 | 01 53.69 | +20 28.6                  | 0.879           | 1.220    | 79.8  | 55.1                      | 18.2   |     |
| 1998 07 26 | 02 34.84 | +24 59.4                  | 0.862           | 1.198    | 78.8  | 56.3                      | 18.1   |     |
| 1998 08 05 | 03 16.72 | +28 41.0                  | 0.855           | 1.186    | 78.2  | 56.8                      | 18.1   |     |
| 1998 08 15 | 03 58.25 | +31 26.0                  | 0.857           | 1.187    | 78.3  | 56.7                      | 18.1   |     |
| 1998 08 25 | 04 38.11 | +33 14.6                  | 0.862           | 1.199    | 79.2  | 55.9                      | 18.1   |     |
| 1998 09 04 | 05 15.05 | +34 12.9                  | 0.867           | 1.222    | 80.9  | 54.6                      | 18.1   |     |
| 1998 09 14 | 05 48.11 | +34 30.9                  | 0.871           | 1.256    | 83.6  | 52.8                      | 18.1   |     |
| 1998 09 24 | 06 16.55 | +34 19.8                  | 0.871           | 1.298    | 87.3  | 50.6                      | 18.1   |     |
| 1998 10 04 | 06 39.86 | +33 50.4                  | 0.866           | 1.348    | 92.1  | 47.9                      | 18.1   |     |
| 1998 10 14 | 06 57.72 | +33 11.5                  | 0.857           | 1.403    | 98.1  | 44.7                      | 18.1   |     |
| 1998 10 24 | 07 09.73 | +32 30.4                  | 0.843           | 1.464    | 105.3 | 41.0                      | 18.1   |     |
| 1998 11 03 | 07 15.54 | +31 51.0                  | 0.829           | 1.528    | 113.8 | 36.4                      | 18.0   |     |
| 1998 11 13 | 07 14.98 | +31 14.5                  | 0.816           | 1.595    | 123.8 | 31.0                      | 17.9   |     |
| 1998 11 23 | 07 08.14 | +30 38.6                  | 0.811           | 1.664    | 135.2 | 24.7                      | 17.8   |     |
| 1998 12 03 | 06 55.96 | +29 58.2                  | 0.819           | 1.734    | 147.7 | 17.7                      | 17.7   |     |
| 1998 12 13 | 06 40.39 | +29 08.4                  | 0.845           | 1.805    | 161.0 | 10.2                      | 17.6   |     |
| 1998 12 23 | 06 24.02 | +28 08.5                  | 0.895           | 1.875    | 173.5 | 3.4                       | 17.5   |     |
| 1999 01 02 | 06 09.51 | +27 02.7                  | 0.970           | 1.946    | 170.3 | 4.9                       | 17.8   |     |
| 1999 01 12 | 05 58.60 | +25 58.3                  | 1.070           | 2.017    | 158.2 | 10.4                      | 18.3   |     |
| 1999 01 22 | 05 51.98 | +25 01.0                  | 1.193           | 2.086    | 146.6 | 15.0                      | 18.8   |     |
| 1999 02 01 | 05 49.59 | +24 13.5                  | 1.335           | 2.155    | 135.9 | 18.5                      | 19.2   |     |
| 1999 02 11 | 05 50.90 | +23 35.7                  | 1.494           | 2.223    | 126.1 | 21.0                      | 19.6   |     |
| 1999 02 21 | 05 55.27 | +23 05.7                  | 1.665           | 2.290    | 117.0 | 22.6                      | 20.0   |     |
| 1999 03 03 | 06 02.13 | +22 41.2                  | 1.846           | 2.356    | 108.5 | 23.5                      | 20.3   |     |
| 1999 03 13 | 06 10.91 | +22 19.9                  | 2.034           | 2.421    | 100.5 | 23.8                      | 20.6   |     |
| 1999 03 23 | 06 21.21 | +21 59.5                  | 2.225           | 2.485    | 93.0  | 23.6                      | 20.8   |     |
| 1999 04 02 | 06 32.66 | +21 38.5                  | 2.418           | 2.547    | 85.8  | 23.0                      | 21.0   |     |

| 1991 YA    |          | $a, e, i = 2.74, 0.44, 44$ |                 |          |       | Elements <i>MPC</i> 26758 |        |     |
|------------|----------|----------------------------|-----------------|----------|-------|---------------------------|--------|-----|
| Date       | TT       | $\alpha_{2000}$            | $\delta_{2000}$ | $\Delta$ | $r$   | $\epsilon$                | $\phi$ | $V$ |
| 1998 03 28 | 18 07.74 | -42 05.6                   | 3.553           | 3.778    | 95.3  | 15.2                      | 21.0   |     |
| 1998 04 07 | 18 08.84 | -42 10.5                   | 3.419           | 3.795    | 104.5 | 14.8                      | 20.9   |     |
| 1998 04 17 | 18 07.41 | -42 13.7                   | 3.292           | 3.811    | 113.9 | 13.9                      | 20.8   |     |
| 1998 04 27 | 18 03.32 | -42 13.0                   | 3.174           | 3.826    | 123.7 | 12.6                      | 20.7   |     |
| 1998 05 07 | 17 56.62 | -42 05.3                   | 3.072           | 3.840    | 133.8 | 10.9                      | 20.5   |     |
| 1998 05 17 | 17 47.56 | -41 47.2                   | 2.990           | 3.853    | 143.9 | 8.9                       | 20.4   |     |
| 1998 05 27 | 17 36.65 | -41 15.6                   | 2.932           | 3.866    | 153.5 | 6.7                       | 20.3   |     |
| 1998 06 06 | 17 24.69 | -40 28.5                   | 2.903           | 3.877    | 161.1 | 4.9                       | 20.2   |     |
| 1998 06 16 | 17 12.60 | -39 26.3                   | 2.905           | 3.888    | 163.1 | 4.4                       | 20.2   |     |

## M.P.C. 31440

1998 MAR. 13

|            |          |          |       |       |       |      |      |
|------------|----------|----------|-------|-------|-------|------|------|
| 1998 06 26 | 17 01.29 | -38 11.4 | 2.937 | 3.898 | 157.9 | 5.6  | 20.2 |
| 1998 07 06 | 16 51.56 | -36 48.2 | 3.000 | 3.907 | 149.0 | 7.7  | 20.4 |
| 1998 07 16 | 16 43.89 | -35 21.8 | 3.090 | 3.915 | 139.1 | 9.8  | 20.6 |
| 1998 07 26 | 16 38.52 | -33 56.9 | 3.203 | 3.922 | 129.0 | 11.6 | 20.7 |
| 1998 08 05 | 16 35.49 | -32 37.2 | 3.335 | 3.929 | 119.1 | 13.0 | 20.9 |
| 1998 08 15 | 16 34.68 | -31 24.7 | 3.480 | 3.934 | 109.4 | 14.1 | 21.0 |

| (7480) Norwan |          | $a, e, i = 1.57, 0.32, 9$ |                 |          |       | Elements <i>MPC</i> 29084 |        |     |
|---------------|----------|---------------------------|-----------------|----------|-------|---------------------------|--------|-----|
| Date          | TT       | $\alpha_{2000}$           | $\delta_{2000}$ | $\Delta$ | $r$   | $\epsilon$                | $\phi$ | $V$ |
| 1998 03 28    | 19 22.78 | -14 31.8                  | 1.656           | 1.732    | 77.1  | 34.2                      | 20.9   |     |
| 1998 04 07    | 19 45.25 | -13 40.9                  | 1.525           | 1.693    | 81.3  | 35.8                      | 20.7   |     |
| 1998 04 17    | 20 07.85 | -12 41.2                  | 1.396           | 1.654    | 85.5  | 37.2                      | 20.5   |     |
| 1998 04 27    | 20 30.71 | -11 33.8                  | 1.269           | 1.612    | 89.5  | 38.6                      | 20.3   |     |
| 1998 05 07    | 20 53.94 | -10 20.4                  | 1.146           | 1.569    | 93.3  | 39.9                      | 20.1   |     |
| 1998 05 17    | 21 17.82 | -09 02.6                  | 1.027           | 1.525    | 96.9  | 41.2                      | 19.8   |     |
| 1998 05 27    | 21 42.65 | -07 42.5                  | 0.914           | 1.480    | 100.2 | 42.4                      | 19.5   |     |
| 1998 06 06    | 22 08.83 | -06 22.7                  | 0.808           | 1.434    | 103.2 | 43.5                      | 19.2   |     |
| 1998 06 16    | 22 36.99 | -05 06.3                  | 0.710           | 1.388    | 105.8 | 44.8                      | 18.9   |     |
| 1998 06 26    | 23 07.83 | -03 56.8                  | 0.620           | 1.343    | 107.8 | 46.1                      | 18.6   |     |
| 1998 07 06    | 23 42.19 | -02 59.0                  | 0.540           | 1.298    | 109.0 | 47.8                      | 18.2   |     |
| 1998 07 16    | 00 21.05 | -02 17.7                  | 0.472           | 1.254    | 109.3 | 49.9                      | 17.9   |     |
| 1998 07 26    | 01 05.01 | -01 57.9                  | 0.416           | 1.214    | 108.4 | 52.6                      | 17.7   |     |
| 1998 08 05    | 01 53.91 | -02 02.9                  | 0.375           | 1.176    | 106.3 | 55.9                      | 17.4   |     |
| 1998 08 15    | 02 46.37 | -02 31.0                  | 0.347           | 1.142    | 103.0 | 59.8                      | 17.3   |     |
| 1998 08 25    | 03 39.54 | -03 15.5                  | 0.334           | 1.114    | 99.2  | 63.6                      | 17.3   |     |
| 1998 09 04    | 04 30.20 | -04 05.7                  | 0.332           | 1.092    | 95.7  | 66.7                      | 17.4   |     |
| 1998 09 14    | 05 16.14 | -04 52.0                  | 0.338           | 1.078    | 93.0  | 68.8                      | 17.4   |     |
| 1998 09 24    | 05 56.32 | -05 29.7                  | 0.348           | 1.071    | 91.6  | 69.4                      | 17.5   |     |
| 1998 10 04    | 06 30.69 | -05 56.1                  | 0.359           | 1.072    | 91.6  | 68.8                      | 17.5   |     |
| 1998 10 14    | 06 59.70 | -06 10.3                  | 0.369           | 1.082    | 93.1  | 67.0                      | 17.6   |     |
| 1998 10 24    | 07 23.56 | -06 10.7                  | 0.375           | 1.099    | 96.0  | 64.2                      | 17.6   |     |
| 1998 11 03    | 07 42.26 | -05 52.4                  | 0.377           | 1.123    | 100.4 | 60.3                      | 17.5   |     |
| 1998 11 13    | 07 55.62 | -05 08.5                  | 0.375           | 1.153    | 106.4 | 55.4                      | 17.4   |     |
| 1998 11 23    | 08 02.99 | -03 48.7                  | 0.369           | 1.188    | 114.2 | 49.3                      | 17.3   |     |
| 1998 12 03    | 08 03.84 | -01 40.2                  | 0.363           | 1.227    | 124.1 | 41.7                      | 17.1   |     |
| 1998 12 13    | 07 58.01 | +01 25.9                  | 0.360           | 1.269    | 136.0 | 32.6                      | 16.9   |     |
| 1998 12 23    | 07 46.20 | +05 27.5                  | 0.366           | 1.313    | 149.6 | 22.3                      | 16.7   |     |
| 1999 01 02    | 07 30.83 | +10 02.2                  | 0.386           | 1.358    | 163.6 | 11.8                      | 16.5   |     |
| 1999 01 12    | 07 15.40 | +14 32.2                  | 0.423           | 1.404    | 171.8 | 5.8                       | 16.5   |     |
| 1999 01 22    | 07 03.17 | +18 24.8                  | 0.479           | 1.449    | 163.0 | 11.5                      | 17.1   |     |
| 1999 02 01    | 06 56.21 | +21 25.9                  | 0.554           | 1.495    | 151.4 | 18.4                      | 17.7   |     |
| 1999 02 11    | 06 54.85 | +23 37.6                  | 0.643           | 1.540    | 140.7 | 23.9                      | 18.3   |     |
| 1999 02 21    | 06 58.58 | +25 07.9                  | 0.746           | 1.583    | 131.3 | 28.0                      | 18.8   |     |
| 1999 03 03    | 07 06.50 | +26 05.3                  | 0.859           | 1.626    | 122.9 | 30.8                      | 19.2   |     |
| 1999 03 13    | 07 17.63 | +26 36.3                  | 0.979           | 1.667    | 115.3 | 32.6                      | 19.6   |     |
| 1999 03 23    | 07 31.20 | +26 45.5                  | 1.107           | 1.706    | 108.3 | 33.7                      | 20.0   |     |
| 1999 04 02    | 07 46.55 | +26 36.4                  | 1.238           | 1.744    | 101.9 | 34.1                      | 20.3   |     |
| 1999 04 12    | 08 03.13 | +26 11.3                  | 1.373           | 1.779    | 95.8  | 34.1                      | 20.6   |     |
| 1999 04 22    | 08 20.57 | +25 32.0                  | 1.509           | 1.813    | 90.0  | 33.7                      | 20.8   |     |
| 1999 05 02    | 08 38.57 | +24 40.3                  | 1.645           | 1.845    | 84.5  | 32.9                      | 21.0   |     |

| 1994 TW <sub>1</sub> |          | $a, e, i = 2.59, 0.58, 36$ |                 |          |       | Elements <i>MPC</i> 29945 |        |     |
|----------------------|----------|----------------------------|-----------------|----------|-------|---------------------------|--------|-----|
| Date                 | TT       | $\alpha_{2000}$            | $\delta_{2000}$ | $\Delta$ | $r$   | $\epsilon$                | $\phi$ | $V$ |
| 1998 04 07           | 21 38.27 | -49 23.0                   | 3.285           | 3.115    | 71.5  | 17.7                      | 21.0   |     |
| 1998 04 17           | 21 54.78 | -49 23.6                   | 3.127           | 3.066    | 77.3  | 18.6                      | 20.9   |     |
| 1998 04 27           | 22 10.39 | -49 33.0                   | 2.965           | 3.016    | 83.2  | 19.3                      | 20.7   |     |
| 1998 05 07           | 22 24.92 | -49 53.1                   | 2.803           | 2.965    | 89.1  | 19.9                      | 20.6   |     |
| 1998 05 17           | 22 38.17 | -50 25.7                   | 2.642           | 2.912    | 95.1  | 20.2                      | 20.4   |     |
| 1998 05 27           | 22 49.85 | -51 13.0                   | 2.484           | 2.857    | 101.1 | 20.4                      | 20.3   |     |
| 1998 06 06           | 22 59.56 | -52 16.3                   | 2.330           | 2.802    | 107.1 | 20.3                      | 20.1   |     |
| 1998 06 16           | 23 06.77 | -53 36.3                   | 2.184           | 2.745    | 113.0 | 19.9                      | 19.9   |     |
| 1998 06 26           | 23 10.72 | -55 12.7                   | 2.047           | 2.686    | 118.6 | 19.4                      | 19.7   |     |
| 1998 07 06           | 23 10.39 | -57 02.2                   | 1.922           | 2.626    | 123.7 | 18.8                      | 19.5   |     |
| 1998 07 16           | 23 04.60 | -58 58.0                   | 1.811           | 2.564    | 128.0 | 18.2                      | 19.3   |     |
| 1998 07 26           | 22 52.03 | -60 48.3                   | 1.716           | 2.501    | 130.9 | 17.9                      | 19.1   |     |
| 1998 08 05           | 22 31.98 | -62 14.9                   | 1.638           | 2.437    | 132.0 | 18.0                      | 18.9   |     |
| 1998 08 15           | 22 05.46 | -62 56.4                   | 1.580           | 2.371    | 131.0 | 18.8                      | 18.8   |     |
| 1998 08 25           | 21 35.88 | -62 34.6                   | 1.541           | 2.304    | 127.8 | 20.3                      | 18.8   |     |
| 1998 09 04           | 21 08.37 | -61 03.0                   | 1.520           | 2.235    | 123.0 | 22.2                      | 18.7   |     |
| 1998 09 14           | 20 47.02 | -58 29.9                   | 1.515           | 2.165    | 116.9 | 24.5                      | 18.7   |     |
| 1998 09 24           | 20 33.41 | -55 11.3                   | 1.524           | 2.094    | 110.1 | 26.7                      | 18.7   |     |
| 1998 10 04           | 20 27.16 | -51 24.1                   | 1.545           | 2.021    | 103.1 | 28.8                      | 18.7   |     |
| 1998 10 14           | 20 27.00 | -47 20.7                   | 1.573           | 1.948    | 95.9  | 30.6                      | 18.7   |     |
| 1998 10 24           | 20 31.59 | -43 08.6                   | 1.606           | 1.873    | 88.9  | 32.1                      | 18.8   |     |
| 1998 11 03           | 20 39.83 | -38 51.6                   | 1.640           | 1.798    | 82.2  | 33.1                      | 18.7   |     |
| 1998 11 13           | 20 50.82 | -34 30.9                   | 1.674           | 1.723    | 75.8  | 33.8                      | 18.7   |     |
| 1998 11 23           | 21 03.92 | -30 05.7                   | 1.706           | 1.647    | 69.7  | 34.2                      | 18.7   |     |
| 1998 12 03           | 21 18.69 | -25 34.6                   | 1.733           | 1.573    | 64.0  | 34.3                      | 18.6   |     |

| 1998 CS <sub>1</sub> |          | $a, e, i = 1.49, 0.58, 8$ |                 |          |       | Elements <i>MPC</i> 31430 |        |     |
|----------------------|----------|---------------------------|-----------------|----------|-------|---------------------------|--------|-----|
| Date                 | TT       | $\alpha_{2000}$           | $\delta_{2000}$ | $\Delta$ | $r$   | $\epsilon$                | $\phi$ | $V$ |
| 1998 04 07           | 22 34.92 | -00 46.5                  | 0.584           | 0.646    | 37.6  | 108.8                     | 19.5   |     |
| 1998 04 12           | 22 40.95 | -01 42.3                  | 0.650           | 0.668    | 41.2  | 99.0                      | 19.3   |     |
| 1998 04 17           | 22 49.46 | -02 13.7                  | 0.713           | 0.699    | 44.1  | 90.6                      | 19.2   |     |
| 1998 04 22           | 22 59.45 | -02 26.6                  | 0.773           | 0.736    | 46.7  | 83.5                      | 19.2   |     |
| 1998 04 27           | 23 10.22 | -02 26.3                  | 0.828           | 0.778    | 49.0  | 77.5                      | 19.3   |     |
| 1998 05 02           | 23 21.27 | -02 16.9                  | 0.877           | 0.824    | 51.2  | 72.6                      | 19.3   |     |
| 1998 05 07           | 23 32.30 | -02 01.7                  | 0.921           | 0.871    | 53.4  | 68.5                      | 19.4   |     |
| 1998 05 12           | 23 43.11 | -01 43.1                  | 0.958           | 0.920    | 55.7  | 65.0                      | 19.5   |     |
| 1998 05 17           | 23 53.57 | -01 22.9                  | 0.990           | 0.970    | 58.0  | 62.1                      | 19.6   |     |
| 1998 05 22           | 00 03.61 | -01 02.5                  | 1.017           | 1.020    | 60.3  | 59.6                      | 19.7   |     |
| 1998 05 27           | 00 13.15 | -00 43.1                  | 1.038           | 1.070    | 62.8  | 57.4                      | 19.8   |     |
| 1998 06 01           | 00 22.15 | -00 25.7                  | 1.055           | 1.119    | 65.5  | 55.5                      | 19.9   |     |
| 1998 06 06           | 00 30.59 | -00 11.0                  | 1.066           | 1.168    | 68.2  | 53.8                      | 19.9   |     |
| 1998 06 11           | 00 38.45 | +00 00.5                  | 1.073           | 1.216    | 71.1  | 52.2                      | 20.0   |     |
| 1998 06 16           | 00 45.69 | +00 08.2                  | 1.076           | 1.262    | 74.2  | 50.7                      | 20.0   |     |
| 1998 06 21           | 00 52.28 | +00 11.6                  | 1.075           | 1.308    | 77.4  | 49.3                      | 20.1   |     |
| 1998 06 26           | 00 58.18 | +00 10.0                  | 1.070           | 1.353    | 80.8  | 47.9                      | 20.1   |     |
| 1998 07 01           | 01 03.34 | +00 03.2                  | 1.062           | 1.397    | 84.4  | 46.4                      | 20.1   |     |
| 1998 07 06           | 01 07.72 | -00 09.4                  | 1.051           | 1.440    | 88.2  | 44.9                      | 20.1   |     |
| 1998 07 11           | 01 11.25 | -00 28.3                  | 1.038           | 1.482    | 92.3  | 43.3                      | 20.1   |     |
| 1998 07 16           | 01 13.89 | -00 53.7                  | 1.023           | 1.522    | 96.5  | 41.6                      | 20.1   |     |
| 1998 07 21           | 01 15.56 | -01 26.1                  | 1.006           | 1.562    | 101.1 | 39.7                      | 20.1   |     |
| 1998 07 26           | 01 16.17 | -02 06.0                  | 0.989           | 1.600    | 105.9 | 37.6                      | 20.0   |     |

1998 MAR. 13

M.P.C. 31441

|            |          |          |       |       |       |      |      |
|------------|----------|----------|-------|-------|-------|------|------|
| 1998 07 31 | 01 15.66 | -02 53.4 | 0.972 | 1.637 | 111.0 | 35.4 | 20.0 |
| 1998 08 05 | 01 13.97 | -03 48.3 | 0.955 | 1.673 | 116.3 | 32.9 | 19.9 |
| 1998 08 10 | 01 11.05 | -04 50.5 | 0.939 | 1.708 | 122.0 | 30.2 | 19.8 |
| 1998 08 15 | 01 06.88 | -05 59.3 | 0.926 | 1.742 | 127.9 | 27.3 | 19.8 |
| 1998 08 20 | 01 01.45 | -07 13.8 | 0.915 | 1.775 | 134.1 | 24.2 | 19.7 |
| 1998 08 25 | 00 54.83 | -08 32.3 | 0.909 | 1.807 | 140.5 | 20.9 | 19.6 |
| 1998 08 30 | 00 47.13 | -09 52.6 | 0.908 | 1.838 | 146.9 | 17.5 | 19.5 |
| 1998 09 04 | 00 38.56 | -11 12.3 | 0.912 | 1.868 | 153.2 | 14.1 | 19.5 |
| 1998 09 09 | 00 29.35 | -12 28.7 | 0.922 | 1.897 | 159.0 | 11.0 | 19.4 |
| 1998 09 14 | 00 19.78 | -13 39.2 | 0.939 | 1.925 | 163.5 | 8.5  | 19.4 |
| 1998 09 19 | 00 10.18 | -14 41.6 | 0.963 | 1.952 | 165.5 | 7.4  | 19.4 |
| 1998 09 24 | 00 00.86 | -15 34.3 | 0.994 | 1.978 | 164.1 | 8.0  | 19.5 |
| 1998 09 29 | 23 52.11 | -16 16.3 | 1.031 | 2.003 | 160.2 | 9.8  | 19.7 |
| 1998 10 04 | 23 44.16 | -16 47.4 | 1.076 | 2.027 | 155.0 | 12.0 | 19.9 |
| 1998 10 09 | 23 37.17 | -17 07.9 | 1.126 | 2.050 | 149.5 | 14.3 | 20.1 |
| 1998 10 14 | 23 31.24 | -17 18.8 | 1.182 | 2.073 | 143.9 | 16.5 | 20.3 |
| 1998 10 19 | 23 26.41 | -17 20.9 | 1.242 | 2.094 | 138.3 | 18.4 | 20.5 |
| 1998 10 24 | 23 22.69 | -17 15.2 | 1.307 | 2.114 | 132.9 | 20.1 | 20.7 |
| 1998 10 29 | 23 20.03 | -17 02.8 | 1.376 | 2.134 | 127.7 | 21.6 | 20.9 |
| 1998 11 03 | 23 18.39 | -16 44.7 | 1.448 | 2.153 | 122.7 | 22.8 | 21.1 |

1994 AB<sub>1</sub> $a, e, i = 2.85, 0.59, 5$ 

Elements MPC 23350

| Date       | TT       | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\epsilon$ | $\phi$ | $V$ |
|------------|----------|-----------------|-----------------|----------|-------|------------|--------|-----|
| 1998 04 07 | 22 44.41 | -11 24.0        | 2.542           | 1.872    | 38.9  | 19.6       | 20.4   |     |
| 1998 04 17 | 23 08.76 | -09 02.0        | 2.409           | 1.797    | 42.2  | 22.0       | 20.2   |     |
| 1998 04 27 | 23 34.12 | -06 27.8        | 2.278           | 1.723    | 45.2  | 24.5       | 20.1   |     |
| 1998 05 07 | 00 00.64 | -03 41.6        | 2.150           | 1.650    | 47.7  | 26.9       | 20.0   |     |
| 1998 05 17 | 00 28.57 | -00 44.4        | 2.029           | 1.578    | 49.8  | 29.3       | 19.8   |     |
| 1998 05 27 | 00 58.13 | +02 22.3        | 1.916           | 1.508    | 51.3  | 31.7       | 19.7   |     |
| 1998 06 06 | 01 29.56 | +05 35.7        | 1.814           | 1.441    | 52.4  | 33.9       | 19.5   |     |
| 1998 06 16 | 02 03.07 | +08 51.4        | 1.724           | 1.378    | 53.0  | 36.1       | 19.4   |     |
| 1998 06 26 | 02 38.81 | +12 03.3        | 1.649           | 1.321    | 53.2  | 38.1       | 19.2   |     |
| 1998 07 06 | 03 16.76 | +15 03.4        | 1.588           | 1.270    | 53.0  | 39.7       | 19.1   |     |
| 1998 07 16 | 03 56.74 | +17 42.6        | 1.543           | 1.229    | 52.6  | 41.1       | 19.0   |     |
| 1998 07 26 | 04 38.30 | +19 52.1        | 1.513           | 1.197    | 52.1  | 42.0       | 18.9   |     |
| 1998 08 05 | 05 20.70 | +21 24.8        | 1.497           | 1.176    | 51.6  | 42.5       | 18.9   |     |
| 1998 08 15 | 06 03.04 | +22 16.9        | 1.493           | 1.168    | 51.3  | 42.6       | 18.9   |     |
| 1998 08 25 | 06 44.40 | +22 28.6        | 1.497           | 1.172    | 51.4  | 42.4       | 18.9   |     |
| 1998 09 04 | 07 23.91 | +22 03.8        | 1.508           | 1.189    | 51.9  | 41.9       | 18.9   |     |
| 1998 09 14 | 08 00.99 | +21 09.2        | 1.521           | 1.218    | 53.0  | 41.3       | 19.0   |     |
| 1998 09 24 | 08 35.28 | +19 52.5        | 1.535           | 1.257    | 54.7  | 40.6       | 19.0   |     |
| 1998 10 04 | 09 06.62 | +18 21.6        | 1.546           | 1.305    | 56.9  | 40.0       | 19.1   |     |
| 1998 10 14 | 09 35.04 | +16 43.6        | 1.553           | 1.361    | 59.9  | 39.3       | 19.2   |     |
| 1998 10 24 | 10 00.60 | +15 04.7        | 1.554           | 1.422    | 63.5  | 38.7       | 19.3   |     |
| 1998 11 03 | 10 23.37 | +13 30.1        | 1.547           | 1.488    | 67.7  | 38.1       | 19.3   |     |
| 1998 11 13 | 10 43.42 | +12 04.1        | 1.532           | 1.557    | 72.7  | 37.4       | 19.4   |     |
| 1998 11 23 | 11 00.73 | +10 50.4        | 1.509           | 1.628    | 78.4  | 36.4       | 19.4   |     |
| 1998 12 03 | 11 15.19 | +09 52.3        | 1.479           | 1.701    | 84.8  | 35.2       | 19.5   |     |
| 1998 12 13 | 11 26.66 | +09 12.6        | 1.442           | 1.775    | 92.1  | 33.7       | 19.4   |     |
| 1998 12 23 | 11 34.88 | +08 53.9        | 1.402           | 1.850    | 100.2 | 31.6       | 19.4   |     |
| 1999 01 02 | 11 39.56 | +08 58.2        | 1.361           | 1.924    | 109.3 | 28.8       | 19.4   |     |
| 1999 01 12 | 11 40.47 | +09 26.1        | 1.323           | 1.998    | 119.3 | 25.4       | 19.3   |     |
| 1999 01 22 | 11 37.44 | +10 16.5        | 1.294           | 2.072    | 130.4 | 21.2       | 19.2   |     |

|            |          |          |       |       |       |      |      |
|------------|----------|----------|-------|-------|-------|------|------|
| 1999 02 01 | 11 30.68 | +11 24.8 | 1.279 | 2.145 | 142.3 | 16.3 | 19.1 |
| 1999 02 11 | 11 20.83 | +12 43.3 | 1.284 | 2.217 | 154.7 | 11.0 | 19.0 |
| 1999 02 21 | 11 09.02 | +14 01.5 | 1.315 | 2.288 | 166.6 | 5.8  | 18.9 |
| 1999 03 03 | 10 56.78 | +15 09.0 | 1.373 | 2.358 | 171.9 | 3.4  | 18.9 |
| 1999 03 13 | 10 45.58 | +15 58.5 | 1.459 | 2.427 | 163.1 | 6.8  | 19.3 |
| 1999 03 23 | 10 36.55 | +16 26.9 | 1.572 | 2.495 | 151.8 | 10.9 | 19.6 |
| 1999 04 02 | 10 30.33 | +16 34.8 | 1.708 | 2.561 | 140.8 | 14.3 | 20.0 |
| 1999 04 12 | 10 27.02 | +16 25.0 | 1.863 | 2.627 | 130.5 | 16.9 | 20.3 |
| 1999 04 22 | 10 26.45 | +16 00.4 | 2.033 | 2.691 | 120.8 | 18.7 | 20.6 |
| 1999 05 02 | 10 28.30 | +15 24.1 | 2.215 | 2.753 | 111.8 | 19.9 | 20.9 |

P/1988 V1 (Ge-Wang)

| Date       | TT       | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | Variation | Elements MPC 27081 | $m_1$ | $m_2$ |
|------------|----------|-----------------|-----------------|----------|-------|-----------|--------------------|-------|-------|
| 1998 04 27 | 18 14.08 | -08 54.6        | 3.241           | 3.867    | -0.67 | -0.1      | 19.9               |       |       |
| 1998 05 07 | 18 13.36 | -08 18.2        | 3.084           | 3.823    | -0.71 | -0.2      | 19.7               |       |       |
| 1998 05 17 | 18 10.95 | -07 44.6        | 2.944           | 3.779    | -0.74 | -0.2      | 19.5               |       |       |
| 1998 05 27 | 18 06.94 | -07 15.6        | 2.826           | 3.734    | -0.77 | -0.2      | 19.3               |       |       |
| 1998 06 06 | 18 01.57 | -06 53.2        | 2.731           | 3.690    | -0.79 | -0.3      | 19.2               |       |       |
| 1998 06 16 | 17 55.26 | -06 39.2        | 2.663           | 3.645    | -0.80 | -0.3      | 19.1               |       |       |
| 1998 06 26 | 17 48.49 | -06 34.8        | 2.622           | 3.601    | -0.80 | -0.3      | 18.9               |       |       |
| 1998 07 06 | 17 41.88 | -06 40.7        | 2.608           | 3.557    | -0.79 | -0.2      | 18.8               |       |       |
| 1998 07 16 | 17 36.02 | -06 56.6        | 2.619           | 3.512    | -0.77 | -0.2      | 18.8               |       |       |
| 1998 07 26 | 17 31.41 | -07 21.6        | 2.653           | 3.468    | -0.75 | -0.1      | 18.7               |       |       |
| 1998 08 05 | 17 28.46 | -07 54.3        | 2.708           | 3.425    | -0.72 | -0.1      | 18.7               |       |       |
| 1998 08 15 | 17 27.41 | -08 32.7        | 2.777           | 3.381    | -0.70 | +0.0      | 18.7               |       |       |
| 1998 08 25 | 17 28.37 | -09 15.1        | 2.859           | 3.338    | -0.68 | +0.1      | 18.6               |       |       |
| 1998 09 04 | 17 31.34 | -09 59.4        | 2.948           | 3.295    | -0.66 | +0.2      | 18.6               |       |       |
| 1998 09 14 | 17 36.26 | -10 43.9        | 3.042           | 3.252    | -0.65 | +0.2      | 18.6               |       |       |
| 1998 09 24 | 17 43.00 | -11 27.0        | 3.137           | 3.210    | -0.64 | +0.3      | 18.6               |       |       |
| 1998 10 04 | 17 51.45 | -12 07.2        | 3.230           | 3.168    | -0.63 | +0.3      | 18.6               |       |       |
| 1998 10 14 | 18 01.43 | -12 43.2        | 3.320           | 3.127    | -0.63 | +0.3      | 18.5               |       |       |
| 1998 10 24 | 18 12.81 | -13 13.9        | 3.404           | 3.087    | -0.63 | +0.2      | 18.5               |       |       |
| 1998 11 03 | 18 25.45 | -13 38.2        | 3.481           | 3.047    | -0.64 | +0.2      | 18.5               |       |       |
| 1998 11 13 | 18 39.18 | -13 55.3        | 3.549           | 3.008    | -0.65 | +0.1      | 18.4               |       |       |
| 1998 11 23 | 18 53.89 | -14 04.5        | 3.608           | 2.969    | -0.66 | +0.0      | 18.4               |       |       |
| 1998 12 03 | 19 09.43 | -14 05.0        | 3.656           | 2.932    | -0.67 | -0.2      | 18.3               |       |       |
| 1998 12 13 | 19 25.67 | -13 56.7        | 3.693           | 2.895    | -0.69 | -0.3      | 18.3               |       |       |

102P/Shoemaker 1

Elements MPC 27081

| Date       | TT       | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\epsilon$ | $\phi$ | $m_1$ | $m_2$ |
|------------|----------|-----------------|-----------------|----------|-------|------------|--------|-------|-------|
| 1998 04 27 | 19 01.29 | -54 22.3        | 2.601           | 3.122    | 112.1 | 17.4       | 18.5   | 22.5  |       |
| 1998 05 07 | 19 05.04 | -55 38.0        | 2.454           | 3.075    | 119.2 | 16.7       | 18.2   | 22.3  |       |
| 1998 05 17 | 19 05.24 | -56 54.2        | 2.320           | 3.027    | 126.0 | 15.7       | 17.9   | 22.1  |       |
| 1998 05 27 | 19 01.35 | -58 06.0        | 2.201           | 2.980    | 132.5 | 14.5       | 17.7   | 21.9  |       |
| 1998 06 06 | 18 53.13 | -59 06.0        | 2.099           | 2.933    | 138.0 | 13.4       | 17.5   | 21.7  |       |
| 1998 06 16 | 18 40.93 | -59 45.2        | 2.017           | 2.885    | 141.9 | 12.6       | 17.2   | 21.6  |       |
| 1998 06 26 | 18 25.86 | -59 54.7        | 1.956           | 2.838    | 143.4 | 12.3       | 17.0   | 21.5  |       |
| 1998 07 06 | 18 09.96 | -59 28.5        | 1.916           | 2.790    | 142.2 | 12.9       | 16.8   | 21.4  |       |
| 1998 07 16 | 17 55.52 | -58 26.3        | 1.898           | 2.743    | 138.4 | 14.2       | 16.7   | 21.4  |       |
| 1998 07 26 | 17 44.44 | -56 53.2        | 1.901           | 2.696    | 132.8 | 16.0       | 16.5   | 21.4  |       |
| 1998 08 05 | 17 37.82 | -54 57.8        | 1.921           | 2.649    | 126.2 | 18.0       | 16.4   | 21.5  |       |
| 1998 08 15 | 17 35.87 | -52 49.5        | 1.957           | 2.603    | 119.0 | 19.9       | 16.3   | 21.5  |       |
| 1998 08 25 | 17 38.28 | -50 35.6        | 2.006           | 2.558    | 111.6 | 21.6       | 16.2   | 21.6  |       |
| 1998 09 04 | 17 44.52 | -48 21.0        | 2.065           | 2.512    | 104.4 | 22.9       | 16.1   | 21.7  |       |

|            |          |          |       |       |      |      |      |      |
|------------|----------|----------|-------|-------|------|------|------|------|
| 1998 09 14 | 17 53.96 | −46 08.6 | 2.130 | 2.468 | 97.2 | 23.9 | 16.0 | 21.7 |
| 1998 09 24 | 18 06.05 | −43 58.7 | 2.201 | 2.425 | 90.4 | 24.4 | 15.9 | 21.8 |
| 1998 10 04 | 18 20.28 | −41 50.9 | 2.274 | 2.382 | 83.7 | 24.7 | 15.8 | 21.8 |
| 1998 10 14 | 18 36.20 | −39 43.8 | 2.348 | 2.341 | 77.3 | 24.6 | 15.7 | 21.8 |
| 1998 10 24 | 18 53.46 | −37 35.8 | 2.421 | 2.301 | 71.2 | 24.2 | 15.7 | 21.9 |
| 1998 11 03 | 19 11.75 | −35 25.3 | 2.491 | 2.263 | 65.2 | 23.5 | 15.6 | 21.9 |
| 1998 11 13 | 19 30.79 | −33 10.6 | 2.559 | 2.226 | 59.5 | 22.5 | 15.5 | 21.9 |
| 1998 11 23 | 19 50.37 | −30 50.5 | 2.622 | 2.191 | 53.9 | 21.4 | 15.4 | 21.8 |
| 1998 12 03 | 20 10.32 | −28 24.0 | 2.681 | 2.158 | 48.5 | 20.0 | 15.3 | 21.8 |
| 1998 12 13 | 20 30.46 | −25 50.4 | 2.735 | 2.127 | 43.2 | 18.5 | 15.2 | 21.8 |
| 1998 12 23 | 20 50.70 | −23 09.3 | 2.783 | 2.099 | 38.1 | 16.8 | 15.2 | 21.7 |
| 1999 01 02 | 21 10.95 | −20 20.7 | 2.826 | 2.073 | 33.1 | 15.0 | 15.1 | 21.7 |

**C/1997 P2 (Spacewatch)**

| Date       | TT       | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | Elements <i>MPC</i> 30738 |        |             |
|------------|----------|-----------------|-----------------|----------|-------|---------------------------|--------|-------------|
|            |          |                 |                 |          |       | $\epsilon$                | $\phi$ | $m_1$ $m_2$ |
| 1998 04 27 | 00 12.72 | +12 59.6        | 5.552           | 4.709    | 30.2  | 6.2                       | 20.5   |             |
| 1998 05 07 | 00 21.88 | +14 18.1        | 5.512           | 4.745    | 37.0  | 7.3                       | 20.5   |             |
| 1998 05 17 | 00 30.56 | +15 34.9        | 5.458           | 4.781    | 43.9  | 8.4                       | 20.5   |             |
| 1998 05 27 | 00 38.68 | +16 49.8        | 5.392           | 4.819    | 51.0  | 9.4                       | 20.5   |             |
| 1998 06 06 | 00 46.15 | +18 02.0        | 5.314           | 4.857    | 58.2  | 10.2                      | 20.5   |             |
| 1998 06 16 | 00 52.89 | +19 11.2        | 5.228           | 4.897    | 65.6  | 10.9                      | 20.5   |             |
| 1998 06 26 | 00 58.78 | +20 16.8        | 5.133           | 4.937    | 73.3  | 11.4                      | 20.5   |             |
| 1998 07 06 | 01 03.73 | +21 18.1        | 5.034           | 4.979    | 81.1  | 11.6                      | 20.5   |             |
| 1998 07 16 | 01 07.65 | +22 14.4        | 4.932           | 5.021    | 89.2  | 11.7                      | 20.5   |             |
| 1998 07 26 | 01 10.44 | +23 05.1        | 4.831           | 5.064    | 97.5  | 11.5                      | 20.5   |             |
| 1998 08 05 | 01 12.02 | +23 49.0        | 4.733           | 5.108    | 106.1 | 11.0                      | 20.5   |             |
| 1998 08 15 | 01 12.37 | +24 25.4        | 4.643           | 5.153    | 114.9 | 10.3                      | 20.5   |             |
| 1998 08 25 | 01 11.50 | +24 53.3        | 4.565           | 5.198    | 124.0 | 9.3                       | 20.5   |             |
| 1998 09 04 | 01 09.49 | +25 11.6        | 4.502           | 5.244    | 133.2 | 8.1                       | 20.5   |             |
| 1998 09 14 | 01 06.51 | +25 20.0        | 4.459           | 5.291    | 142.3 | 6.7                       | 20.5   |             |
| 1998 09 24 | 01 02.78 | +25 18.3        | 4.438           | 5.338    | 151.1 | 5.2                       | 20.5   |             |
| 1998 10 04 | 00 58.62 | +25 06.9        | 4.443           | 5.386    | 158.6 | 3.9                       | 20.6   |             |
| 1998 10 14 | 00 54.37 | +24 47.2        | 4.476           | 5.435    | 162.5 | 3.2                       | 20.6   |             |
| 1998 10 24 | 00 50.38 | +24 21.1        | 4.537           | 5.484    | 160.4 | 3.5                       | 20.7   |             |
| 1998 11 03 | 00 46.98 | +23 51.0        | 4.627           | 5.534    | 153.8 | 4.5                       | 20.8   |             |
| 1998 11 13 | 00 44.42 | +23 19.5        | 4.744           | 5.585    | 145.1 | 5.8                       | 20.9   |             |
| 1998 11 23 | 00 42.88 | +22 49.1        | 4.885           | 5.635    | 135.8 | 7.0                       | 21.0   |             |
| 1998 12 03 | 00 42.48 | +22 22.1        | 5.048           | 5.687    | 126.3 | 8.0                       | 21.1   |             |
| 1998 12 13 | 00 43.23 | +22 00.0        | 5.227           | 5.739    | 116.8 | 8.8                       | 21.2   |             |
| 1998 12 23 | 00 45.10 | +21 44.0        | 5.420           | 5.791    | 107.4 | 9.3                       | 21.3   |             |
| 1999 01 02 | 00 48.05 | +21 34.8        | 5.622           | 5.844    | 98.2  | 9.6                       | 21.4   |             |

**P/1990 UL<sub>3</sub> (Shoemaker-Levy 2)**

| Date       | TT       | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | Elements <i>MPC</i> 29881 |       |       |
|------------|----------|-----------------|-----------------|----------|-------|---------------------------|-------|-------|
|            |          |                 |                 |          |       | Variation                 | $m_1$ | $m_2$ |
| 1998 05 07 | 16 24.95 | −20 44.9        | 3.943           | 4.895    | −0.39 | +0.5                      | 20.9  | 22.8  |
| 1998 05 17 | 16 18.82 | −20 25.4        | 3.855           | 4.852    | −0.39 | +0.5                      | 20.8  | 22.6  |
| 1998 05 27 | 16 12.14 | −20 03.8        | 3.796           | 4.809    | −0.39 | +0.5                      | 20.7  | 22.4  |
| 1998 06 06 | 16 05.35 | −19 41.3        | 3.769           | 4.766    | −0.39 | +0.6                      | 20.7  | 22.5  |
| 1998 06 16 | 15 58.93 | −19 19.2        | 3.771           | 4.722    | −0.38 | +0.6                      | 20.6  | 22.7  |
| 1998 06 26 | 15 53.26 | −18 59.1        | 3.800           | 4.677    | −0.36 | +0.6                      | 20.6  | 22.8  |

**55P/Tempel-Tuttle**

| Date       | TT       | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\epsilon$ | $\phi$ | $m_1$ | $m_2$ |
|------------|----------|-----------------|-----------------|----------|-------|------------|--------|-------|-------|
| 1998 05 07 | 01 09.08 | −03 54.2        | 2.184           | 1.451    | 33.4  | 22.5       | 15.7   | 19.6  |       |
| 1998 05 17 | 01 07.12 | −05 54.7        | 2.120           | 1.562    | 44.1  | 26.8       | 16.5   | 19.8  |       |
| 1998 05 27 | 01 03.63 | −08 18.8        | 2.027           | 1.674    | 55.4  | 29.9       | 17.1   | 20.0  |       |
| 1998 06 06 | 00 57.83 | −11 16.3        | 1.914           | 1.788    | 67.3  | 31.6       | 17.7   | 20.0  |       |
| 1998 06 16 | 00 48.63 | −14 57.5        | 1.791           | 1.902    | 80.2  | 31.7       | 18.2   | 20.0  |       |
| 1998 06 26 | 00 34.57 | −19 31.7        | 1.670           | 2.016    | 94.1  | 30.2       | 18.7   | 19.9  |       |
| 1998 07 06 | 00 13.70 | −25 00.6        | 1.565           | 2.130    | 109.3 | 26.8       | 19.2   | 19.8  |       |
| 1998 07 16 | 23 43.92 | −31 06.8        | 1.496           | 2.242    | 125.3 | 21.7       | 19.6   | 19.7  |       |
| 1998 07 26 | 23 03.98 | −37 02.7        | 1.481           | 2.354    | 140.4 | 16.0       |        | 19.6  |       |
| 1998 08 05 | 22 15.84 | −41 40.4        | 1.531           | 2.464    | 150.5 | 11.7       |        | 19.6  |       |
| 1998 08 15 | 21 26.00 | −44 14.0        | 1.647           | 2.574    | 149.8 | 11.4       |        | 19.8  |       |
| 1998 08 25 | 20 42.18 | −44 51.1        | 1.822           | 2.682    | 140.7 | 13.8       |        | 20.2  |       |
| 1998 09 04 | 20 08.61 | −44 13.6        | 2.042           | 2.789    | 128.9 | 16.3       |        | 20.7  |       |
| 1998 09 14 | 19 45.22 | −43 02.4        | 2.293           | 2.894    | 117.1 | 18.0       |        | 21.0  |       |
| 1998 09 24 | 19 30.10 | −41 42.0        | 2.564           | 2.999    | 105.9 | 18.8       |        | 21.4  |       |
| 1998 10 04 | 19 21.20 | −40 24.5        | 2.845           | 3.102    | 95.3  | 18.7       |        | 21.7  |       |
| 1998 10 14 | 19 16.80 | −39 14.2        | 3.129           | 3.203    | 85.2  | 18.1       |        | 21.9  |       |
| 1998 10 24 | 19 15.68 | −38 11.9        | 3.409           | 3.304    | 75.5  | 16.9       |        | 22.2  |       |
| 1998 11 03 | 19 16.95 | −37 17.4        | 3.680           | 3.403    | 66.2  | 15.5       |        | 22.3  |       |
| 1998 11 13 | 19 19.96 | −36 29.5        | 3.937           | 3.502    | 57.2  | 13.7       |        | 22.5  |       |

**84P/Giclas**

| Date       | TT       | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$   | $\epsilon$ | $\phi$ | $m_1$ | $m_2$ |
|------------|----------|-----------------|-----------------|----------|-------|------------|--------|-------|-------|
| 1998 05 17 | 18 25.24 | −19 07.7        | 2.943           | 3.773    | 139.8 | 10.0       |        | 22.4  |       |
| 1998 05 27 | 18 20.42 | −19 12.4        | 2.814           | 3.729    | 150.5 | 7.7        |        | 22.2  |       |
| 1998 06 06 | 18 13.95 | −19 19.8        | 2.710           | 3.686    | 161.4 | 5.0        |        | 21.9  |       |
| 1998 06 16 | 18 06.23 | −19 29.3        | 2.633           | 3.642    | 172.2 | 2.2        |        | 21.7  |       |
| 1998 06 26 | 17 57.79 | −19 40.5        | 2.584           | 3.597    | 173.9 | 1.7        |        | 21.6  |       |
| 1998 07 06 | 17 49.34 | −19 53.0        | 2.566           | 3.552    | 163.3 | 4.7        |        | 21.7  |       |
| 1998 07 16 | 17 41.57 | −20 06.5        | 2.575           | 3.506    | 152.2 | 7.8        |        | 21.8  |       |
| 1998 07 26 | 17 35.11 | −20 21.2        | 2.609           | 3.459    | 141.2 | 10.6       |        | 21.9  |       |
| 1998 08 05 | 17 30.45 | −20 37.1        | 2.664           | 3.413    | 130.6 | 13.0       |        | 22.1  |       |
| 1998 08 15 | 17 27.88 | −20 54.3        | 2.737           | 3.365    | 120.5 | 15.0       |        | 22.2  |       |
| 1998 08 25 | 17 27.54 | −21 12.9        | 2.821           | 3.318    | 110.8 | 16.6       | 22.2   | 22.2  |       |
| 1998 09 04 | 17 29.44 | −21 32.5        | 2.914           | 3.269    | 101.6 | 17.6       | 22.1   | 22.3  |       |
| 1998 09 14 | 17 33.48 | −21 52.4        | 3.010           | 3.221    | 92.8  | 18.2       | 22.1   | 22.4  |       |
| 1998 09 24 | 17 39.54 | −22 12.1        | 3.107           | 3.172    | 84.5  | 18.4       | 22.0   | 22.4  |       |
| 1998 10 04 | 17 47.46 | −22 30.4        | 3.200           | 3.122    | 76.5  | 18.2       | 21.9   | 22.4  |       |
| 1998 10 14 | 17 57.06 | −22 46.5        | 3.288           | 3.072    | 68.9  | 17.6       | 21.8   | 22.4  |       |
| 1998 10 24 | 18 08.20 | −22 59.4        | 3.368           | 3.022    | 61.5  | 16.8       | 21.7   | 22.4  |       |

**C/1997 D1 (Mueller)**

| Date       | TT       | $\alpha_{2000}$ | $\delta_{2000}$ | $\Delta$ | $r$  | $\epsilon$ | $\phi$ | $m_1$ | $m_2$ |
|------------|----------|-----------------|-----------------|----------|------|------------|--------|-------|-------|
| 1998 05 17 | 02 55.61 | −13 05.6        | 4.080           | 3.287    | 33.7 | 9.8        | 15.7   |       |       |
| 1998 05 27 | 02 59.33 | −13 51.3        | 4.081           | 3.363    | 39.6 | 11.1       | 15.8   |       |       |
| 1998 06 06 | 03 02.61 | −14 50.4        | 4.058           | 3.440    | 46.5 | 12.4       | 15.9   |       |       |
| 1998 06 16 | 03 05.25 | −16 04.1        | 4.016           | 3.518    | 54.1 | 13.5       | 16.0   |       |       |
| 1998 06 26 | 03 07.04 | −17 33.7        | 3.957           | 3.596    | 62.1 | 14.5       | 16.0   |       |       |
| 1998 07 06 | 03 07.74 | −19 20.3        | 3.886           | 3.675    | 70.6 | 15.1       | 16.1   |       |       |
| 1998 07 16 | 03 07.07 | −21 24.3        | 3.808           | 3.754    | 79.3 | 15.4       | 16.1   |       |       |
| 1998 07 26 | 03 04.72 | −23 45.5        | 3.728           | 3.834    | 88.3 | 15.4       | 16.2   |       |       |
| 1998 08 05 | 03 00.35 | −26 22.4        | 3.654           | 3.914    | 97.3 | 14.9       | 16.2   |       |       |

|            |          |          |       |       |       |      |      |
|------------|----------|----------|-------|-------|-------|------|------|
| 1998 08 15 | 02 53.62 | -29 11.6 | 3.591 | 3.995 | 106.3 | 14.1 | 16.3 |
| 1998 08 25 | 02 44.24 | -32 07.6 | 3.546 | 4.075 | 114.8 | 13.0 | 16.3 |
| 1998 09 04 | 02 32.00 | -35 02.0 | 3.527 | 4.156 | 122.4 | 11.8 | 16.4 |
| 1998 09 14 | 02 16.96 | -37 44.8 | 3.539 | 4.237 | 128.3 | 10.7 | 16.5 |
| 1998 09 24 | 01 59.49 | -40 05.7 | 3.586 | 4.318 | 131.6 | 10.0 | 16.6 |
| 1998 10 04 | 01 40.39 | -41 55.4 | 3.669 | 4.399 | 131.8 | 9.8  | 16.8 |
| 1998 10 14 | 01 20.79 | -43 09.1 | 3.787 | 4.481 | 128.8 | 10.0 | 16.9 |
| 1998 10 24 | 01 01.92 | -43 46.1 | 3.938 | 4.562 | 123.4 | 10.5 | 17.1 |
| 1998 11 03 | 00 44.87 | -43 50.0 | 4.117 | 4.643 | 116.4 | 11.0 | 17.2 |
| 1998 11 13 | 00 30.35 | -43 27.3 | 4.318 | 4.724 | 108.4 | 11.5 | 17.4 |
| 1998 11 23 | 00 18.67 | -42 45.0 | 4.535 | 4.805 | 100.0 | 11.7 | 17.6 |
| 1998 12 03 | 00 09.82 | -41 49.6 | 4.762 | 4.886 | 91.4  | 11.6 | 17.8 |
| 1998 12 13 | 00 03.57 | -40 46.7 | 4.992 | 4.967 | 82.9  | 11.3 | 18.0 |
| 1998 12 23 | 23 59.62 | -39 40.3 | 5.221 | 5.048 | 74.5  | 10.8 | 18.1 |
| 1999 01 02 | 23 57.60 | -38 33.5 | 5.444 | 5.128 | 66.3  | 10.1 | 18.3 |
| 1999 01 12 | 23 57.18 | -37 28.5 | 5.655 | 5.209 | 58.5  | 9.3  | 18.4 |
| 1999 01 22 | 23 58.06 | -36 26.7 | 5.850 | 5.289 | 51.1  | 8.3  | 18.6 |

| 77P/Longmore |          |                 | Elements MPC 20123 |          |       |            |        |             |
|--------------|----------|-----------------|--------------------|----------|-------|------------|--------|-------------|
| Date         | TT       | $\alpha_{2000}$ | $\delta_{2000}$    | $\Delta$ | $r$   | $\epsilon$ | $\phi$ | $m_1$ $m_2$ |
| 1998 07 06   | 01 29.33 | +07 17.7        | 4.809              | 4.747    | 80.4  | 12.2       |        | 22.5        |
| 1998 07 16   | 01 32.13 | +07 51.3        | 4.665              | 4.759    | 89.1  | 12.3       |        | 22.5        |
| 1998 07 26   | 01 33.76 | +08 19.1        | 4.519              | 4.769    | 98.1  | 12.2       |        | 22.4        |
| 1998 08 05   | 01 34.12 | +08 40.7        | 4.377              | 4.780    | 107.4 | 11.7       |        | 22.3        |
| 1998 08 15   | 01 33.12 | +08 55.8        | 4.242              | 4.790    | 117.2 | 10.8       |        | 22.2        |
| 1998 08 25   | 01 30.72 | +09 04.2        | 4.119              | 4.799    | 127.3 | 9.6        |        | 22.1        |
| 1998 09 04   | 01 26.95 | +09 05.9        | 4.013              | 4.808    | 137.8 | 8.1        |        | 22.0        |
| 1998 09 14   | 01 21.95 | +09 01.3        | 3.929              | 4.817    | 148.7 | 6.2        |        | 21.9        |
| 1998 09 24   | 01 15.93 | +08 51.1        | 3.871              | 4.825    | 159.9 | 4.1        |        | 21.7        |
| 1998 10 04   | 01 09.23 | +08 36.6        | 3.842              | 4.833    | 171.3 | 1.8        |        | 21.6        |
| 1998 10 14   | 01 02.27 | +08 19.5        | 3.844              | 4.840    | 176.7 | 0.7        |        | 21.5        |
| 1998 10 24   | 00 55.48 | +08 02.1        | 3.878              | 4.847    | 165.3 | 3.0        |        | 21.7        |
| 1998 11 03   | 00 49.29 | +07 46.4        | 3.943              | 4.854    | 153.9 | 5.2        |        | 21.8        |
| 1998 11 13   | 00 44.07 | +07 34.5        | 4.036              | 4.860    | 142.6 | 7.1        |        | 22.0        |
| 1998 11 23   | 00 40.06 | +07 28.1        | 4.154              | 4.866    | 131.6 | 8.7        |        | 22.1        |
| 1998 12 03   | 00 37.43 | +07 28.2        | 4.291              | 4.871    | 120.9 | 10.0       |        | 22.2        |
| 1998 12 13   | 00 36.22 | +07 35.6        | 4.443              | 4.876    | 110.5 | 10.9       |        | 22.4        |
| 1998 12 23   | 00 36.41 | +07 50.3        | 4.604              | 4.880    | 100.5 | 11.4       |        | 22.5        |
| 1999 01 02   | 00 37.92 | +08 12.3        | 4.770              | 4.884    | 90.8  | 11.6       |        | 22.5        |

## OPPOSITION DATA

| Planet                | Opposition   | $\alpha_{2000}$ | $\delta_{2000}$ | $V$  | $\dot{\alpha}$ | $\dot{\delta}$ | $\phi_{\text{MIN}}$ | MPC   |
|-----------------------|--------------|-----------------|-----------------|------|----------------|----------------|---------------------|-------|
| 1991 PU               | 1998 02 13.0 | 09 45.67        | +09 40.5        | 17.6 | -0.91          | + 3.6          | 1.2/14.0            | 24104 |
| 1998 BB <sub>42</sub> | 1998 02 13.0 | 09 45.98        | +22 34.4        | 16.9 | -1.03          | + 3.0          | 3.3/10.8            | 31402 |
| (8422)                | 1998 02 13.0 | 09 46.02        | +16 50.5        | 18.4 | -0.82          | + 4.6          | 0.9/12.1            | 31370 |
| (8258)                | 1998 02 13.1 | 09 46.11        | +19 53.6        | 18.3 | -1.09          | + 4.0          | 2.3/11.5            | 31209 |
| 1992 SC <sub>1</sub>  | 1998 02 13.1 | 09 46.14        | +13 19.1        | 17.3 | -0.92          | + 6.2          | 0.0/13.2            | 30782 |
| 3233 T-1              | 1998 02 13.1 | 09 46.20        | +21 58.5        | 17.7 | -1.00          | + 2.0          | 3.2/11.1            | 31436 |
| 1998 BL <sub>25</sub> | 1998 02 13.2 | 09 46.49        | +12 34.1        | 17.4 | -0.84          | + 6.1          | 0.3/13.5            | 31400 |
| 1996 SY <sub>4</sub>  | 1998 02 13.2 | 09 46.57        | +18 03.5        | 19.3 | -1.00          | + 5.2          | 1.5/12.0            | 31142 |
| 1998 DA               | 1998 02 13.3 | 09 46.86        | +20 47.4        | 17.3 | -0.90          | + 6.0          | 2.4/11.2            | 31405 |
| (7343)                | 1998 02 13.3 | 09 46.89        | +18 25.9        | 16.6 | -1.16          | + 3.8          | 2.2/12.1            | 28574 |
| 1998 CH <sub>2</sub>  | 1998 02 13.3 | 09 47.05        | +19 47.2        | 18.2 | -1.07          | + 0.3          | 2.9/11.9            | 31405 |

|                       |              |          |          |      |       |       |           |       |
|-----------------------|--------------|----------|----------|------|-------|-------|-----------|-------|
| 1978 RX <sub>7</sub>  | 1998 02 13.3 | 09 47.12 | +12 53.3 | 17.1 | -1.02 | + 2.8 | 0.2/13.5  | 31414 |
| 1979 MJ <sub>8</sub>  | 1998 02 13.5 | 09 47.72 | +06 34.1 | 19.2 | -0.95 | + 5.2 | 2.3/15.3  | 30779 |
| 1975 SP <sub>1</sub>  | 1998 02 13.5 | 09 47.81 | +02 18.3 | 20.4 | -0.86 | + 5.9 | 3.3/16.7  | 25526 |
| 1981 EC <sub>40</sub> | 1998 02 13.5 | 09 48.01 | +05 27.7 | 19.3 | -0.95 | + 2.5 | 2.4/15.5  | 26922 |
| 1979 MX <sub>3</sub>  | 1998 02 13.6 | 09 48.28 | +08 19.2 | 20.6 | -1.03 | + 5.1 | 1.7/14.9  | 30778 |
| (7550)                | 1998 02 13.6 | 09 48.33 | +04 50.0 | 18.5 | -0.99 | + 5.9 | 2.9/15.9  | 29589 |
| (8367)                | 1998 02 13.6 | 09 48.50 | +23 36.8 | 16.2 | -1.12 | + 5.5 | 4.5/11.0  | 31358 |
| 1993 TC <sub>3</sub>  | 1998 02 13.7 | 09 48.75 | +11 43.8 | 18.1 | -1.05 | + 6.4 | 0.5/14.2  | 31419 |
| (7379)                | 1998 02 13.8 | 09 49.20 | +10 00.6 | 19.0 | -0.90 | + 4.1 | 1.0/14.7  | 28821 |
| (7616)                | 1998 02 13.9 | 09 49.56 | -01 12.0 | 16.4 | -0.79 | + 4.0 | 4.2/18.0  | 29604 |
| (7365)                | 1998 02 13.9 | 09 49.60 | +10 03.2 | 17.3 | -1.01 | + 7.7 | 1.1/14.9  | 28579 |
| (8404)                | 1998 02 14.0 | 09 49.69 | +28 30.1 | 15.3 | -1.77 | - 8.4 | 8.1/12.3  | 31366 |
| (7501)                | 1998 02 14.0 | 09 49.74 | +11 29.5 | 17.0 | -0.74 | + 4.1 | 0.4/14.5  | 29090 |
| 2087 T-2              | 1998 02 14.0 | 09 49.76 | +15 10.1 | 18.0 | -0.91 | + 3.5 | 0.6/13.5  | 21978 |
| (8381)                | 1998 02 14.1 | 09 49.99 | +00 26.2 | 17.1 | -0.90 | + 5.7 | 5.2/17.7  | 31361 |
| 1998 BP <sub>25</sub> | 1998 02 14.1 | 09 50.36 | +14 11.2 | 16.6 | -0.79 | + 5.2 | 0.4/13.9  | 31401 |
| 1986 WB               | 1998 02 14.3 | 09 51.19 | +26 23.8 | 16.9 | -1.10 | + 5.3 | 5.3/10.8  | 31416 |
| 1995 FH <sub>5</sub>  | 1998 02 14.4 | 09 51.55 | +37 24.2 | 19.6 | -1.44 | - 0.2 | 8.2/09.1  | 29946 |
| 1991 PO <sub>8</sub>  | 1998 02 14.4 | 09 51.61 | +14 15.2 | 19.6 | -0.91 | + 3.1 | 0.4/14.2  | 22083 |
| 1994 EH <sub>7</sub>  | 1998 02 14.6 | 09 52.26 | +28 14.0 | 17.8 | -1.07 | + 2.4 | 4.8/10.7  | 31276 |
| 1996 VT <sub>8</sub>  | 1998 02 14.7 | 09 52.67 | +33 11.3 | 18.2 | -0.99 | + 4.5 | 5.9/08.9  | 31249 |
| (7346)                | 1998 02 14.9 | 09 53.24 | +15 04.1 | 16.9 | -0.84 | + 5.2 | 0.7/14.3  | 28574 |
| 4025 P-L              | 1998 02 14.9 | 09 53.37 | +01 43.2 | 17.0 | -0.96 | + 8.0 | 4.7/18.2  | 31294 |
| 1991 NL               | 1998 02 14.9 | 09 53.41 | -09 43.0 | 18.0 | -0.93 | + 2.5 | 6.9/20.8  | 31229 |
| (7461)                | 1998 02 15.1 | 09 53.99 | +12 40.5 | 17.6 | -0.78 | + 4.1 | 0.0/15.2  | 29079 |
| 2287 T-2              | 1998 02 15.2 | 09 54.55 | +08 04.2 | 17.7 | -0.83 | + 6.4 | 1.5/16.6  | 21978 |
| 6755 P-L              | 1998 02 15.3 | 09 54.82 | +13 48.8 | 19.0 | -0.84 | + 4.2 | 0.3/15.0  | 29314 |
| 1996 VX <sub>8</sub>  | 1998 02 15.4 | 09 55.17 | +04 04.8 | 17.8 | -0.96 | + 6.1 | 2.9/17.8  | 31279 |
| 1994 EJ <sub>1</sub>  | 1998 02 15.4 | 09 55.34 | -06 14.6 | 16.1 | -0.78 | +11.4 | 6.4/22.1  | 31420 |
| (8345)                | 1998 02 15.4 | 09 55.40 | -24 16.6 | 16.2 | -1.27 | - 2.5 | 15.1/25.4 | 31353 |
| 1988 XE               | 1998 02 15.4 | 09 55.45 | -09 33.1 | 16.3 | -0.98 | + 3.8 | 8.4/22.0  | 30780 |
| 1990 RO <sub>6</sub>  | 1998 02 15.5 | 09 55.46 | +13 56.5 | 18.5 | -0.84 | + 4.0 | 0.4/15.1  | 31379 |
| 1995 MB               | 1998 02 15.6 | 09 56.24 | -23 21.7 | 18.2 | -1.16 | - 2.4 | 12.1/23.0 | 25963 |
| 1998 CC <sub>2</sub>  | 1998 02 15.7 | 09 56.37 | +11 09.0 | 16.6 | -1.02 | + 1.6 | 0.6/16.1  | 31404 |
| 1993 FW <sub>34</sub> | 1998 02 15.7 | 09 56.38 | +13 16.5 | 17.5 | -0.74 | + 4.5 | 0.2/15.5  | 28616 |
| (7549)                | 1998 02 15.8 | 09 56.91 | -02 16.0 | 17.0 | -0.78 | + 4.6 | 4.5/20.2  | 29589 |
| 1996 VP <sub>1</sub>  | 1998 02 15.8 | 09 57.00 | -05 21.8 | 17.8 | -0.89 | + 3.0 | 4.9/20.7  | 31248 |
| 1079 T-2              | 1998 02 16.0 | 09 57.64 | +14 20.7 | 17.6 | -0.89 | + 4.3 | 0.6/15.5  | 31436 |
| (8403)                | 1998 02 16.1 | 09 57.94 | +01 59.5 | 17.9 | -0.75 | + 5.6 | 2.9/19.3  | 31366 |
| 1996 RE <sub>1</sub>  | 1998 02 16.1 | 09 58.03 | +20 01.3 | 18.2 | -1.00 | + 5.5 | 2.8/14.1  | 31421 |
| 1994 AE <sub>11</sub> | 1998 02 16.1 | 09 58.14 | +20 23.6 | 17.9 | -0.99 | + 5.7 | 3.1/14.0  | 31419 |
| (8417)                | 1998 02 16.2 | 09 58.25 | +03 02.1 | 17.2 | -1.07 | + 4.4 | 3.5/18.6  | 31369 |
| 1995 GV               | 1998 02 16.3 | 09 58.61 | +08 06.8 | 17.1 | -1.00 | + 6.5 | 1.7/17.5  | 26191 |
| 1981 EC <sub>19</sub> | 1998 02 16.3 | 09 58.64 | +16 33.1 | 17.4 | -1.12 | + 3.3 | 1.6/15.3  | 31415 |
| 1990 HU <sub>1</sub>  | 1998 02 16.3 | 09 58.76 | +14 35.4 | 17.0 | -0.85 | +10.4 | 0.8/15.6  | 24582 |
| 1992 WG <sub>5</sub>  | 1998 02 16.4 | 09 59.06 | +32 59.9 | 16.4 | -0.93 | + 7.2 | 7.6/09.7  | 31418 |
| 2024 T-2              | 1998 02 16.4 | 09 59.26 | +19 11.2 | 16.9 | -1.01 | + 1.8 | 2.5/14.8  | 31410 |
| (8391)                | 1998 02 16.6 | 09 59.72 | +14 10.1 | 16.3 | -0.79 | + 5.2 | 0.6/16.0  | 31363 |
| 1995 KL <sub>1</sub>  | 1998 02 16.6 | 09 59.97 | -06 45.9 | 16.1 | -1.42 | - 7.4 | 8.6/18.9  | 31420 |
| 1996 VM <sub>3</sub>  | 1998 02 16.6 | 10 00.15 | +10 34.4 | 17.1 | -0.83 | + 4.3 | 0.5/17.2  | 29117 |
| 1991 GK <sub>5</sub>  | 1998 02 16.7 | 10 00.17 | +16 28.6 | 16.8 | -1.03 | + 4.3 | 1.8/15.6  | 31417 |

|                       |              |                        |             |           |       |                       |              |                        |             |          |       |
|-----------------------|--------------|------------------------|-------------|-----------|-------|-----------------------|--------------|------------------------|-------------|----------|-------|
| 3297 T-1              | 1998 02 16.7 | 10 00.26 +10 28.4 17.2 | -0.79 + 4.9 | 0.6/17.2  | 31436 | (7507)                | 1998 02 18.7 | 10 07.97 +04 25.5 18.2 | -0.98 + 5.2 | 2.3/20.7 | 29092 |
| 1996 TO <sub>9</sub>  | 1998 02 16.7 | 10 00.56 +41 47.2 18.2 | -1.39 - 2.5 | 11.0/10.1 | 29116 | 2604 P-L              | 1998 02 18.7 | 10 08.15 +15 10.7 16.9 | -1.08 + 4.6 | 1.5/17.8 | 31436 |
| 1998 BM <sub>25</sub> | 1998 02 16.8 | 10 00.65 +15 23.8 16.7 | -1.10 + 1.1 | 1.5/16.1  | 31400 | 1998 BC <sub>26</sub> | 1998 02 18.8 | 10 08.35 +26 16.9 16.1 | -1.06 + 5.1 | 5.3/14.7 | 31401 |
| 1998 ED <sub>6</sub>  | 1998 02 16.8 | 10 00.76 +00 10.9 16.8 | -0.79 + 2.2 | 3.0/20.1  | 31409 | (7414)                | 1998 02 18.8 | 10 08.42 +11 17.6 17.5 | -0.76 + 4.3 | 0.0/18.9 | 28830 |
| (7775)                | 1998 02 16.8 | 10 00.86 +06 35.3 16.2 | -0.92 + 4.1 | 1.9/18.4  | 30264 | (8409)                | 1998 02 18.8 | 10 08.57 +05 33.0 17.9 | -0.74 + 3.8 | 1.5/20.6 | 31367 |
| 1991 AB <sub>2</sub>  | 1998 02 16.8 | 10 00.89 +08 15.9 15.2 | -0.91 + 7.9 | 1.8/18.0  | 31274 | 1996 VM <sub>2</sub>  | 1998 02 18.9 | 10 08.80 +29 48.2 19.2 | -0.96 + 4.8 | 5.2/13.5 | 31422 |
| 1981 DU               | 1998 02 16.8 | 10 00.89 +01 23.3 18.4 | -1.02 + 4.3 | 3.9/19.7  | 26914 | 1981 EQ <sub>15</sub> | 1998 02 18.9 | 10 09.03 +00 18.2 17.7 | -0.86 + 5.7 | 4.5/22.3 | 28580 |
| 1998 DF               | 1998 02 16.8 | 10 00.94 +14 30.9 16.8 | -0.97 + 7.9 | 1.0/16.2  | 31405 | 1991 RP <sub>17</sub> | 1998 02 19.0 | 10 09.09 +18 25.8 18.2 | -1.04 + 2.6 | 2.2/17.2 | 31274 |
| 1990 HH <sub>1</sub>  | 1998 02 16.9 | 10 00.96 +07 26.9 16.9 | -0.84 + 8.5 | 1.5/18.4  | 26189 | 1995 QS <sub>3</sub>  | 1998 02 19.0 | 10 09.40 +02 54.4 17.4 | -0.82 + 2.0 | 2.3/21.3 | 31277 |
| 1981 EU <sub>11</sub> | 1998 02 16.9 | 10 01.22 +17 48.4 19.7 | -1.00 + 2.4 | 1.7/15.5  | 26917 | 1979 OA               | 1998 02 19.1 | 10 09.48 -13 37.5 18.2 | -1.05 - 1.2 | 7.6/24.3 | 31414 |
| 1974 RY <sub>1</sub>  | 1998 02 17.0 | 10 01.55 +09 33.1 18.3 | -0.96 + 5.9 | 0.8/17.8  | 29652 | 3464 T-3              | 1998 02 19.1 | 10 09.56 +13 55.8 20.3 | -0.99 + 4.7 | 0.8/18.4 | 31295 |
| 1996 TH <sub>42</sub> | 1998 02 17.0 | 10 01.56 +17 40.2 17.5 | -1.04 + 5.6 | 2.0/15.5  | 31246 | (7615)                | 1998 02 19.1 | 10 09.66 +15 17.1 17.4 | -0.96 + 6.0 | 1.2/18.0 | 29604 |
| 1990 EA <sub>7</sub>  | 1998 02 17.0 | 10 01.58 +18 47.7 16.4 | -1.06 + 2.1 | 2.4/15.4  | 31416 | 1989 CE <sub>6</sub>  | 1998 02 19.2 | 10 09.75 +09 44.9 16.9 | -0.99 + 1.7 | 0.5/19.6 | 31416 |
| 5061 T-2              | 1998 02 17.0 | 10 01.62 +07 43.3 18.1 | -1.08 + 4.0 | 1.5/18.2  | 31436 | 1998 CJ <sub>4</sub>  | 1998 02 19.2 | 10 09.92 +09 28.2 15.6 | -1.10 - 0.1 | 0.8/19.6 | 31405 |
| 1998 BH <sub>25</sub> | 1998 02 17.0 | 10 01.71 +17 15.4 17.3 | -0.98 + 5.6 | 2.0/15.6  | 31400 | 1998 DN <sub>5</sub>  | 1998 02 19.3 | 10 10.55 -02 16.1 15.7 | -0.89 + 4.0 | 6.1/23.2 | 31407 |
| 1992 RS <sub>7</sub>  | 1998 02 17.1 | 10 01.78 +13 44.0 19.8 | -0.94 + 6.4 | 0.5/16.7  | 31382 | 1981 DK <sub>2</sub>  | 1998 02 19.3 | 10 10.58 +07 02.5 17.7 | -0.96 - 0.3 | 2.0/20.4 | 31414 |
| 1991 LZ               | 1998 02 17.1 | 10 01.85 -03 24.1 17.1 | -0.93 + 7.0 | 5.9/21.6  | 30654 | 1993 FK <sub>80</sub> | 1998 02 19.4 | 10 10.77 +18 14.0 17.2 | -0.85 + 3.9 | 2.1/17.5 | 31276 |
| 1981 ET <sub>34</sub> | 1998 02 17.1 | 10 01.85 -03 20.4 20.2 | -0.82 + 5.2 | 4.1/21.7  | 27909 | 1992 SJ <sub>26</sub> | 1998 02 19.4 | 10 10.91 +25 13.5 19.1 | -1.02 + 3.8 | 4.5/15.7 | 25641 |
| 1995 SJ <sub>4</sub>  | 1998 02 17.1 | 10 01.91 -16 46.0 18.9 | -0.78 + 2.0 | 7.3/25.6  | 29664 | 4152 P-L              | 1998 02 19.5 | 10 11.02 -00 28.3 17.8 | -0.76 + 6.3 | 3.2/23.0 | 31436 |
| 1994 AS <sub>2</sub>  | 1998 02 17.1 | 10 02.09 +13 30.2 17.7 | -1.02 + 4.8 | 0.5/16.8  | 31385 | 1990 SX <sub>16</sub> | 1998 02 19.5 | 10 11.05 +22 01.1 17.7 | -0.90 + 2.7 | 3.0/16.6 | 31417 |
| 1995 JK               | 1998 02 17.2 | 10 02.10 +15 30.3 18.3 | -0.95 + 7.9 | 1.2/16.2  | 25335 | (8394)                | 1998 02 19.5 | 10 11.33 +12 32.0 16.7 | -1.01 + 7.1 | 0.6/19.2 | 31364 |
| 1991 PE <sub>10</sub> | 1998 02 17.2 | 10 02.22 +14 34.6 17.6 | -0.94 + 2.6 | 0.8/16.6  | 31417 | 1994 CT <sub>12</sub> | 1998 02 19.7 | 10 11.74 +16 37.0 16.7 | -0.90 + 7.9 | 2.0/18.0 | 31420 |
| 3141 T-2              | 1998 02 17.2 | 10 02.45 +15 26.8 19.2 | -1.00 + 4.9 | 1.2/16.4  | 24237 | 1981 EJ <sub>27</sub> | 1998 02 19.7 | 10 11.81 +10 05.4 18.7 | -1.05 + 5.5 | 0.4/20.0 | 26920 |
| 1991 EG <sub>3</sub>  | 1998 02 17.3 | 10 02.66 +07 22.4 18.4 | -0.97 + 4.6 | 1.5/18.6  | 31415 | 1981 EX <sub>7</sub>  | 1998 02 19.8 | 10 12.06 -02 39.3 19.7 | -0.81 + 7.3 | 4.2/24.2 | 26916 |
| 1998 EE <sub>6</sub>  | 1998 02 17.4 | 10 03.17 +02 05.0 17.1 | -0.88 + 4.9 | 3.8/20.3  | 31409 | 1996 UR               | 1998 02 19.8 | 10 12.34 +04 44.2 17.3 | -0.85 + 6.2 | 2.0/21.8 | 31390 |
| 6114 P-L              | 1998 02 17.6 | 10 03.72 +20 19.8 17.2 | -1.11 + 0.2 | 3.2/15.7  | 31436 | (7348)                | 1998 02 19.9 | 10 12.64 +12 01.6 16.3 | -0.81 + 4.3 | 0.3/19.7 | 28575 |
| 1995 LD               | 1998 02 17.6 | 10 04.01 +01 43.4 17.4 | -0.94 + 6.0 | 4.0/20.6  | 31277 | 1992 SY <sub>16</sub> | 1998 02 19.9 | 10 12.78 +18 53.4 18.2 | -1.06 + 2.2 | 2.9/18.0 | 27914 |
| 1998 BB <sub>7</sub>  | 1998 02 17.7 | 10 03.96 +15 18.1 17.6 | -1.08 + 2.6 | 1.4/16.9  | 31398 | 1981 ES <sub>3</sub>  | 1998 02 19.9 | 10 12.78 +02 55.9 17.9 | -0.99 + 2.0 | 2.7/22.0 | 26915 |
| 1998 CF <sub>2</sub>  | 1998 02 17.7 | 10 04.00 +07 03.5 18.5 | -1.07 + 3.2 | 1.8/18.9  | 31405 | 1996 XR <sub>1</sub>  | 1998 02 19.9 | 10 12.85 +16 38.9 17.6 | -0.63 + 3.7 | 1.2/18.3 | 31422 |
| 4128 T-2              | 1998 02 17.7 | 10 04.28 +13 59.0 19.8 | -0.94 + 6.2 | 0.7/17.2  | 31269 | 1981 ER <sub>21</sub> | 1998 02 19.9 | 10 12.89 +10 21.5 18.3 | -0.72 + 5.3 | 0.2/20.2 | 26188 |
| 1994 CG <sub>2</sub>  | 1998 02 17.7 | 10 04.41 +26 02.8 17.3 | -1.12 + 1.2 | 4.8/14.3  | 31385 | 1991 NS <sub>2</sub>  | 1998 02 20.0 | 10 13.00 +04 07.7 17.8 | -0.87 + 6.9 | 2.3/22.1 | 28886 |
| 1995 OU               | 1998 02 17.8 | 10 04.50 +16 44.2 18.0 | -0.99 + 3.9 | 1.6/16.5  | 31277 | 1989 SR <sub>3</sub>  | 1998 02 20.1 | 10 13.23 +14 58.6 17.6 | -0.73 + 4.6 | 1.1/18.9 | 31416 |
| 5133 T-2              | 1998 02 17.8 | 10 04.70 +09 19.0 19.2 | -0.96 + 2.0 | 0.8/18.5  | 31132 | 1998 BR <sub>8</sub>  | 1998 02 20.1 | 10 13.26 +13 13.9 17.3 | -0.91 + 1.8 | 0.7/19.5 | 31399 |
| 1148 T-3              | 1998 02 17.8 | 10 04.73 +03 53.6 18.8 | -0.84 + 3.9 | 2.2/20.1  | 31269 | 1991 FY               | 1998 02 20.1 | 10 13.38 +14 34.2 15.9 | -0.91 +10.0 | 1.4/19.0 | 31380 |
| 1994 AM <sub>1</sub>  | 1998 02 17.9 | 10 04.90 +03 01.7 18.1 | -1.02 + 4.1 | 3.3/20.3  | 31008 | 1995 HL               | 1998 02 20.1 | 10 13.51 +27 17.0 17.6 | -1.07 + 5.0 | 5.2/15.4 | 28617 |
| 1997 AU <sub>3</sub>  | 1998 02 17.9 | 10 05.05 +14 01.9 17.5 | -0.89 + 2.3 | 0.6/17.4  | 31422 | 1998 DR <sub>5</sub>  | 1998 02 20.3 | 10 13.99 +01 01.6 16.8 | -1.04 + 0.6 | 3.4/22.6 | 31407 |
| 1981 ER <sub>6</sub>  | 1998 02 18.0 | 10 05.15 +03 03.3 16.9 | -0.90 + 2.9 | 3.8/20.3  | 31271 | 1998 BF <sub>18</sub> | 1998 02 20.3 | 10 14.19 +13 37.7 18.6 | -0.94 + 4.3 | 1.1/19.6 | 31266 |
| 1993 FF <sub>4</sub>  | 1998 02 18.1 | 10 05.52 +15 29.5 17.1 | -0.84 + 4.2 | 1.3/17.0  | 31418 | 1998 BQ <sub>8</sub>  | 1998 02 20.3 | 10 14.20 +15 15.7 17.8 | -0.91 + 8.9 | 1.8/19.0 | 31399 |
| 1995 OG               | 1998 02 18.1 | 10 05.70 +06 57.7 19.0 | -0.86 + 2.3 | 1.4/19.4  | 31420 | 1981 EG <sub>23</sub> | 1998 02 20.3 | 10 14.31 +11 43.4 18.0 | -0.80 + 4.2 | 0.3/20.1 | 31375 |
| 1994 CE <sub>1</sub>  | 1998 02 18.1 | 10 05.91 +07 45.5 17.0 | -1.12 - 0.2 | 1.5/19.0  | 31419 | 1994 CS <sub>2</sub>  | 1998 02 20.4 | 10 14.45 +19 00.4 15.5 | -0.83 +11.6 | 3.0/17.6 | 31420 |
| 1998 BL <sub>8</sub>  | 1998 02 18.2 | 10 06.20 +14 33.6 17.3 | -1.12 + 2.1 | 1.0/17.6  | 31398 | 1996 RZ <sub>20</sub> | 1998 02 20.4 | 10 14.55 +15 27.1 18.8 | -1.15 + 2.7 | 1.8/19.3 | 31388 |
| 1981 EP <sub>40</sub> | 1998 02 18.2 | 10 06.29 +03 50.1 18.8 | -0.96 + 6.8 | 2.6/20.5  | 21968 | 1981 EG <sub>40</sub> | 1998 02 20.4 | 10 14.57 +11 06.9 19.0 | -0.78 + 4.9 | 0.1/20.4 | 31415 |
| 1979 MG <sub>8</sub>  | 1998 02 18.3 | 10 06.69 +21 07.0 18.1 | -0.79 + 8.3 | 2.9/15.3  | 30779 | 1996 RW               | 1998 02 20.5 | 10 14.93 +07 08.5 17.7 | -0.93 + 5.0 | 1.5/21.6 | 31388 |
| 1993 FS <sub>14</sub> | 1998 02 18.3 | 10 06.72 +18 21.8 16.6 | -0.78 + 5.3 | 1.9/16.4  | 31419 | 1987 RO <sub>5</sub>  | 1998 02 20.5 | 10 15.05 +09 47.4 18.1 | -0.60 + 4.3 | 0.2/20.9 | 31416 |
| 1988 TW <sub>2</sub>  | 1998 02 18.4 | 10 06.99 -24 54.5 17.4 | -1.03 + 1.0 | 11.8/28.2 | 28884 | (7577)                | 1998 02 20.5 | 10 15.05 +17 59.2 16.6 | -0.77 + 7.1 | 2.1/18.3 | 29595 |
| 1998 BG <sub>34</sub> | 1998 02 18.5 | 10 07.38 +13 12.4 19.9 | -0.77 + 4.2 | 0.4/18.1  | 31402 | 1993 BR <sub>2</sub>  | 1998 02 20.6 | 10 15.23 +14 22.0 16.2 | -0.91 + 2.6 | 1.4/19.7 | 31383 |
| 1998 CA <sub>1</sub>  | 1998 02 18.5 | 10 07.38 +11 03.5 17.4 | -1.13 + 3.5 | 0.2/18.7  | 31403 | 1991 VD <sub>6</sub>  | 1998 02 20.6 | 10 15.29 +17 24.2 18.3 | -0.81 + 6.3 | 2.0/18.6 | 31418 |
| 1998 DR <sub>2</sub>  | 1998 02 18.5 | 10 07.42 +16 27.5 15.9 | -0.92 + 1.9 | 1.6/17.3  | 31406 | 1997 XW <sub>4</sub>  | 1998 02 20.7 | 10 15.63 +10 18.7 18.9 | -0.85 + 4.6 | 0.2/20.9 | 31424 |
| 1990 OB <sub>2</sub>  | 1998 02 18.6 | 10 07.48 +17 46.9 19.0 | -0.83 + 2.7 | 1.5/16.9  | 18633 | 1992 PT <sub>1</sub>  | 1998 02 20.7 | 10 15.69 +11 54.3 19.1 | -1.03 + 9.3 | 0.4/20.4 | 31382 |
| 2246 T-2              | 1998 02 18.6 | 10 07.61 +08 09.7 19.4 | -0.84 + 5.3 | 1.0/19.6  | 28892 | (8412)                | 1998 02 20.7 | 10 15.75 +14 26.9 19.2 | -1.01 + 5.3 | 1.3/19.7 | 31368 |
| 1998 BN <sub>8</sub>  | 1998 02 18.6 | 10 07.80 +16 26.7 17.5 | -1.11 + 3.3 | 2.2/17.4  | 31398 | (8371)                | 1998 02 20.8 | 10 15.95 +14 25.3 17.6 | -0.86 + 5.9 | 1.2/19.7 | 31359 |

|                       |              |                        |             |           |       |                       |              |                        |             |           |       |
|-----------------------|--------------|------------------------|-------------|-----------|-------|-----------------------|--------------|------------------------|-------------|-----------|-------|
| 1981 DZ <sub>1</sub>  | 1998 02 20.8 | 10 15.98 -15 31.7 18.0 | -0.69 + 7.0 | 7.8/02.1  | 21966 | 3526 T-3              | 1998 02 22.7 | 10 23.63 +12 17.0 19.3 | -1.02 + 5.1 | 0.8/22.2  | 31437 |
| 1998 CR               | 1998 02 20.8 | 10 16.02 +07 47.8 17.4 | -0.74 + 7.0 | 0.8/21.8  | 31403 | 1981 ER <sub>10</sub> | 1998 02 22.8 | 10 23.54 +06 15.2 18.3 | -1.00 + 5.6 | 1.3/23.9  | 21966 |
| 1996 VN <sub>4</sub>  | 1998 02 20.8 | 10 16.35 +08 56.6 16.7 | -0.82 + 4.8 | 0.6/21.4  | 31391 | 1979 TH <sub>2</sub>  | 1998 02 22.8 | 10 23.67 +11 28.8 17.5 | -0.80 + 4.3 | 0.4/22.4  | 31414 |
| 1981 EV <sub>31</sub> | 1998 02 20.9 | 10 16.55 +07 56.1 19.2 | -0.98 + 8.1 | 1.1/21.8  | 26921 | 4349 T-1              | 1998 02 22.8 | 10 23.72 +09 01.7 18.4 | -0.79 + 6.2 | 0.3/23.2  | 22087 |
| 1996 VE <sub>9</sub>  | 1998 02 20.9 | 10 16.62 +27 25.7 16.2 | -0.86 + 5.3 | 5.2/15.7  | 31422 | 1979 ME <sub>7</sub>  | 1998 02 22.8 | 10 23.90 -09 17.6 17.7 | -0.97 + 2.9 | 6.8/28.4  | 21100 |
| 1998 CL <sub>1</sub>  | 1998 02 21.0 | 10 16.82 +06 55.5 18.3 | -0.80 + 4.4 | 1.3/22.1  | 31404 | 1998 DA <sub>6</sub>  | 1998 02 22.8 | 10 23.95 +07 59.1 17.2 | -0.96 + 5.1 | 0.9/23.5  | 31408 |
| 1984 HH <sub>1</sub>  | 1998 02 21.1 | 10 17.04 +09 32.4 17.0 | -0.99 + 6.9 | 0.4/21.4  | 31376 | 1987 HD <sub>2</sub>  | 1998 02 22.9 | 10 23.98 +09 25.6 16.0 | -0.98 + 6.3 | 10.1/03.0 | 31377 |
| 1981 EC <sub>43</sub> | 1998 02 21.1 | 10 17.15 +05 40.7 18.6 | -0.96 + 6.9 | 1.7/22.6  | 31376 | (8346)                | 1998 02 22.9 | 10 24.02 +11 56.1 16.4 | -0.81 + 4.2 | 0.6/22.3  | 31353 |
| 1981 EP <sub>42</sub> | 1998 02 21.1 | 10 17.25 +07 14.2 18.6 | -0.87 + 5.9 | 1.1/22.2  | 29940 | 1978 NK               | 1998 02 22.9 | 10 24.28 +05 14.0 19.0 | -0.86 + 4.8 | 1.4/24.4  | 28610 |
| (7720)                | 1998 02 21.1 | 10 17.30 +10 18.7 19.6 | -0.73 + 4.2 | 0.1/21.3  | 30074 | (8334)                | 1998 02 23.0 | 10 24.46 +25 04.3 16.0 | -0.86 + 6.7 | 5.4/18.1  | 31351 |
| 1981 ES <sub>15</sub> | 1998 02 21.1 | 10 17.30 +13 09.0 18.5 | -1.08 + 1.4 | 0.9/20.5  | 26918 | 1998 BR <sub>33</sub> | 1998 02 23.0 | 10 24.77 +20 54.2 16.4 | -1.10 + 1.8 | 4.4/20.3  | 31429 |
| 1987 RA <sub>3</sub>  | 1998 02 21.1 | 10 17.47 +12 03.2 17.7 | -0.88 + 6.1 | 0.4/20.8  | 31416 | 1992 GF <sub>4</sub>  | 1998 02 23.1 | 10 24.88 +20 37.5 17.7 | -1.13 + 4.6 | 4.0/20.2  | 31275 |
| (8416)                | 1998 02 21.1 | 10 17.48 +08 50.9 17.0 | -1.05 + 7.3 | 0.7/21.7  | 31369 | 1993 FD <sub>22</sub> | 1998 02 23.2 | 10 25.08 +08 17.6 17.2 | -0.81 + 5.0 | 0.6/23.7  | 31383 |
| 1981 EZ <sub>35</sub> | 1998 02 21.2 | 10 17.56 +11 19.3 19.0 | -0.78 + 4.5 | 0.2/21.0  | 26921 | 1979 MH <sub>6</sub>  | 1998 02 23.2 | 10 25.30 +19 41.3 18.5 | -0.78 + 7.5 | 3.1/20.0  | 31414 |
| 1996 VM               | 1998 02 21.2 | 10 17.75 +35 20.1 17.2 | -1.05 + 5.8 | 8.6/13.0  | 31421 | 1993 UU               | 1998 02 23.3 | 10 25.77 +23 43.3 16.8 | -1.11 + 5.1 | 5.1/19.5  | 31419 |
| (8337)                | 1998 02 21.3 | 10 17.96 +13 26.2 17.7 | -0.77 + 4.9 | 0.8/20.5  | 31351 | 1981 EJ <sub>38</sub> | 1998 02 23.5 | 10 26.28 -00 14.6 16.8 | -0.81 + 7.7 | 3.6/26.7  | 26922 |
| 1989 TD               | 1998 02 21.3 | 10 18.07 +08 22.2 18.7 | -1.01 + 4.9 | 0.7/22.0  | 21973 | 1981 DW <sub>1</sub>  | 1998 02 23.5 | 10 26.32 -00 54.8 19.4 | -0.91 + 3.5 | 4.2/26.5  | 26914 |
| 1993 YN <sub>2</sub>  | 1998 02 21.4 | 10 18.25 +04 56.2 17.6 | -0.96 + 5.2 | 2.5/23.0  | 31385 | 1980 TZ <sub>3</sub>  | 1998 02 23.5 | 10 26.53 +07 00.5 17.0 | -1.04 + 6.1 | 1.0/24.3  | 31414 |
| 3224 T-3              | 1998 02 21.4 | 10 18.42 +09 08.8 18.2 | -1.01 + 7.8 | 0.6/21.9  | 31411 | 1996 XY <sub>5</sub>  | 1998 02 23.6 | 10 26.67 +17 59.5 18.3 | -0.64 + 3.9 | 1.8/21.0  | 28871 |
| 1981 EZ <sub>28</sub> | 1998 02 21.5 | 10 18.67 +20 09.8 18.4 | -1.41 - 1.9 | 3.5/19.6  | 15409 | (8438)                | 1998 02 23.6 | 10 26.79 +12 50.7 17.4 | -1.02 + 7.1 | 1.2/22.7  | 31373 |
| 1981 EW <sub>2</sub>  | 1998 02 21.5 | 10 18.92 +05 04.1 18.0 | -1.03 + 0.8 | 1.9/22.9  | 31271 | 4135 T-2              | 1998 02 23.6 | 10 26.98 +21 43.0 17.9 | -0.96 + 3.4 | 3.9/20.3  | 19690 |
| 1997 CT <sub>1</sub>  | 1998 02 21.5 | 10 18.96 +06 42.8 19.1 | -0.59 + 3.3 | 0.7/22.8  | 31423 | 1985 UT               | 1998 02 23.7 | 10 27.03 +22 08.5 16.6 | -0.84 + 4.3 | 3.5/19.9  | 31376 |
| 1996 SS <sub>4</sub>  | 1998 02 21.6 | 10 19.25 +05 08.8 17.6 | -0.94 + 6.7 | 2.1/23.2  | 31421 | 1983 RX <sub>4</sub>  | 1998 02 23.7 | 10 27.04 +00 37.9 17.9 | -1.03 + 5.7 | 3.2/26.3  | 28084 |
| 1996 RK <sub>1</sub>  | 1998 02 21.7 | 10 19.79 +13 38.9 19.6 | -0.91 + 4.7 | 1.1/20.9  | 31421 | 1996 VB <sub>30</sub> | 1998 02 23.7 | 10 27.06 +10 01.6 18.9 | -0.92 + 6.1 | 0.1/23.6  | 31422 |
| (7499)                | 1998 02 21.8 | 10 20.14 +08 06.8 17.0 | -0.84 + 2.3 | 0.6/22.5  | 29090 | 1997 XV <sub>4</sub>  | 1998 02 23.7 | 10 27.42 +11 37.7 17.6 | -0.99 + 7.0 | 0.8/23.2  | 31424 |
| (7431)                | 1998 02 21.9 | 10 20.20 +08 13.6 16.8 | -0.78 + 4.9 | 0.6/22.6  | 28834 | 1992 SK <sub>26</sub> | 1998 02 23.7 | 10 27.43 +08 04.8 18.6 | -0.89 + 6.7 | 0.5/24.3  | 31418 |
| 1993 OV <sub>10</sub> | 1998 02 21.9 | 10 20.32 +07 29.3 20.0 | -0.58 + 3.3 | 0.5/22.8  | 22959 | 6700 P-L              | 1998 02 23.8 | 10 27.38 +13 09.5 18.0 | -0.91 + 4.2 | 1.2/22.8  | 28319 |
| 1994 CC <sub>18</sub> | 1998 02 22.0 | 10 20.78 +20 57.7 17.3 | -1.14 + 0.7 | 4.0/19.6  | 31420 | 1996 SF <sub>8</sub>  | 1998 02 23.8 | 10 27.71 +08 39.2 19.1 | -0.90 + 5.5 | 0.3/24.2  | 29630 |
| 1998 AB <sub>6</sub>  | 1998 02 22.0 | 10 20.92 +11 52.5 18.8 | -0.98 + 5.1 | 0.5/21.6  | 31426 | 1981 EW <sub>45</sub> | 1998 02 23.9 | 10 27.87 +04 28.7 18.6 | -0.72 + 4.9 | 1.3/25.5  | 17628 |
| 1995 KA <sub>1</sub>  | 1998 02 22.1 | 10 21.14 -06 07.0 18.4 | -0.89 + 9.8 | 5.3/27.5  | 29138 | 1993 FK <sub>81</sub> | 1998 02 24.0 | 10 28.18 +05 05.7 17.0 | -0.73 + 7.4 | 1.4/25.5  | 31419 |
| (7551)                | 1998 02 22.1 | 10 21.25 +06 15.2 16.2 | -0.72 + 6.4 | 1.3/23.5  | 29589 | 1981 EO <sub>40</sub> | 1998 02 24.0 | 10 28.24 +02 57.3 18.2 | -0.80 + 8.5 | 2.0/26.2  | 25647 |
| 1996 TL <sub>9</sub>  | 1998 02 22.2 | 10 21.35 +17 35.9 18.1 | -1.01 + 6.5 | 2.5/20.0  | 31421 | (7356)                | 1998 02 24.0 | 10 28.32 -02 40.1 16.6 | -1.03 - 0.1 | 4.9/26.9  | 28577 |
| 1996 VP <sub>4</sub>  | 1998 02 22.2 | 10 21.60 +06 56.9 17.8 | -0.78 + 4.8 | 1.0/23.3  | 28619 | (8390)                | 1998 02 24.0 | 10 28.39 +07 57.3 17.0 | -0.79 + 4.9 | 0.5/24.6  | 31363 |
| (8358)                | 1998 02 22.3 | 10 21.75 +08 56.1 16.9 | -1.00 + 4.9 | 10.7/15.0 | 31356 | 1998 CC <sub>3</sub>  | 1998 02 24.0 | 10 28.46 +09 35.2 16.9 | -1.11 + 4.5 | 0.0/24.1  | 31405 |
| 1991 RB <sub>13</sub> | 1998 02 22.3 | 10 21.80 +12 29.7 18.1 | -0.89 + 3.3 | 0.6/21.7  | 31381 | 1996 XE <sub>19</sub> | 1998 02 24.0 | 10 28.56 +07 19.1 17.1 | -0.75 + 5.0 | 0.6/24.8  | 30671 |
| 1994 AC <sub>1</sub>  | 1998 02 22.3 | 10 21.99 +02 07.1 17.1 | -1.07 + 3.1 | 3.1/24.5  | 27716 | 1996 TY <sub>4</sub>  | 1998 02 24.0 | 10 28.58 +28 26.8 17.5 | -1.16 - 0.5 | 7.7/19.4  | 31244 |
| 1988 XO               | 1998 02 22.3 | 10 22.02 +31 42.2 17.4 | -0.97 + 6.3 | 6.5/15.4  | 25339 | 1996 XR               | 1998 02 24.1 | 10 28.69 +12 11.6 18.4 | -0.89 + 5.1 | 0.8/23.4  | 31422 |
| 1998 DC <sub>24</sub> | 1998 02 22.4 | 10 22.34 -01 39.3 15.4 | -0.77 +11.7 | 4.5/26.8  | 31408 | 1996 YP <sub>3</sub>  | 1998 02 24.1 | 10 28.80 +35 13.4 17.3 | -1.05 + 4.5 | 8.9/15.7  | 31422 |
| 1981 DU <sub>2</sub>  | 1998 02 22.4 | 10 22.41 +02 44.3 19.0 | -0.98 + 2.0 | 2.4/24.4  | 26914 | 1981 EZ <sub>40</sub> | 1998 02 24.1 | 10 28.83 +11 57.5 18.7 | -1.08 + 4.1 | 0.9/23.5  | 31415 |
| 1981 ER <sub>13</sub> | 1998 02 22.4 | 10 22.45 +04 04.6 19.5 | -0.91 + 3.9 | 2.3/24.2  | 26917 | 1152 T-2              | 1998 02 24.2 | 10 29.03 +14 47.0 18.0 | -1.03 + 4.6 | 1.8/22.8  | 31436 |
| (7457)                | 1998 02 22.5 | 10 22.72 +15 15.2 17.1 | -0.91 + 3.7 | 1.6/21.1  | 29078 | 1978 VF <sub>3</sub>  | 1998 02 24.2 | 10 29.16 +12 08.7 18.3 | -1.02 + 5.6 | 1.0/23.5  | 23245 |
| 1973 QR <sub>1</sub>  | 1998 02 22.5 | 10 22.78 +06 23.8 17.2 | -1.03 + 6.6 | 1.3/23.6  | 31414 | 6533 P-L              | 1998 02 24.2 | 10 29.17 +11 03.5 17.6 | -0.75 + 4.8 | 0.4/23.8  | 31294 |
| 1996 VK <sub>8</sub>  | 1998 02 22.5 | 10 22.79 +06 45.6 18.7 | -0.86 + 4.4 | 0.9/23.6  | 28602 | 1996 SV <sub>7</sub>  | 1998 02 24.2 | 10 29.18 +02 56.2 18.1 | -0.99 + 4.4 | 2.3/26.1  | 29307 |
| 1993 HV <sub>1</sub>  | 1998 02 22.6 | 10 22.82 +46 08.8 20.0 | -1.09 + 1.1 | 8.9/10.8  | 26191 | 1996 TR <sub>5</sub>  | 1998 02 24.2 | 10 29.24 +17 47.3 18.5 | -1.28 - 0.3 | 2.7/22.5  | 28306 |
| 1996 VP <sub>5</sub>  | 1998 02 22.6 | 10 22.99 -03 04.6 16.5 | -0.74 + 4.7 | 3.9/26.7  | 30903 | 1998 BT <sub>33</sub> | 1998 02 24.3 | 10 29.43 +19 43.9 17.2 | -1.02 + 6.2 | 3.8/21.3  | 31402 |
| 1998 DW <sub>5</sub>  | 1998 02 22.6 | 10 23.03 +06 05.9 18.4 | -1.05 - 1.4 | 1.3/23.5  | 31407 | (8436)                | 1998 02 24.3 | 10 29.55 +12 18.7 17.8 | -0.77 + 5.7 | 0.9/23.5  | 31373 |
| (8327)                | 1998 02 22.6 | 10 23.08 +08 14.5 17.0 | -0.89 + 5.5 | 0.7/23.0  | 31349 | 1981 EM <sub>35</sub> | 1998 02 24.4 | 10 29.67 +14 31.7 18.8 | -1.12 + 3.8 | 2.0/23.1  | 26921 |
| 1988 EA <sub>2</sub>  | 1998 02 22.6 | 10 23.09 +09 44.3 16.0 | -0.95 + 8.0 | 11.1/03.0 | 31416 | 3219 T-1              | 1998 02 24.4 | 10 29.69 +08 53.9 17.7 | -1.08 + 4.1 | 0.2/24.6  | 31023 |
| 1986 QC <sub>1</sub>  | 1998 02 22.7 | 10 23.45 +15 18.9 17.4 | -0.86 + 5.8 | 1.7/21.2  | 31416 | 1990 US <sub>3</sub>  | 1998 02 24.4 | 10 30.07 +19 10.4 18.3 | -0.77 + 4.9 | 2.6/21.4  | 23975 |
| 1981 EE <sub>23</sub> | 1998 02 22.7 | 10 23.57 +07 47.4 19.4 | -0.90 + 4.4 | 0.7/23.4  | 25438 | 1994 ER <sub>3</sub>  | 1998 02 24.5 | 10 30.02 +13 14.9 15.1 | -0.71 +10.6 | 1.7/23.1  | 31420 |
| 1998 DZ <sub>5</sub>  | 1998 02 22.7 | 10 23.60 +08 18.1 16.0 | -0.81 + 7.9 | 0.7/23.4  | 31407 | 1993 WB               | 1998 02 24.5 | 10 30.02 +09 33.5 16.2 | -1.00 + 4.5 | 0.1/24.5  | 31384 |

|                       |              |                        |             |           |       |                       |              |                        |             |           |       |
|-----------------------|--------------|------------------------|-------------|-----------|-------|-----------------------|--------------|------------------------|-------------|-----------|-------|
| 1981 EV <sub>38</sub> | 1998 02 24.5 | 10 30.26 +07 42.5 18.4 | -0.80 + 3.3 | 0.5/25.0  | 26922 | 1993 FH <sub>22</sub> | 1998 02 26.4 | 10 37.49 +08 08.5 17.8 | -0.74 + 4.5 | 0.1/26.6  | 31419 |
| (8229)                | 1998 02 24.5 | 10 30.27 -00 21.6 17.5 | -0.71 + 6.6 | 2.5/27.8  | 31093 | 2012 P-L              | 1998 02 26.5 | 10 37.64 +13 09.0 19.3 | -0.94 + 3.4 | 1.3/25.3  | 27938 |
| 1984 DZ               | 1998 02 24.5 | 10 30.41 +12 11.0 16.9 | -1.16 + 2.3 | 1.2/23.9  | 31415 | 4262 T-1              | 1998 02 26.5 | 10 37.80 +14 25.3 16.7 | -0.87 + 5.3 | 2.1/24.8  | 21808 |
| 1992 SL <sub>23</sub> | 1998 02 24.6 | 10 30.72 +30 46.5 17.6 | -1.12 + 1.3 | 7.8/19.0  | 24230 | 1997 YR <sub>11</sub> | 1998 02 26.5 | 10 37.83 +16 05.3 16.7 | -1.14 + 3.4 | 3.1/24.6  | 31257 |
| 1991 GE <sub>2</sub>  | 1998 02 24.8 | 10 31.42 +27 56.2 16.8 | -0.99 + 8.3 | 6.2/18.5  | 29658 | 1991 RE <sub>20</sub> | 1998 02 26.5 | 10 37.91 +11 02.8 16.9 | -1.00 + 1.3 | 0.8/26.0  | 31417 |
| 1981 ES <sub>5</sub>  | 1998 02 24.9 | 10 31.71 -00 59.0 18.2 | -0.93 + 3.1 | 3.2/27.8  | 19857 | 1970 JB               | 1998 02 26.6 | 10 37.97 -30 54.0 16.0 | -1.33 -13.3 | 20.8/01.7 | 31271 |
| 1993 GG <sub>1</sub>  | 1998 02 24.9 | 10 31.83 +19 21.9 16.7 | -0.81 + 4.7 | 3.1/21.8  | 31383 | 1994 CF <sub>14</sub> | 1998 02 26.6 | 10 37.99 +19 18.9 17.6 | -1.01 + 2.9 | 3.4/23.6  | 31385 |
| (8387)                | 1998 02 24.9 | 10 31.92 +09 50.7 16.4 | -0.75 + 7.8 | 0.2/24.8  | 31363 | 1990 TK <sub>13</sub> | 1998 02 26.6 | 10 38.03 +22 12.5 18.4 | -0.78 + 5.6 | 3.7/22.2  | 31417 |
| 1992 OO               | 1998 02 24.9 | 10 31.99 +30 36.3 17.0 | -1.00 +11.9 | 6.7/17.1  | 25441 | 1981 ES <sub>19</sub> | 1998 02 26.7 | 10 38.74 +11 05.8 19.4 | -1.08 + 3.4 | 1.1/26.1  | 31375 |
| 1988 VO <sub>3</sub>  | 1998 02 25.0 | 10 32.03 +14 21.7 18.6 | -0.96 + 4.3 | 1.6/23.6  | 28315 | 4188 T-2              | 1998 02 26.8 | 10 38.78 +11 26.0 18.5 | -0.84 + 6.1 | 1.0/25.9  | 31410 |
| 1991 PN <sub>8</sub>  | 1998 02 25.0 | 10 32.06 +08 13.0 18.1 | -0.85 + 5.5 | 0.3/25.3  | 28886 | 1981 ES <sub>43</sub> | 1998 02 26.8 | 10 38.89 +05 50.7 18.5 | -0.73 + 4.8 | 0.8/27.7  | 26923 |
| 1983 RL               | 1998 02 25.0 | 10 32.09 +12 14.1 17.0 | -1.61 - 2.9 | 1.4/24.5  | 31415 | 1998 DW <sub>25</sub> | 1998 02 26.8 | 10 39.00 +12 07.1 20.0 | -1.00 + 5.6 | 1.5/25.8  | 31409 |
| (8357)                | 1998 02 25.0 | 10 32.14 +07 04.2 17.5 | -1.01 + 5.6 | 0.7/25.7  | 31356 | 1993 QB <sub>3</sub>  | 1998 02 26.8 | 10 39.15 +15 09.1 16.9 | -0.99 +14.5 | 2.4/24.6  | 31384 |
| 3474 T-3              | 1998 02 25.0 | 10 32.28 +15 39.8 17.2 | -0.97 + 5.5 | 2.8/23.2  | 31436 | 1998 CR <sub>2</sub>  | 1998 02 26.9 | 10 39.10 +06 34.6 17.1 | -0.72 + 6.8 | 0.5/27.5  | 31405 |
| 1996 XF <sub>1</sub>  | 1998 02 25.0 | 10 32.33 +17 22.6 18.0 | -0.76 + 4.7 | 2.1/22.5  | 31422 | 1996 RK <sub>11</sub> | 1998 02 26.9 | 10 39.39 +10 53.3 19.6 | -0.98 + 5.3 | 0.9/26.3  | 31388 |
| 1981 EW <sub>12</sub> | 1998 02 25.1 | 10 32.40 +06 43.5 19.6 | -1.08 + 3.3 | 1.0/25.8  | 26917 | 1991 TQ <sub>6</sub>  | 1998 02 26.9 | 10 39.48 +02 43.1 18.1 | -0.88 + 4.0 | 2.2/28.7  | 31418 |
| 1988 VB <sub>1</sub>  | 1998 02 25.1 | 10 32.73 +19 31.9 17.0 | -1.07 + 2.1 | 3.3/22.5  | 31416 | 3160 T-2              | 1998 02 27.0 | 10 39.64 +07 38.0 18.1 | -0.71 + 6.9 | 0.2/27.3  | 25971 |
| 1996 XJ <sub>11</sub> | 1998 02 25.2 | 10 32.74 +10 35.5 20.0 | -0.94 + 6.7 | 0.5/24.8  | 31391 | 1990 UJ <sub>5</sub>  | 1998 02 27.0 | 10 39.67 +04 26.0 17.1 | -0.72 + 6.5 | 1.1/28.4  | 31417 |
| 1996 XN <sub>26</sub> | 1998 02 25.2 | 10 32.74 +13 55.3 17.0 | -0.84 + 4.9 | 1.5/23.8  | 31422 | 1969 QR               | 1998 02 27.0 | 10 39.72 -04 37.2 17.2 | -1.00 + 5.9 | 4.9/02.9  | 28881 |
| 1996 XT <sub>30</sub> | 1998 02 25.2 | 10 32.89 +35 43.4 16.7 | -0.87 + 5.1 | 7.5/15.8  | 31422 | (8434)                | 1998 02 27.1 | 10 40.10 +11 57.8 16.7 | -0.82 + 5.9 | 1.3/26.0  | 31373 |
| 4314 P-L              | 1998 02 25.3 | 10 33.04 +12 08.5 19.0 | -0.92 + 3.7 | 0.9/24.4  | 14629 | (7345)                | 1998 02 27.2 | 10 40.41 +14 07.7 19.2 | -0.93 + 5.4 | 1.6/25.5  | 28574 |
| 1979 MY <sub>3</sub>  | 1998 02 25.3 | 10 33.19 +14 39.6 19.0 | -0.88 + 6.7 | 1.7/23.6  | 30778 | 1977 EU <sub>1</sub>  | 1998 02 27.2 | 10 40.60 +08 35.2 16.6 | -0.86 + 6.3 | 0.1/27.2  | 31375 |
| 1990 WX <sub>3</sub>  | 1998 02 25.3 | 10 33.21 +19 54.3 16.8 | -1.06 + 7.3 | 4.3/22.1  | 31417 | 1981 ET <sub>47</sub> | 1998 02 27.2 | 10 40.66 +11 16.0 18.6 | -0.90 + 4.1 | 0.8/26.5  | 18807 |
| (7413)                | 1998 02 25.3 | 10 33.24 +09 42.9 17.9 | -0.76 + 4.4 | 0.2/25.2  | 28829 | 1979 MT <sub>4</sub>  | 1998 02 27.3 | 10 40.61 -11 39.2 17.5 | -0.98 + 3.0 | 7.3/05.3  | 22948 |
| 1978 VE <sub>15</sub> | 1998 02 25.5 | 10 33.90 +14 33.9 17.2 | -1.01 + 5.8 | 2.0/23.9  | 31414 | 1981 EH <sub>21</sub> | 1998 02 27.3 | 10 40.66 -02 00.4 17.7 | -0.67 + 9.1 | 2.8/03.0  | 28838 |
| 2202 T-2              | 1998 02 25.6 | 10 34.26 +08 23.6 17.0 | -0.78 + 4.5 | 0.2/25.8  | 31410 | (7422)                | 1998 02 27.3 | 10 40.98 +12 29.2 17.1 | -1.00 + 6.5 | 1.4/26.1  | 28831 |
| 1993 FW <sub>31</sub> | 1998 02 25.6 | 10 34.48 +23 10.4 16.0 | -0.83 + 3.1 | 3.8/21.4  | 30897 | 1995 ST <sub>48</sub> | 1998 02 27.3 | 10 41.01 +11 57.4 17.9 | -0.81 + 5.4 | 1.2/26.3  | 31387 |
| 1990 OV <sub>4</sub>  | 1998 02 25.7 | 10 34.58 -12 20.8 18.8 | -0.83 + 2.5 | 5.5/04.0  | 29316 | 1981 EP <sub>11</sub> | 1998 02 27.3 | 10 41.05 +06 09.3 19.1 | -1.03 + 4.4 | 0.7/28.0  | 28580 |
| 1991 RJ               | 1998 02 25.7 | 10 34.60 +09 27.3 16.9 | -1.00 + 2.0 | 0.2/25.6  | 31417 | 4095 T-2              | 1998 02 27.4 | 10 41.08 +00 38.3 18.1 | -0.70 + 7.8 | 2.1/02.0  | 30467 |
| (8351)                | 1998 02 25.7 | 10 34.84 +07 42.3 16.3 | -0.82 + 6.8 | 0.4/26.2  | 31355 | 1993 FM <sub>40</sub> | 1998 02 27.4 | 10 41.14 +09 35.2 18.5 | -0.77 + 5.1 | 0.4/27.0  | 23527 |
| 1996 XH <sub>6</sub>  | 1998 02 25.7 | 10 34.97 +12 32.7 17.4 | -0.80 + 5.3 | 1.0/24.7  | 30786 | 2186 T-1              | 1998 02 27.4 | 10 41.26 +19 06.9 16.3 | -0.95 + 0.9 | 3.7/24.6  | 31436 |
| 1977 RR <sub>6</sub>  | 1998 02 25.7 | 10 35.01 +11 32.9 17.6 | -1.00 + 4.3 | 0.9/25.1  | 31414 | 1992 SM <sub>12</sub> | 1998 02 27.4 | 10 41.41 +09 53.1 16.8 | -0.92 + 7.9 | 0.5/27.0  | 31418 |
| 1981 EO <sub>5</sub>  | 1998 02 25.8 | 10 34.97 -01 52.4 19.3 | -0.97 + 5.9 | 4.3/29.0  | 26915 | 2206 T-3              | 1998 02 27.5 | 10 41.40 +04 00.8 18.9 | -0.84 + 4.9 | 1.3/28.8  | 24120 |
| 1997 XF <sub>5</sub>  | 1998 02 25.8 | 10 35.01 +04 36.3 18.0 | -0.92 + 0.3 | 1.4/26.9  | 31283 | 1975 XF               | 1998 02 27.5 | 10 41.63 +08 32.1 18.4 | -0.94 + 7.8 | 0.1/27.5  | 27930 |
| 1992 OJ <sub>8</sub>  | 1998 02 25.8 | 10 35.38 +01 39.1 16.9 | -1.04 + 3.8 | 2.6/27.9  | 31418 | (8340)                | 1998 02 27.6 | 10 41.73 -03 37.0 16.4 | -0.82 + 3.4 | 3.7/03.1  | 31352 |
| 1981 ES <sub>31</sub> | 1998 02 25.9 | 10 35.65 +04 09.0 18.6 | -0.68 + 7.6 | 1.3/27.6  | 26921 | 1996 VA <sub>7</sub>  | 1998 02 27.6 | 10 42.15 +02 40.7 16.8 | -0.85 + 6.4 | 2.1/01.4  | 31422 |
| 1979 MM <sub>7</sub>  | 1998 02 26.0 | 10 35.91 +08 23.3 18.8 | -1.02 + 8.1 | 0.2/26.2  | 30779 | (8389)                | 1998 02 27.7 | 10 42.17 +08 02.1 16.4 | -0.77 + 5.8 | 8.9/08.0  | 31363 |
| 9056 P-L              | 1998 02 26.0 | 10 35.93 +11 49.7 19.6 | -1.11 + 4.2 | 1.1/25.2  | 31409 | 1996 TO <sub>6</sub>  | 1998 02 27.8 | 10 42.91 -10 04.1 20.0 | -1.01 + 4.1 | 6.0/05.3  | 31389 |
| 1995 HK               | 1998 02 26.0 | 10 36.07 +11 02.4 16.4 | -0.98 + 7.6 | 1.0/25.4  | 31386 | (8050)                | 1998 02 27.9 | 10 43.02 +05 25.4 18.6 | -1.05 + 6.8 | 1.0/28.7  | 30864 |
| 2037 P-L              | 1998 02 26.1 | 10 36.16 +22 51.9 18.2 | -0.95 + 1.0 | 4.0/22.3  | 22086 | (7592)                | 1998 02 27.9 | 10 43.05 +30 26.4 15.7 | -0.90 + 6.7 | 8.2/20.2  | 29599 |
| 1989 TU <sub>10</sub> | 1998 02 26.2 | 10 36.49 +04 40.0 16.9 | -0.95 + 8.5 | 1.6/28.0  | 31416 | 1993 FU <sub>32</sub> | 1998 02 27.9 | 10 43.14 +10 43.1 19.4 | -0.74 + 5.0 | 0.7/27.1  | 26927 |
| 1981 EX <sub>21</sub> | 1998 02 26.2 | 10 36.81 +02 48.3 17.8 | -0.80 + 7.9 | 1.7/28.2  | 22074 | 1983 WQ               | 1998 02 27.9 | 10 43.19 +23 45.7 16.8 | -0.94 + 4.3 | 4.8/23.2  | 31415 |
| 1989 RJ <sub>2</sub>  | 1998 02 26.2 | 10 36.88 -26 30.3 18.3 | -1.03 + 4.1 | 11.1/10.5 | 30781 | 1997 XG <sub>5</sub>  | 1998 02 27.9 | 10 43.20 +10 56.5 18.4 | -0.85 + 4.6 | 0.9/27.1  | 31395 |
| 1981 EW <sub>6</sub>  | 1998 02 26.3 | 10 36.84 -01 47.3 19.1 | -1.01 + 3.4 | 4.8/01.2  | 26916 | 1991 RQ <sub>16</sub> | 1998 02 27.9 | 10 43.24 +14 35.5 19.3 | -0.87 + 5.2 | 1.9/26.0  | 28585 |
| 1996 TC <sub>16</sub> | 1998 02 26.3 | 10 36.88 -01 12.3 18.7 | -1.00 + 4.8 | 4.4/01.2  | 28309 | 1996 VK               | 1998 02 27.9 | 10 43.30 +20 31.8 17.2 | -0.93 + 4.6 | 4.2/24.2  | 30785 |
| (7390)                | 1998 02 26.3 | 10 36.93 +04 04.3 18.2 | -0.83 + 8.8 | 1.4/27.9  | 28823 | 1986 RF <sub>7</sub>  | 1998 02 28.0 | 10 43.53 +08 41.1 17.5 | -1.01 + 7.0 | 0.2/27.9  | 31416 |
| 1978 RN <sub>5</sub>  | 1998 02 26.3 | 10 36.94 +14 47.0 18.2 | -0.95 + 3.1 | 1.7/24.7  | 29652 | 1981 EJ <sub>19</sub> | 1998 02 28.0 | 10 43.63 +08 23.1 17.1 | -0.76 + 4.8 | 0.1/28.0  | 31415 |
| 1990 EU               | 1998 02 26.3 | 10 37.06 -01 33.8 18.1 | -0.93 + 3.9 | 3.3/01.3  | 19027 | 3088 T-2              | 1998 02 28.1 | 10 43.75 +13 15.0 20.1 | -0.86 + 5.0 | 1.6/26.5  | 15083 |
| 1984 SP <sub>4</sub>  | 1998 02 26.3 | 10 37.06 +03 53.0 18.9 | -0.95 + 4.4 | 1.6/28.0  | 28582 | 1981 EL <sub>33</sub> | 1998 02 28.1 | 10 44.00 +01 02.4 19.6 | -1.01 + 4.8 | 2.2/02.2  | 22599 |
| 1995 KZ               | 1998 02 26.3 | 10 37.27 +20 57.0 18.1 | -0.93 +14.0 | 4.0/21.9  | 31420 | 2763 P-L              | 1998 02 28.2 | 10 44.13 +10 59.1 18.9 | -0.81 + 5.2 | 0.9/27.3  | 31436 |
| 1996 VY <sub>29</sub> | 1998 02 26.4 | 10 37.28 +06 21.2 17.3 | -0.97 + 6.7 | 0.8/27.1  | 31422 | 1996 UX               | 1998 02 28.2 | 10 44.16 +06 25.1 16.7 | -0.83 + 4.9 | 0.5/28.7  | 31421 |

1998 MAR. 13

M.P.C. 31447

1998 DL<sub>8</sub> 1998 02 28.2 10 44.18 +02 45.5 18.5 -0.81 + 5.6 1.6/01.9 31408  
 1996 XQ<sub>13</sub> 1998 02 28.3 10 44.58 -10 15.3 17.8 -0.85 + 5.0 5.6/06.1 31249  
 1998 DW<sub>2</sub> 1998 02 28.3 10 44.71 +02 29.9 17.0 -0.83 + 4.9 1.7/02.1 31406  
 1981 ES<sub>35</sub> 1998 02 28.3 10 44.72 +14 53.7 16.8 -0.86 + 2.0 2.1/26.4 31415  
 1997 YS<sub>11</sub> 1998 02 28.3 10 44.76 +16 33.6 17.1 -1.00 + 7.9 3.2/25.6 31425  
 1992 WX<sub>2</sub> 1998 02 28.4 10 44.75 +03 39.1 16.3 -0.84 + 6.4 1.7/01.8 31418  
 1998 DT<sub>10</sub> 1998 02 28.4 10 44.99 +03 32.3 16.1 -0.92 + 5.1 1.9/01.8 31408  
 (7340) 1998 02 28.5 10 45.13 +06 50.1 17.0 -0.84 + 4.7 0.4/28.8 28572  
 1993 FS<sub>34</sub> 1998 02 28.5 10 45.16 +11 03.0 17.0 -0.74 + 4.3 0.8/27.5 28588  
 5125 T-2 1998 02 28.5 10 45.25 -02 43.9 18.2 -0.83 + 2.8 3.1/03.6 27928  
 1996 UK<sub>1</sub> 1998 02 28.5 10 45.32 +13 02.9 18.0 -0.98 + 5.4 1.7/27.0 28866  
 1985 QM<sub>5</sub> 1998 02 28.5 10 45.40 +08 34.9 18.1 -0.77 + 5.3 0.2/28.3 31415  
 1996 XG<sub>20</sub> 1998 02 28.6 10 45.54 +04 41.6 20.2 -0.83 + 5.0 0.9/01.6 28873  
 1979 TY<sub>1</sub> 1998 02 28.7 10 46.06 +21 22.8 17.3 -1.14 + 2.9 5.6/25.1 30892  
 1994 PV<sub>24</sub> 1998 02 28.9 10 46.64 +10 30.4 18.5 -0.60 + 3.3 0.5/28.0 29138  
 1980 VO 1998 02 28.9 10 46.76 +22 11.5 17.6 -1.04 + 3.7 4.6/24.9 30287  
 1989 SQ 1998 03 01.0 10 47.03 +02 51.6 17.0 -1.04 + 4.9 1.8/02.4 31416  
 1989 NH<sub>1</sub> 1998 03 01.0 10 47.09 +14 12.2 17.7 -1.02 + 8.1 2.3/27.0 31273  
 1981 ED<sub>3</sub> 1998 03 01.0 10 47.11 -07 06.6 19.5 -0.71 + 7.0 4.7/06.2 30754  
 1991 RN<sub>5</sub> 1998 03 01.0 10 47.14 +07 22.0 17.3 -0.81 + 6.8 0.1/01.1 31417  
 1996 XT<sub>10</sub> 1998 03 01.1 10 47.50 +13 24.5 20.7 -1.02 + 4.2 1.9/27.5 28606  
 2282 T-3 1998 03 01.1 10 47.82 -02 43.4 17.4 -0.84 + 8.5 4.3/05.0 31411  
 1981 EO<sub>8</sub> 1998 03 01.2 10 47.91 +01 49.6 16.6 -0.92 + 4.6 2.2/03.0 31415  
 1998 BE<sub>30</sub> 1998 03 01.3 10 48.31 +15 10.1 17.5 -0.92 + 2.0 2.4/27.2 31401  
 1993 FY<sub>22</sub> 1998 03 01.4 10 48.73 +11 56.7 17.6 -0.86 + 2.5 1.4/28.2 31419  
 (7404) 1998 03 01.5 10 48.95 +02 07.1 17.6 -0.83 + 6.8 1.6/03.3 28827  
 1996 XN<sub>2</sub> 1998 03 01.6 10 49.35 +04 06.7 19.7 -0.89 + 5.1 1.0/02.6 30786  
 1981 EV<sub>29</sub> 1998 03 01.6 10 49.38 -08 39.2 19.0 -0.81 + 7.7 5.7/07.1 23535  
 1994 AD<sub>3</sub> 1998 03 01.6 10 49.50 +12 51.8 18.1 -0.99 + 7.1 2.1/28.0 31385  
 1995 OB<sub>1</sub> 1998 03 01.6 10 49.70 -01 06.7 19.9 -0.88 + 4.2 2.6/04.2 29318  
 4017 P-L 1998 03 01.7 10 49.65 +14 56.1 18.9 -0.98 + 2.4 2.2/27.7 22601  
 1993 UF<sub>7</sub> 1998 03 01.7 10 49.85 +09 39.4 17.0 -0.98 + 8.3 0.9/01.0 31419  
 1979 MO<sub>8</sub> 1998 03 01.8 10 50.01 -05 19.4 18.9 -0.82 + 3.2 3.8/05.6 30779  
 1047 T-3 1998 03 01.8 10 50.20 -02 11.6 18.8 -0.85 + 4.3 2.9/04.7 25646  
 1995 HP 1998 03 01.8 10 50.32 +12 34.3 17.8 -0.98 + 6.5 1.7/28.3 31420  
 1997 XD<sub>5</sub> 1998 03 01.8 10 50.34 +13 59.4 18.0 -0.90 + 8.0 2.5/27.7 31424  
 (8378) 1998 03 01.9 10 50.80 +21 48.8 16.5 -1.12 + 1.2 4.9/26.3 31361  
 1990 UY<sub>3</sub> 1998 03 02.0 10 50.77 +22 00.3 18.4 -0.78 + 4.2 3.6/25.3 29658  
 1993 FZ<sub>35</sub> 1998 03 02.0 10 51.10 +10 04.0 17.4 -0.73 + 4.9 0.7/01.2 27730  
 5077 T-2 1998 03 02.1 10 51.13 +00 32.3 19.6 -0.96 + 4.4 2.3/04.1 28881  
 1995 TF<sub>1</sub> 1998 03 02.1 10 51.24 -12 32.5 19.0 -0.85 + 5.0 5.8/08.4 26569  
 1993 TZ<sub>32</sub> 1998 03 02.1 10 51.46 +10 29.5 17.4 -1.01 + 7.4 1.3/01.2 31419  
 1996 TK<sub>10</sub> 1998 03 02.2 10 51.66 +06 02.0 17.9 -1.02 + 4.1 0.4/02.6 28890  
 1991 GA<sub>9</sub> 1998 03 02.2 10 51.81 -00 20.3 16.4 -0.89 + 7.9 3.1/04.7 28086  
 (8275) 1998 03 02.2 10 51.81 +15 14.6 16.1 -1.00 + 6.9 3.7/27.8 31213  
 (7751) 1998 03 02.2 10 51.82 +05 28.9 17.9 -0.91 + 5.5 0.6/02.8 30257  
 3502 T-3 1998 03 02.4 10 52.26 +10 16.8 18.5 -1.04 + 5.8 1.4/01.5 31437  
 1981 EB<sub>35</sub> 1998 03 02.4 10 52.34 +03 13.0 17.9 -0.92 + 8.8 1.6/03.7 26921  
 1981 ET<sub>17</sub> 1998 03 02.4 10 52.42 +05 16.8 18.0 -0.93 + 5.5 0.7/03.0 31415  
 1996 VL<sub>8</sub> 1998 03 02.5 10 52.67 +02 07.5 18.0 -1.03 + 5.2 1.7/04.0 31422  
 1996 VH<sub>16</sub> 1998 03 02.5 10 52.72 +25 12.5 19.9 -1.11 + 4.7 6.6/25.0 28604

1981 EE<sub>42</sub> 1998 03 02.5 10 52.89 +02 52.9 18.7 -0.69 + 8.4 1.2/04.1 26922  
 1992 CQ<sub>2</sub> 1998 03 02.6 10 53.05 +08 10.7 16.5 -0.72 + 6.9 0.3/02.3 31418  
 1981 EM<sub>27</sub> 1998 03 02.6 10 53.10 +08 55.0 17.4 -0.75 + 5.6 0.6/02.0 31415  
 1991 NF<sub>3</sub> 1998 03 02.6 10 53.14 -10 52.3 18.1 -0.89 + 3.9 5.3/08.2 31274  
 1996 TC<sub>54</sub> 1998 03 02.7 10 53.36 +11 20.0 19.1 -0.97 + 4.4 1.6/01.5 28598  
 1997 YT<sub>11</sub> 1998 03 02.7 10 53.63 +23 09.1 15.8 -0.83 + 9.8 5.8/24.9 31425  
 1996 TJ<sub>7</sub> 1998 03 02.8 10 54.00 +02 49.6 19.4 -0.83 + 6.3 1.3/04.2 31389  
 (7511) 1998 03 02.9 10 54.23 +07 33.3 17.9 -0.74 + 4.8 0.2/02.7 29289  
 (7334) 1998 03 02.9 10 54.30 +07 55.3 17.2 -0.89 + 7.8 0.3/02.6 29893  
 (7411) 1998 03 02.9 10 54.40 +06 24.4 16.2 -0.96 + 0.7 0.2/03.1 28829  
 1988 NY 1998 03 02.9 10 54.42 +37 03.4 19.1 -1.04 +11.1 10.2/18.7 25648  
 1981 EM<sub>1</sub> 1998 03 02.9 10 54.55 +09 29.7 16.9 -0.76 + 5.2 0.8/02.2 31415  
 (7508) 1998 03 03.0 10 54.66 +02 40.5 18.3 -0.83 + 5.0 1.3/04.4 29092  
 (7432) 1998 03 03.0 10 54.68 +08 20.2 17.0 -0.75 + 4.5 0.4/02.6 28834  
 3134 T-3 1998 03 03.1 10 54.87 +04 06.1 18.1 -1.02 + 7.6 1.0/04.0 31436  
 1978 RA<sub>8</sub> 1998 03 03.3 10 55.65 +07 28.1 19.1 -0.74 + 4.9 0.2/03.1 25728  
 1981 ER<sub>9</sub> 1998 03 03.3 10 55.67 +01 14.5 18.5 -0.78 + 3.5 1.7/05.0 26916  
 1981 DL<sub>3</sub> 1998 03 03.3 10 56.05 -02 05.7 17.8 -1.01 + 4.9 3.2/06.0 26914  
 1996 PB<sub>5</sub> 1998 03 03.4 10 56.00 +03 08.1 18.0 -1.04 + 5.3 1.4/04.5 31388  
 1995 HG 1998 03 03.7 10 57.17 +16 19.5 16.5 -1.06 + 5.6 3.7/28.8 31277  
 1994 FS 1998 03 03.7 10 57.34 +04 24.6 17.0 -0.94 + 6.4 0.8/04.5 31420  
 (7502) 1998 03 03.7 10 57.38 +05 02.2 16.4 -0.81 + 5.5 0.5/04.3 29090  
 (7326) 1998 03 03.7 10 57.51 -05 14.7 18.1 -0.88 + 7.5 3.7/07.7 28568  
 1983 QG 1998 03 03.9 10 57.98 +27 43.1 18.6 -0.92 + 4.9 5.5/25.1 28612  
 2204 T-3 1998 03 04.1 10 58.82 -03 44.3 18.3 -0.89 + 6.6 4.1/07.4 29321  
 1995 FM<sub>11</sub> 1998 03 04.2 10 59.08 +03 58.1 19.0 -1.01 + 8.1 1.0/05.0 25223  
 1995 KO<sub>1</sub> 1998 03 04.3 10 59.56 +34 21.6 18.9 -1.01 +13.3 9.7/20.8 29138  
 (8333) 1998 03 04.4 10 59.76 +13 31.9 17.0 -0.92 + 3.3 2.2/02.3 31350  
 1198 T-1 1998 03 04.4 11 00.10 +02 55.5 18.1 -0.81 + 3.6 1.2/05.5 31436  
 1993 VY 1998 03 04.5 11 00.52 +43 48.2 17.3 -1.68 - 5.4 15.3/24.8 31236  
 1988 VK<sub>2</sub> 1998 03 04.6 11 00.54 +18 50.1 16.9 -0.93 + 5.3 4.1/28.7 29656  
 1993 FG<sub>24</sub> 1998 03 04.6 11 00.75 -01 17.0 16.5 -0.72 + 6.7 2.2/07.2 31419  
 1988 PK 1998 03 04.7 11 00.87 +06 19.7 18.4 -0.90 + 6.7 7.8/13.0 29656  
 1977 PP<sub>1</sub> 1998 03 04.7 11 01.19 +01 44.8 17.6 -0.80 + 6.2 1.4/06.3 31414  
 1981 EL<sub>44</sub> 1998 03 04.8 11 01.28 -01 47.8 20.5 -1.05 + 4.3 3.1/07.1 26923  
 1993 FT<sub>23</sub> 1998 03 04.8 11 01.50 +05 00.6 17.2 -0.75 + 4.5 0.3/05.3 23525  
 1993 FZ<sub>25</sub> 1998 03 04.9 11 01.63 +03 12.5 16.5 -0.78 + 4.9 0.9/05.9 28616  
 1325 T-2 1998 03 05.0 11 02.08 +11 07.5 17.9 -0.89 + 4.0 1.6/03.5 25540  
 1996 UA<sub>3</sub> 1998 03 05.0 11 02.14 +20 17.1 19.7 -1.02 + 5.4 4.8/28.7 31390  
 1993 FR<sub>18</sub> 1998 03 05.0 11 02.23 +19 28.5 18.1 -0.80 + 3.5 3.4/28.8 31234  
 1981 EY<sub>9</sub> 1998 03 05.0 11 02.39 +00 28.6 16.9 -1.01 + 4.3 2.6/06.7 31415  
 (7466) 1998 03 05.2 11 03.12 +11 34.1 17.3 -0.73 + 3.5 1.3/03.6 29080  
 1996 YO<sub>2</sub> 1998 03 05.3 11 03.25 +11 28.0 17.2 -0.83 + 5.1 1.8/03.6 31422  
 (7445) 1998 03 05.3 11 03.36 +04 16.7 18.5 -1.01 + 6.5 0.6/05.9 28837  
 7607 P-L 1998 03 05.3 11 03.40 +12 03.8 17.9 -0.98 + 6.6 2.5/03.5 31436  
 1981 EH<sub>30</sub> 1998 03 05.4 11 03.59 +03 22.0 19.0 -0.69 + 7.7 0.9/06.4 26920  
 1996 VD<sub>6</sub> 1998 03 05.4 11 03.73 +01 56.6 18.1 -0.72 + 5.3 1.1/06.8 31422  
 1981 EB<sub>33</sub> 1998 03 05.5 11 04.01 +00 00.2 19.1 -0.96 + 2.4 1.9/07.2 25536  
 1981 ET<sub>40</sub> 1998 03 05.5 11 04.22 +03 16.2 19.8 -0.90 + 4.5 0.9/06.4 26922  
 1996 RB<sub>4</sub> 1998 03 05.6 11 04.37 -12 28.8 16.8 -0.96 + 2.9 6.3/11.2 31421  
 1995 OH<sub>10</sub> 1998 03 05.7 11 04.57 +02 16.6 19.0 -0.84 + 4.8 1.0/06.8 31386

|                       |              |                        |             |           |       |                       |              |                        |             |           |       |
|-----------------------|--------------|------------------------|-------------|-----------|-------|-----------------------|--------------|------------------------|-------------|-----------|-------|
| 1993 XF <sub>1</sub>  | 1998 03 05.7 | 11 04.58 +15 15.1 17.9 | -1.02 + 6.2 | 3.3/02.8  | 29318 | (8228)                | 1998 03 07.6 | 11 11.96 +03 17.3 15.9 | -0.82 + 9.5 | 0.6/08.3  | 31093 |
| 1996 VG <sub>3</sub>  | 1998 03 05.7 | 11 04.91 +00 22.4 18.9 | -0.90 + 6.1 | 1.7/07.5  | 28600 | 1985 PL <sub>1</sub>  | 1998 03 07.7 | 11 12.06 -02 34.7 18.1 | -0.74 + 7.7 | 2.3/10.4  | 22698 |
| 1990 RK <sub>5</sub>  | 1998 03 05.8 | 11 04.92 +01 11.0 18.5 | -0.76 + 5.4 | 1.2/07.3  | 26579 | 1996 VJ <sub>30</sub> | 1998 03 07.7 | 11 12.16 -03 45.8 17.2 | -0.92 + 6.0 | 2.9/10.6  | 31422 |
| (7321)                | 1998 03 05.8 | 11 05.05 +06 38.1 16.4 | -0.87 + 6.7 | 0.3/05.6  | 28567 | 1991 GY <sub>2</sub>  | 1998 03 07.7 | 11 12.18 -00 04.2 18.2 | -0.86 + 8.5 | 2.2/09.5  | 31417 |
| (8342)                | 1998 03 05.8 | 11 05.05 +11 25.1 17.5 | -1.02 + 6.4 | 2.0/04.1  | 31352 | 1992 QC               | 1998 03 07.9 | 11 12.88 +32 47.2 19.9 | -1.18 + 2.0 | 7.8/27.5  | 25215 |
| 1993 KT <sub>1</sub>  | 1998 03 05.8 | 11 05.09 +54 06.6 17.0 | -1.53 + 3.2 | 19.7/18.0 | 25651 | 1277 T-2              | 1998 03 07.9 | 11 12.98 +05 14.5 19.0 | -0.72 + 4.9 | 0.0/07.9  | 31409 |
| 1993 XO <sub>1</sub>  | 1998 03 05.8 | 11 05.25 +00 26.6 16.9 | -0.96 + 7.0 | 1.9/07.6  | 31419 | 1978 RQ <sub>9</sub>  | 1998 03 08.0 | 11 13.13 +05 42.5 16.2 | -1.08 + 2.7 | 0.3/07.8  | 25438 |
| 1981 DW               | 1998 03 05.9 | 11 05.38 -05 30.1 18.5 | -0.95 + 2.1 | 4.4/09.1  | 26914 | 1998 BS <sub>33</sub> | 1998 03 08.0 | 11 13.19 +14 46.0 16.8 | -0.84 + 8.1 | 4.1/04.6  | 31401 |
| 1981 EN <sub>38</sub> | 1998 03 05.9 | 11 05.53 -04 20.9 19.8 | -0.68 + 7.4 | 3.0/09.5  | 30780 | 1985 RV <sub>2</sub>  | 1998 03 08.1 | 11 13.84 +09 02.8 19.4 | -0.92 + 7.4 | 1.3/06.9  | 29655 |
| 1981 EV <sub>33</sub> | 1998 03 05.9 | 11 05.58 -03 52.3 19.9 | -0.74 +13.7 | 3.3/09.7  | 26921 | 1981 UV <sub>23</sub> | 1998 03 08.2 | 11 13.88 +16 19.1 17.0 | -0.98 + 5.0 | 3.6/04.7  | 31415 |
| 1994 AR <sub>2</sub>  | 1998 03 05.9 | 11 05.62 +07 32.5 16.8 | -0.98 + 6.0 | 0.7/05.4  | 31237 | 1983 RF <sub>2</sub>  | 1998 03 08.3 | 11 14.46 +16 29.1 18.5 | -0.89 + 5.2 | 3.3/04.7  | 28883 |
| 1982 TT <sub>2</sub>  | 1998 03 06.0 | 11 05.71 +15 20.5 17.3 | -0.91 + 3.0 | 2.6/03.2  | 27726 | 1992 UJ               | 1998 03 08.3 | 11 14.46 +02 18.0 18.1 | -0.92 + 5.2 | 0.9/09.2  | 31418 |
| 1992 DB <sub>10</sub> | 1998 03 06.0 | 11 05.82 +01 58.1 18.8 | -0.70 + 5.6 | 1.0/07.3  | 31418 | (8350)                | 1998 03 08.3 | 11 14.54 +27 01.3 15.9 | -0.87 + 6.2 | 8.4/28.5  | 31354 |
| 1981 EM <sub>46</sub> | 1998 03 06.0 | 11 05.83 +03 16.6 18.8 | -0.99 + 6.3 | 1.0/06.8  | 26923 | 1996 QU <sub>1</sub>  | 1998 03 08.3 | 11 14.59 +01 00.6 18.1 | -0.97 + 4.7 | 1.2/09.5  | 29140 |
| 1981 ES <sub>24</sub> | 1998 03 06.0 | 11 05.88 +03 57.3 18.2 | -1.09 + 2.6 | 0.8/06.5  | 26919 | 1981 EH <sub>11</sub> | 1998 03 08.5 | 11 15.09 +03 23.4 18.2 | -0.96 + 2.4 | 0.4/08.9  | 21966 |
| 1971 SB               | 1998 03 06.0 | 11 06.00 +18 07.2 16.0 | -1.97 - 9.8 | 6.5/04.7  | 31414 | 1981 ET <sub>29</sub> | 1998 03 08.5 | 11 15.24 -01 32.4 18.5 | -0.73 + 5.4 | 2.0/10.7  | 31415 |
| 1996 VQ               | 1998 03 06.1 | 11 06.05 +24 30.0 16.3 | -0.97 + 1.3 | 6.5/28.7  | 31279 | 1990 GS               | 1998 03 08.6 | 11 15.34 +09 09.4 17.4 | -1.04 + 2.1 | 1.5/07.4  | 31416 |
| (7582)                | 1998 03 06.1 | 11 06.20 +11 41.0 16.4 | -0.72 + 6.6 | 1.6/04.1  | 29597 | 4014 P-L              | 1998 03 08.6 | 11 15.36 +04 04.8 17.0 | -1.11 + 3.8 | 0.3/08.8  | 31436 |
| 1993 TJ <sub>24</sub> | 1998 03 06.1 | 11 06.25 +08 33.0 19.2 | -1.02 + 7.2 | 1.1/05.3  | 27715 | 1996 VU <sub>5</sub>  | 1998 03 08.7 | 11 15.71 +06 30.8 16.9 | -0.75 + 5.2 | 0.5/08.1  | 30670 |
| 3827 T-3              | 1998 03 06.1 | 11 06.48 +08 13.2 21.0 | -0.95 + 5.5 | 0.8/05.4  | 28313 | (8343)                | 1998 03 08.7 | 11 15.91 +03 48.9 17.0 | -0.80 + 5.7 | 0.3/09.1  | 31353 |
| 1996 TG               | 1998 03 06.3 | 11 07.00 +03 16.8 17.6 | -1.04 + 5.1 | 0.9/07.0  | 31421 | 1989 UE               | 1998 03 08.8 | 11 16.11 +10 15.5 17.5 | -0.99 + 5.8 | 1.9/07.1  | 31416 |
| 1996 TD <sub>8</sub>  | 1998 03 06.4 | 11 07.46 -10 03.5 21.0 | -0.81 + 7.1 | 4.1/11.9  | 29116 | 1991 PY <sub>10</sub> | 1998 03 08.8 | 11 16.13 -00 13.8 16.9 | -0.78 + 7.8 | 1.5/10.5  | 31417 |
| 1188 T-1              | 1998 03 06.5 | 11 07.68 +06 47.2 16.0 | -1.11 + 2.6 | 0.5/06.2  | 31436 | 1981 DX               | 1998 03 08.8 | 11 16.28 -06 25.2 17.6 | -0.74 + 4.2 | 3.2/12.5  | 31414 |
| (7617)                | 1998 03 06.5 | 11 07.71 +06 00.7 17.4 | -0.79 + 7.2 | 0.1/06.4  | 29605 | 1175 T-2              | 1998 03 08.8 | 11 16.39 +03 18.0 17.6 | -0.90 + 6.0 | 0.6/09.3  | 31436 |
| 1991 GM <sub>10</sub> | 1998 03 06.5 | 11 07.77 +10 58.5 18.1 | -0.57 + 3.8 | 1.0/04.7  | 31417 | 1996 QU               | 1998 03 09.0 | 11 17.09 -13 32.4 18.0 | -1.30 - 0.4 | 6.7/13.6  | 31421 |
| 4049 P-L              | 1998 03 06.6 | 11 08.06 -00 02.6 17.7 | -0.69 + 6.1 | 1.5/08.6  | 23866 | 1070 T-2              | 1998 03 09.0 | 11 17.11 +01 11.9 18.4 | -0.88 + 8.2 | 1.3/10.0  | 22274 |
| 1996 XA <sub>6</sub>  | 1998 03 06.6 | 11 08.11 -02 06.2 16.8 | -0.79 + 3.8 | 2.1/09.0  | 28871 | (7500)                | 1998 03 09.0 | 11 17.19 +14 01.1 16.7 | -1.03 + 4.8 | 3.5/06.3  | 29090 |
| 1985 GA <sub>1</sub>  | 1998 03 06.6 | 11 08.17 +11 30.4 16.6 | -0.98 + 9.0 | 2.3/04.7  | 31415 | 1988 XX <sub>1</sub>  | 1998 03 09.2 | 11 17.57 +20 11.8 17.3 | -1.02 + 2.4 | 4.9/04.7  | 31416 |
| 1981 EM <sub>9</sub>  | 1998 03 06.7 | 11 08.45 -02 56.8 19.4 | -1.02 + 5.2 | 3.3/09.2  | 26916 | 3358 T-3              | 1998 03 09.5 | 11 18.80 +07 26.5 17.2 | -0.96 + 4.3 | 1.3/08.6  | 23989 |
| 1986 RE <sub>1</sub>  | 1998 03 06.7 | 11 08.45 +02 34.3 18.6 | -0.98 + 7.0 | 1.0/07.7  | 31416 | 4223 T-2              | 1998 03 09.5 | 11 18.85 +03 16.5 18.0 | -0.75 +12.8 | 0.5/10.0  | 31410 |
| 1992 UA <sub>1</sub>  | 1998 03 06.7 | 11 08.45 +17 57.2 16.3 | -1.13 + 0.1 | 4.7/03.6  | 30658 | 1981 GG               | 1998 03 09.5 | 11 19.01 +26 45.0 16.3 | -1.09 - 0.7 | 9.5/03.3  | 31415 |
| 1274 T-2              | 1998 03 06.7 | 11 08.46 +06 53.2 18.0 | -0.87 + 4.7 | 0.5/06.3  | 29142 | 1996 XL <sub>4</sub>  | 1998 03 09.6 | 11 19.06 -11 14.2 20.7 | -0.88 + 4.9 | 4.4/14.7  | 30786 |
| 1981 DJ               | 1998 03 06.7 | 11 08.65 -07 07.8 17.8 | -0.72 + 5.4 | 3.8/11.0  | 26914 | 1993 FO               | 1998 03 09.6 | 11 19.27 +03 39.8 17.2 | -0.74 + 5.0 | 0.2/09.9  | 29102 |
| 1987 DQ <sub>6</sub>  | 1998 03 06.9 | 11 09.19 +08 49.0 15.6 | -0.88 + 1.5 | 0.9/06.0  | 31226 | 1996 SD <sub>7</sub>  | 1998 03 09.6 | 11 19.40 -07 30.2 18.1 | -0.94 + 6.2 | 4.1/13.5  | 29307 |
| 1996 TD <sub>21</sub> | 1998 03 06.9 | 11 09.22 +08 05.9 17.7 | -0.99 + 5.4 | 1.1/06.1  | 31390 | 1996 TT <sub>5</sub>  | 1998 03 09.7 | 11 19.56 -25 37.4 19.1 | -1.07 + 2.9 | 9.9/19.4  | 28864 |
| (7375)                | 1998 03 06.9 | 11 09.43 -01 47.9 17.3 | -1.01 + 3.0 | 2.4/09.0  | 28820 | 1981 EU <sub>43</sub> | 1998 03 09.8 | 11 19.78 -07 30.7 19.5 | -1.02 + 1.7 | 3.9/13.1  | 26923 |
| 1991 PD <sub>13</sub> | 1998 03 07.0 | 11 09.41 +05 17.8 19.2 | -0.88 + 4.8 | 0.0/07.0  | 24104 | 1991 CU <sub>1</sub>  | 1998 03 09.8 | 11 19.91 -03 41.1 15.9 | -0.95 + 5.0 | 3.7/12.3  | 31417 |
| 4640 P-L              | 1998 03 07.0 | 11 09.45 +04 42.4 19.3 | -0.68 + 6.1 | 0.2/07.3  | 26192 | 1981 EQ <sub>34</sub> | 1998 03 09.8 | 11 20.07 +04 21.1 19.1 | -0.84 + 7.4 | 8.1/18.0  | 26921 |
| 1989 UO               | 1998 03 07.0 | 11 09.47 +11 16.3 17.6 | -0.99 + 5.9 | 2.1/05.2  | 31378 | 1991 AK <sub>2</sub>  | 1998 03 09.8 | 11 20.10 -17 57.7 18.4 | -0.69 + 7.2 | 6.0/18.3  | 26189 |
| 1996 TB <sub>6</sub>  | 1998 03 07.0 | 11 09.80 +19 50.4 17.8 | -0.94 + 3.3 | 4.0/02.8  | 31278 | 1994 XY <sub>4</sub>  | 1998 03 09.8 | 11 20.17 +51 51.1 17.3 | -1.50 + 2.3 | 20.4/19.1 | 31277 |
| 1992 BB <sub>5</sub>  | 1998 03 07.1 | 11 09.99 +14 53.7 17.1 | -0.76 + 5.2 | 2.7/04.0  | 31418 | 1989 RV <sub>2</sub>  | 1998 03 09.9 | 11 20.23 +12 25.6 17.6 | -1.02 + 5.2 | 2.8/07.5  | 31273 |
| 1981 EO <sub>9</sub>  | 1998 03 07.1 | 11 10.00 -01 04.5 17.7 | -0.76 + 2.8 | 1.6/09.1  | 29653 | 1994 EQ               | 1998 03 09.9 | 11 20.30 +18 21.0 16.9 | -1.08 + 1.8 | 5.2/05.9  | 31420 |
| 9057 P-L              | 1998 03 07.1 | 11 10.10 +01 39.7 17.3 | -1.00 + 4.3 | 1.6/08.2  | 31436 | 1996 VC <sub>34</sub> | 1998 03 09.9 | 11 20.30 +15 31.5 19.9 | -1.05 + 5.5 | 4.0/06.5  | 28604 |
| (7408)                | 1998 03 07.3 | 11 10.67 +05 30.7 17.4 | -1.04 + 5.4 | 0.1/07.3  | 28828 | 1331 T-2              | 1998 03 10.0 | 11 20.61 +01 34.9 19.4 | -0.84 + 5.2 | 0.8/10.9  | 25229 |
| 1981 DF               | 1998 03 07.3 | 11 10.72 -00 49.9 16.5 | -0.89 + 1.2 | 2.0/09.1  | 31414 | 1996 UB <sub>4</sub>  | 1998 03 10.0 | 11 20.75 +00 13.7 19.6 | -0.92 + 8.5 | 1.4/11.4  | 28599 |
| 1995 QE <sub>2</sub>  | 1998 03 07.5 | 11 11.39 -21 13.7 19.5 | -0.72 + 5.8 | 6.3/17.2  | 29107 | 1109 T-2              | 1998 03 10.0 | 11 20.90 +03 04.5 18.3 | -0.98 + 5.1 | 0.4/10.4  | 27927 |
| 1996 XY <sub>12</sub> | 1998 03 07.5 | 11 11.67 +24 11.2 19.9 | -0.84 + 4.7 | 5.8/01.2  | 30786 | 1994 PO <sub>1</sub>  | 1998 03 10.1 | 11 20.84 +44 37.8 18.6 | -1.00 + 2.2 | 9.6/23.0  | 24763 |
| 1997 CE <sub>18</sub> | 1998 03 07.6 | 11 11.68 +07 37.4 20.2 | -0.54 + 4.3 | 0.4/06.8  | 29928 | 6055 P-L              | 1998 03 10.1 | 11 21.14 +02 55.1 19.6 | -0.99 + 5.6 | 0.5/10.6  | 31436 |
| 1981 EQ <sub>16</sub> | 1998 03 07.6 | 11 11.71 +02 23.6 18.9 | -0.85 + 1.8 | 0.8/08.4  | 31415 | 1978 UJ <sub>4</sub>  | 1998 03 10.2 | 11 21.28 -02 50.1 20.0 | -0.93 + 6.4 | 2.2/12.5  | 28314 |
| 1990 HW <sub>1</sub>  | 1998 03 07.6 | 11 11.76 +18 08.6 16.9 | -0.82 +10.5 | 4.5/02.9  | 31416 | 1995 QC <sub>2</sub>  | 1998 03 10.2 | 11 21.66 -01 24.2 16.9 | -1.03 + 1.4 | 1.8/11.8  | 30455 |
| 1996 SX <sub>6</sub>  | 1998 03 07.6 | 11 11.82 -05 05.4 19.4 | -0.84 + 5.5 | 3.3/11.0  | 28864 | 1995 QF <sub>1</sub>  | 1998 03 10.3 | 11 21.73 +03 58.0 19.4 | -0.85 + 6.2 | 0.0/10.4  | 30455 |

|                       |              |                        |             |           |       |
|-----------------------|--------------|------------------------|-------------|-----------|-------|
| 1996 TR               | 1998 03 10.5 | 11 22.35 +02 56.6 18.7 | -0.89 + 8.5 | 0.4/10.9  | 31389 |
| 1981 EF <sub>28</sub> | 1998 03 10.5 | 11 22.37 +10 25.7 17.7 | -0.94 + 3.1 | 1.9/08.6  | 31415 |
| 1989 KF               | 1998 03 10.5 | 11 22.39 +30 52.5 16.6 | -0.89 + 4.9 | 8.5/28.7  | 31416 |
| 1994 LD <sub>1</sub>  | 1998 03 10.7 | 11 23.12 +12 35.8 20.9 | -0.85 + 2.9 | 2.1/08.1  | 24409 |
| 1983 RL <sub>4</sub>  | 1998 03 10.7 | 11 23.39 +05 28.6 18.3 | -0.79 + 9.3 | 0.4/10.2  | 18424 |
| 1994 VW <sub>1</sub>  | 1998 03 10.8 | 11 23.84 +32 33.3 17.6 | -1.14 + 7.9 | 13.4/01.0 | 31420 |
| 1997 XT <sub>10</sub> | 1998 03 11.0 | 11 24.19 -15 55.6 16.4 | -0.92 - 0.9 | 8.1/16.6  | 31253 |
| 1981 EZ <sub>45</sub> | 1998 03 11.0 | 11 24.22 +05 06.2 18.4 | -0.69 + 5.7 | 0.3/10.6  | 26923 |
| 1994 AH <sub>3</sub>  | 1998 03 11.0 | 11 24.40 -04 32.0 16.2 | -0.93 + 5.5 | 3.3/13.7  | 31419 |
| 1996 VS <sub>4</sub>  | 1998 03 11.1 | 11 24.55 +10 31.9 16.5 | -0.88 + 5.0 | 2.3/09.0  | 31422 |
| 1977 RY <sub>6</sub>  | 1998 03 11.1 | 11 24.95 +07 54.8 17.9 | -0.88 + 3.3 | 1.2/10.0  | 21964 |
| 1993 PZ <sub>2</sub>  | 1998 03 11.2 | 11 24.89 -01 11.5 18.6 | -0.56 + 3.9 | 0.9/12.9  | 30897 |
| 1991 FV <sub>2</sub>  | 1998 03 11.2 | 11 24.94 +08 38.9 16.3 | -1.05 + 4.4 | 2.0/09.8  | 25080 |
| 1987 SN <sub>12</sub> | 1998 03 11.3 | 11 25.41 +04 47.5 18.1 | -0.86 + 5.9 | 0.3/11.0  | 25648 |
| 1993 FL <sub>15</sub> | 1998 03 11.3 | 11 25.42 +10 08.2 17.0 | -0.77 + 4.9 | 1.8/09.2  | 23523 |
| 1995 FA <sub>1</sub>  | 1998 03 11.3 | 11 25.52 +01 14.0 17.4 | -0.99 + 7.1 | 1.1/12.1  | 29302 |
| 1986 QZ               | 1998 03 11.3 | 11 25.63 +09 03.3 16.9 | -0.99 + 7.2 | 1.9/09.7  | 30651 |
| 1996 VP <sub>6</sub>  | 1998 03 11.4 | 11 25.90 +00 07.9 17.8 | -0.94 + 4.5 | 1.1/12.5  | 31422 |
| 1987 RD <sub>1</sub>  | 1998 03 11.5 | 11 26.06 +04 50.9 16.6 | -0.90 + 4.9 | 0.4/11.2  | 31416 |
| 1991 CN               | 1998 03 11.5 | 11 26.16 +05 12.2 15.5 | -1.03 + 3.8 | 0.7/11.1  | 31417 |
| 1968 OH               | 1998 03 11.6 | 11 26.42 -14 29.5 17.5 | -0.85 + 4.3 | 5.3/17.4  | 31414 |
| 1981 EM <sub>12</sub> | 1998 03 11.6 | 11 26.74 -01 42.6 19.9 | -0.87 + 1.2 | 1.6/13.2  | 11045 |
| 1995 QK <sub>1</sub>  | 1998 03 11.7 | 11 26.94 +04 23.3 18.6 | -0.79 + 7.2 | 0.3/11.5  | 26403 |
| 1971 UT               | 1998 03 11.7 | 11 27.10 -04 08.0 17.3 | -0.93 + 7.1 | 2.7/14.3  | 31414 |
| 1019 T-1              | 1998 03 11.8 | 11 27.22 -03 52.0 18.3 | -0.82 + 5.5 | 2.2/14.3  | 24403 |
| (7737)                | 1998 03 11.8 | 11 27.47 +01 49.2 17.7 | -0.92 + 6.6 | 0.6/12.4  | 30254 |
| 1981 EZ <sub>23</sub> | 1998 03 11.8 | 11 27.52 +00 13.2 19.6 | -0.84 + 6.4 | 1.2/13.0  | 21967 |
| 1981 ET <sub>20</sub> | 1998 03 11.8 | 11 27.53 +05 24.0 17.9 | -1.01 + 0.9 | 0.8/11.4  | 31415 |
| 1996 WZ               | 1998 03 11.9 | 11 27.48 +19 46.7 16.7 | -0.83 + 3.6 | 4.6/06.6  | 31422 |
| 1996 TQ <sub>1</sub>  | 1998 03 12.0 | 11 28.25 +02 29.9 18.6 | -0.93 + 6.6 | 0.3/12.4  | 29320 |
| 1994 CA <sub>1</sub>  | 1998 03 12.1 | 11 28.23 +00 02.6 18.3 | -0.88 + 7.7 | 1.3/13.2  | 31140 |
| 1987 SH <sub>4</sub>  | 1998 03 12.1 | 11 28.27 +14 40.4 17.9 | -0.98 + 2.7 | 3.4/08.8  | 31416 |
| 1978 VW <sub>4</sub>  | 1998 03 12.1 | 11 28.40 +05 44.3 18.9 | -0.98 + 5.6 | 0.9/11.4  | 27930 |
| 1992 EN <sub>25</sub> | 1998 03 12.2 | 11 28.60 +05 39.0 19.5 | -0.71 + 4.6 | 0.6/11.5  | 24106 |
| 1995 QM <sub>2</sub>  | 1998 03 12.2 | 11 28.70 +09 49.8 17.2 | -0.81 + 5.8 | 1.9/10.1  | 29664 |
| 1981 ET <sub>39</sub> | 1998 03 12.2 | 11 28.73 +01 17.5 19.1 | -0.79 + 3.8 | 0.6/12.9  | 26922 |
| 1992 DA <sub>10</sub> | 1998 03 12.3 | 11 29.03 -02 06.7 19.2 | -0.70 + 4.8 | 1.3/14.2  | 29616 |
| 1981 SL               | 1998 03 12.3 | 11 29.11 -01 13.1 19.0 | -0.89 + 7.5 | 1.4/13.8  | 29653 |
| 1981 DV               | 1998 03 12.3 | 11 29.25 -11 04.1 18.5 | -0.77 + 9.4 | 5.0/17.7  | 31414 |
| 1981 EQ <sub>13</sub> | 1998 03 12.3 | 11 29.34 -03 51.8 15.9 | -1.10 - 3.4 | 3.4/14.0  | 26917 |
| 1981 EN <sub>15</sub> | 1998 03 12.4 | 11 29.30 -01 06.1 18.3 | -0.99 + 5.8 | 1.9/13.8  | 21967 |
| 1981 EM <sub>3</sub>  | 1998 03 12.4 | 11 29.40 -07 33.3 17.8 | -0.97 + 6.5 | 4.3/15.9  | 29653 |
| 1993 FX <sub>23</sub> | 1998 03 12.5 | 11 29.69 +02 28.0 18.2 | -0.79 + 4.5 | 0.2/12.8  | 26400 |
| 1982 SG <sub>12</sub> | 1998 03 12.5 | 11 29.79 +00 46.8 17.2 | -0.90 + 9.1 | 0.9/13.4  | 28314 |
| 1992 SQ <sub>23</sub> | 1998 03 12.5 | 11 29.84 -06 10.0 18.9 | -0.94 + 7.2 | 3.0/15.6  | 21798 |
| 1981 DY <sub>1</sub>  | 1998 03 12.5 | 11 30.05 -06 32.3 18.7 | -0.88 + 1.2 | 3.1/15.0  | 26914 |
| 1996 TL <sub>10</sub> | 1998 03 12.6 | 11 30.15 -01 12.1 18.4 | -1.02 + 5.0 | 1.5/13.9  | 31421 |
| 2045 T-2              | 1998 03 12.6 | 11 30.18 +08 19.2 15.9 | -1.03 + 1.6 | 1.8/11.2  | 31436 |
| 4068 P-L              | 1998 03 12.6 | 11 30.24 +01 59.0 17.0 | -1.05 + 5.0 | 0.5/13.0  | 31436 |
| 1996 YK               | 1998 03 12.6 | 11 30.31 +03 01.1 17.4 | -0.70 + 4.6 | 0.0/12.7  | 29140 |
| 1974 SF               | 1998 03 12.7 | 11 30.70 +01 02.3 18.9 | -0.90 + 7.2 | 0.7/13.5  | 28610 |

|                       |              |                        |             |           |       |
|-----------------------|--------------|------------------------|-------------|-----------|-------|
| 1995 UR <sub>5</sub>  | 1998 03 12.8 | 11 31.16 -05 30.3 17.6 | -0.71 + 7.1 | 2.4/15.9  | 27731 |
| 1997 AX <sub>14</sub> | 1998 03 12.9 | 11 31.23 +19 27.5 18.9 | -0.86 + 6.7 | 4.4/07.2  | 31422 |
| 1988 RC <sub>5</sub>  | 1998 03 12.9 | 11 31.34 +11 40.7 17.1 | -0.97 + 5.0 | 2.9/10.3  | 31416 |
| 1981 EG <sub>18</sub> | 1998 03 12.9 | 11 31.36 +02 04.7 17.1 | -1.04 + 4.3 | 0.4/13.2  | 29609 |
| 2672 T-3              | 1998 03 12.9 | 11 31.51 -05 31.9 18.0 | -0.67 + 6.1 | 2.0/16.0  | 29949 |
| 1996 XC               | 1998 03 13.0 | 11 31.71 +15 01.3 17.0 | -0.95 + 7.1 | 4.5/09.0  | 31422 |
| 5016 P-L              | 1998 03 13.1 | 11 31.96 +07 08.6 17.3 | -1.08 + 3.4 | 1.9/12.0  | 28319 |
| 1996 VD <sub>9</sub>  | 1998 03 13.1 | 11 32.23 +08 34.7 17.4 | -0.85 + 6.1 | 1.8/11.4  | 31422 |
| 1990 BY <sub>1</sub>  | 1998 03 13.2 | 11 32.25 -02 38.6 15.6 | -0.90 + 6.4 | 2.2/15.0  | 28885 |
| (7325)                | 1998 03 13.2 | 11 32.37 +01 55.7 16.6 | -0.87 + 9.3 | 0.4/13.6  | 28568 |
| 1993 TY <sub>24</sub> | 1998 03 13.2 | 11 32.50 +02 19.5 19.0 | -0.99 + 8.0 | 0.3/13.5  | 23125 |
| 1983 CZ <sub>2</sub>  | 1998 03 13.2 | 11 32.53 -04 57.2 15.9 | -0.99 + 1.7 | 3.7/15.5  | 31415 |
| 1996 TY <sub>8</sub>  | 1998 03 13.2 | 11 32.56 -26 54.3 20.0 | -0.91 + 8.3 | 8.8/24.9  | 28864 |
| 2277 T-2              | 1998 03 13.2 | 11 32.61 +06 29.7 18.0 | -0.86 + 4.7 | 1.1/12.2  | 29142 |
| 1991 PH <sub>2</sub>  | 1998 03 13.2 | 11 32.64 +05 13.6 18.6 | -0.88 + 5.7 | 0.8/12.6  | 31417 |
| 1997 AY               | 1998 03 13.3 | 11 33.00 +08 43.7 17.3 | -0.72 + 4.4 | 1.4/11.5  | 31422 |
| 1990 OE <sub>4</sub>  | 1998 03 13.4 | 11 33.15 -03 49.4 18.8 | -0.78 + 6.1 | 1.8/15.7  | 21974 |
| 1990 WM               | 1998 03 13.4 | 11 33.15 +21 31.3 16.4 | -0.79 + 5.7 | 5.5/06.8  | 31380 |
| 1984 SS <sub>5</sub>  | 1998 03 13.4 | 11 33.17 +12 09.0 18.2 | -0.74 + 4.6 | 2.3/10.4  | 29316 |
| 3060 T-2              | 1998 03 13.6 | 11 33.87 +08 49.7 16.7 | -0.91 + 5.2 | 2.6/11.7  | 28892 |
| 1981 DO <sub>3</sub>  | 1998 03 13.6 | 11 33.99 -05 45.6 17.9 | -0.74 + 3.9 | 2.3/16.4  | 28882 |
| 1996 VO <sub>1</sub>  | 1998 03 13.6 | 11 34.02 +19 24.2 16.9 | -0.99 + 2.7 | 5.0/08.7  | 31422 |
| 1981 UK <sub>11</sub> | 1998 03 13.7 | 11 34.12 +05 19.0 18.3 | -0.90 + 6.6 | 0.8/12.9  | 28882 |
| 1990 VK <sub>6</sub>  | 1998 03 13.7 | 11 34.31 -03 10.5 18.0 | -0.70 + 6.7 | 1.5/15.8  | 23516 |
| 1990 RE <sub>7</sub>  | 1998 03 13.7 | 11 34.48 +04 37.2 17.1 | -0.88 + 2.4 | 0.6/13.2  | 31417 |
| 1994 CM <sub>13</sub> | 1998 03 13.8 | 11 34.60 +08 35.8 17.9 | -0.96 + 4.2 | 1.9/12.1  | 30453 |
| 1995 US               | 1998 03 13.9 | 11 35.02 -14 41.8 16.8 | -0.95 + 0.4 | 5.0/18.8  | 31420 |
| 1989 VJ <sub>1</sub>  | 1998 03 13.9 | 11 35.10 +01 33.5 19.2 | -0.89 + 9.0 | 0.4/14.4  | 28297 |
| 1997 AO <sub>1</sub>  | 1998 03 14.0 | 11 35.26 +09 00.8 16.2 | -0.60 + 4.3 | 1.4/11.8  | 31422 |
| 1995 QJ <sub>3</sub>  | 1998 03 14.1 | 11 35.82 -02 28.8 18.4 | -0.71 + 8.2 | 1.4/16.0  | 29139 |
| 2583 P-L              | 1998 03 14.1 | 11 35.85 +06 54.6 18.7 | -0.80 + 4.8 | 1.3/12.8  | 27925 |
| 1996 VV <sub>5</sub>  | 1998 03 14.1 | 11 35.86 -02 37.7 17.5 | -0.85 + 7.0 | 1.7/15.9  | 28601 |
| 1995 SO <sub>2</sub>  | 1998 03 14.1 | 11 35.88 -03 02.0 20.2 | -0.87 + 6.0 | 1.7/16.0  | 30783 |
| 1995 KM <sub>1</sub>  | 1998 03 14.2 | 11 36.02 +08 24.1 19.7 | -0.98 + 7.4 | 2.1/12.3  | 30783 |
| 4095 P-L              | 1998 03 14.2 | 11 36.23 -03 42.4 19.1 | -0.83 + 6.3 | 2.1/16.4  | 28892 |
| 1993 FR <sub>26</sub> | 1998 03 14.3 | 11 36.42 +01 45.2 16.3 | -0.84 + 2.8 | 0.2/14.6  | 31383 |
| (7692)                | 1998 03 14.3 | 11 36.45 +03 15.5 17.4 | -0.85 + 1.5 | 0.2/14.1  | 30067 |
| 1996 SK <sub>8</sub>  | 1998 03 14.3 | 11 36.70 +03 46.8 17.6 | -0.96 + 5.5 | 0.4/14.0  | 29307 |
| 1991 TR <sub>1</sub>  | 1998 03 14.4 | 11 36.70 -25 26.4 16.7 | -1.03 +11.8 | 11.3/25.3 | 28086 |
| 1992 YC <sub>2</sub>  | 1998 03 14.4 | 11 36.78 +00 04.5 18.6 | -0.87 + 5.4 | 0.7/15.2  | 29661 |
| 1982 SM <sub>2</sub>  | 1998 03 14.5 | 11 37.24 +01 36.7 18.4 | -1.02 + 4.7 | 0.3/14.8  | 31415 |
| 1996 VK <sub>3</sub>  | 1998 03 14.7 | 11 37.78 -01 00.2 18.1 | -0.82 + 5.9 | 1.1/15.8  | 31144 |
| 1993 FA <sub>23</sub> | 1998 03 14.8 | 11 38.32 -02 47.7 17.3 | -0.74 + 6.0 | 1.5/16.6  | 23524 |
| 1992 YW <sub>3</sub>  | 1998 03 14.8 | 11 38.32 +24 15.9 14.8 | -0.87 + 4.3 | 8.3/07.5  | 31418 |
| 1995 UL <sub>3</sub>  | 1998 03 14.8 | 11 38.35 +07 11.9 17.0 | -0.79 + 2.5 | 1.2/13.4  | 29319 |
| 1981 EK <sub>20</sub> | 1998 03 14.9 | 11 38.56 +04 08.8 17.6 | -1.03 + 1.7 | 0.7/14.4  | 26918 |
| 6584 P-L              | 1998 03 14.9 | 11 38.60 +05 53.5 17.3 | -0.88 + 4.5 | 1.3/13.8  | 31436 |
| 1992 PX               | 1998 03 14.9 | 11 38.60 +03 59.7 18.3 | -0.91 + 7.6 | 0.6/14.4  | 31139 |
| 1996 XS <sub>25</sub> | 1998 03 14.9 | 11 38.81 +31 45.5 17.6 | -0.81 + 6.1 | 8.4/03.2  | 31249 |
| 1981 EF <sub>31</sub> | 1998 03 14.9 | 11 38.83 +04 03.0 18.5 | -0.93 + 8.3 | 0.7/14.4  | 26921 |
| 1987 UN <sub>1</sub>  | 1998 03 14.9 | 11 38.83 -13 43.7 17.8 | -0.81 + 7.0 | 4.8/20.7  | 31227 |

|                       |              |                        |             |           |       |                       |              |                        |             |          |       |
|-----------------------|--------------|------------------------|-------------|-----------|-------|-----------------------|--------------|------------------------|-------------|----------|-------|
| 1994 LF <sub>1</sub>  | 1998 03 15.1 | 11 39.26 -40 11.6 18.9 | -0.91 + 6.6 | 13.0/01.1 | 24395 | 1990 QK <sub>7</sub>  | 1998 03 17.7 | 11 48.93 +06 44.4 16.7 | -0.72 + 7.6 | 1.6/15.8 | 23515 |
| 1979 ME <sub>2</sub>  | 1998 03 15.1 | 11 39.39 +10 58.2 21.2 | -0.84 + 6.6 | 2.4/12.2  | 30778 | 1986 QT <sub>2</sub>  | 1998 03 17.7 | 11 48.96 +04 50.8 17.8 | -1.02 + 7.2 | 1.4/16.6 | 31416 |
| 1991 RY <sub>4</sub>  | 1998 03 15.1 | 11 39.49 -00 03.4 19.3 | -0.81 + 5.7 | 0.7/15.9  | 22084 | 1996 VE <sub>8</sub>  | 1998 03 17.8 | 11 49.16 -08 13.7 16.4 | -0.89 + 6.1 | 3.3/20.9 | 31422 |
| 1994 BM               | 1998 03 15.2 | 11 39.61 -04 47.6 17.1 | -1.00 + 4.1 | 2.6/17.3  | 31419 | 1981 EL <sub>34</sub> | 1998 03 17.9 | 11 49.76 -00 22.7 19.1 | -0.71 + 4.7 | 0.4/18.5 | 24116 |
| (7406)                | 1998 03 15.2 | 11 39.65 -00 07.5 17.5 | -0.90 + 5.7 | 0.7/16.0  | 28828 | 1989 VD <sub>1</sub>  | 1998 03 17.9 | 11 49.76 +14 47.8 17.9 | -0.94 + 6.6 | 5.3/13.4 | 31378 |
| 1977 EO <sub>1</sub>  | 1998 03 15.4 | 11 40.39 +06 19.5 16.6 | -0.80 + 4.6 | 1.4/14.1  | 27118 | 1981 ET <sub>37</sub> | 1998 03 17.9 | 11 49.81 -03 32.2 19.0 | -0.99 + 7.6 | 1.9/19.5 | 30780 |
| 1996 UG <sub>1</sub>  | 1998 03 15.5 | 11 40.79 -00 20.8 18.8 | -0.95 + 8.1 | 0.8/16.3  | 28599 | 1981 EA <sub>40</sub> | 1998 03 18.0 | 11 49.91 +04 00.5 19.3 | -0.72 + 5.1 | 0.8/17.0 | 31415 |
| 1989 SR <sub>1</sub>  | 1998 03 15.7 | 11 41.46 +10 42.9 17.4 | -1.00 + 6.3 | 3.4/12.9  | 31416 | 1981 EP <sub>45</sub> | 1998 03 18.1 | 11 50.22 -03 55.2 19.1 | -0.89 + 1.2 | 1.6/19.5 | 26923 |
| 1993 FG <sub>6</sub>  | 1998 03 15.7 | 11 41.56 +04 10.7 17.5 | -0.75 + 4.6 | 0.6/15.0  | 26190 | 1981 EF <sub>8</sub>  | 1998 03 18.1 | 11 50.54 -05 40.9 18.1 | -0.71 + 6.1 | 1.8/20.5 | 25972 |
| 1996 VU <sub>6</sub>  | 1998 03 15.7 | 11 41.60 +13 53.9 19.1 | -0.90 + 5.0 | 3.4/11.9  | 29308 | 1981 DL <sub>2</sub>  | 1998 03 18.2 | 11 50.59 -09 16.0 18.4 | -1.10 + 2.0 | 4.4/21.0 | 26914 |
| 1973 SB <sub>6</sub>  | 1998 03 15.8 | 11 41.75 +03 32.9 18.3 | -0.90 + 6.3 | 0.5/15.3  | 25338 | 1992 RZ <sub>5</sub>  | 1998 03 18.3 | 11 50.89 +07 33.5 16.4 | -0.88 + 5.4 | 3.0/16.2 | 31418 |
| 1981 EC <sub>39</sub> | 1998 03 15.8 | 11 41.82 -00 20.7 19.7 | -0.66 +11.9 | 0.7/16.7  | 26922 | 1991 PK <sub>15</sub> | 1998 03 18.3 | 11 51.00 -02 48.4 18.3 | -0.88 + 4.8 | 1.1/19.5 | 28886 |
| 1996 UU               | 1998 03 15.9 | 11 42.25 -09 41.9 17.8 | -0.82 + 8.9 | 3.7/20.1  | 31421 | 1981 EL <sub>2</sub>  | 1998 03 18.3 | 11 51.16 -12 04.7 19.2 | -0.82 + 6.9 | 4.0/22.8 | 30779 |
| 5175 T-3              | 1998 03 15.9 | 11 42.41 +23 21.5 17.0 | -0.84 + 6.7 | 9.3/08.0  | 22702 | 4283 T-1              | 1998 03 18.3 | 11 51.23 +09 06.5 17.2 | -1.10 + 3.0 | 3.3/16.1 | 31436 |
| 1990 YC               | 1998 03 16.0 | 11 42.57 +07 09.0 16.7 | -1.02 + 6.3 | 2.1/14.4  | 31417 | 1985 UJ <sub>3</sub>  | 1998 03 18.3 | 11 51.26 +02 57.6 18.1 | -0.96 + 6.4 | 0.7/17.7 | 31135 |
| 1992 RZ <sub>3</sub>  | 1998 03 16.0 | 11 42.62 +01 13.4 17.7 | -0.96 + 6.6 | 0.3/16.2  | 28586 | 1989 TY <sub>4</sub>  | 1998 03 18.4 | 11 51.60 +03 31.9 17.9 | -0.94 + 9.6 | 1.0/17.6 | 31416 |
| 1995 SD <sub>5</sub>  | 1998 03 16.1 | 11 43.03 -00 05.4 16.2 | -0.89 + 1.9 | 0.6/16.7  | 31420 | 1990 SH <sub>7</sub>  | 1998 03 18.5 | 11 51.94 +05 45.3 18.8 | -0.78 + 5.1 | 1.4/17.0 | 26168 |
| 1988 RD <sub>6</sub>  | 1998 03 16.1 | 11 43.04 +04 39.9 17.9 | -0.92 + 5.6 | 0.9/15.2  | 29316 | 1996 XY               | 1998 03 18.5 | 11 52.00 +19 09.3 17.4 | -0.86 + 4.8 | 6.1/12.3 | 31391 |
| 1979 MM <sub>4</sub>  | 1998 03 16.1 | 11 43.23 -00 49.0 17.5 | -0.97 + 7.9 | 1.1/17.0  | 30778 | 1316 T-2              | 1998 03 18.6 | 11 52.41 +01 52.4 20.4 | -0.93 + 5.6 | 0.4/18.4 | 28088 |
| 7081 P-L              | 1998 03 16.2 | 11 43.46 +00 34.6 18.1 | -1.08 + 3.7 | 0.5/16.6  | 22822 | 1089 T-1              | 1998 03 18.6 | 11 52.41 -02 21.7 17.6 | -0.84 + 2.5 | 1.0/19.7 | 22701 |
| 1979 MB <sub>6</sub>  | 1998 03 16.2 | 11 43.50 +04 20.0 18.9 | -0.96 + 7.4 | 0.9/15.4  | 22270 | 4651 P-L              | 1998 03 18.7 | 11 52.49 +00 32.3 16.7 | -0.74 + 4.9 | 0.1/18.8 | 26761 |
| 1996 XG <sub>9</sub>  | 1998 03 16.3 | 11 43.95 +17 02.8 16.9 | -0.90 + 3.9 | 5.6/11.4  | 31422 | (7370)                | 1998 03 18.7 | 11 52.80 +06 27.5 16.5 | -0.88 + 4.7 | 2.0/17.0 | 28819 |
| 1981 EW <sub>7</sub>  | 1998 03 16.4 | 11 44.13 -04 33.0 17.9 | -0.75 +10.5 | 2.3/18.8  | 26916 | 1988 RA <sub>11</sub> | 1998 03 18.8 | 11 52.87 +04 38.5 18.5 | -0.69 + 4.9 | 1.0/17.5 | 31416 |
| 1993 FX <sub>14</sub> | 1998 03 16.5 | 11 44.53 +07 09.3 17.2 | -0.71 + 7.3 | 1.5/14.6  | 23783 | 1996 VN <sub>3</sub>  | 1998 03 18.8 | 11 52.91 +04 03.0 17.8 | -0.76 + 4.7 | 1.0/17.8 | 31391 |
| (7802)                | 1998 03 16.5 | 11 44.72 -00 29.5 17.7 | -0.89 + 6.3 | 0.7/17.3  | 30271 | (7371)                | 1998 03 18.8 | 11 52.99 +03 44.1 17.7 | -0.75 + 4.6 | 0.9/17.9 | 28819 |
| 4586 P-L              | 1998 03 16.6 | 11 44.70 +03 39.1 17.3 | -0.72 + 4.6 | 0.5/15.9  | 28892 | 1992 UK <sub>2</sub>  | 1998 03 18.9 | 11 53.32 +17 33.5 17.4 | -1.06 + 1.4 | 5.6/14.3 | 31382 |
| 1981 EK <sub>3</sub>  | 1998 03 16.7 | 11 45.23 -08 12.3 18.5 | -0.83 + 6.2 | 3.7/20.0  | 26915 | 6792 P-L              | 1998 03 18.9 | 11 53.39 +05 52.7 18.2 | -0.78 + 5.3 | 1.6/17.2 | 26192 |
| 1987 DO <sub>6</sub>  | 1998 03 16.7 | 11 45.31 -04 27.1 16.2 | -0.79 + 3.3 | 1.7/18.7  | 31273 | 1981 TZ               | 1998 03 18.9 | 11 53.41 +00 34.4 18.3 | -0.86 + 3.3 | 0.0/19.0 | 31415 |
| 1996 US <sub>3</sub>  | 1998 03 16.7 | 11 45.36 +05 39.2 20.9 | -0.89 + 4.6 | 1.3/15.5  | 30785 | 1981 FR               | 1998 03 18.9 | 11 53.42 +00 35.4 17.3 | -0.79 +10.0 | 0.0/19.0 | 25647 |
| 1995 UX <sub>6</sub>  | 1998 03 16.8 | 11 45.56 +03 46.9 20.1 | -0.73 + 4.4 | 0.6/16.1  | 28889 | 1977 QN <sub>2</sub>  | 1998 03 18.9 | 11 53.47 -02 11.1 18.6 | -0.96 + 5.6 | 1.0/19.9 | 25077 |
| 1986 QX <sub>1</sub>  | 1998 03 16.8 | 11 45.59 +04 00.7 16.3 | -1.06 + 5.2 | 1.0/16.1  | 22430 | 1981 EO <sub>6</sub>  | 1998 03 19.0 | 11 53.63 -11 42.6 19.3 | -0.86 + 6.4 | 4.1/23.3 | 26915 |
| 1992 WU <sub>1</sub>  | 1998 03 17.0 | 11 46.58 -05 14.1 18.9 | -0.87 + 6.4 | 1.9/19.3  | 29661 | 1995 SQ <sub>2</sub>  | 1998 03 19.0 | 11 53.64 -17 01.8 18.8 | -0.87 + 5.1 | 6.0/24.9 | 29109 |
| (7410)                | 1998 03 17.1 | 11 46.73 -02 51.5 19.6 | -0.75 + 4.1 | 1.0/18.6  | 28829 | 1996 XD               | 1998 03 19.0 | 11 53.73 +06 26.1 18.2 | -0.92 + 5.9 | 1.9/17.2 | 28605 |
| 1995 KH               | 1998 03 17.1 | 11 46.81 +03 24.4 17.7 | -0.92 + 7.4 | 0.9/16.5  | 31420 | 1991 YZ               | 1998 03 19.0 | 11 53.89 -10 55.5 16.1 | -0.85 + 2.5 | 3.7/22.6 | 31418 |
| 1988 VP               | 1998 03 17.1 | 11 46.92 +23 51.7 16.3 | -1.03 + 2.4 | 7.7/10.2  | 29656 | (7638)                | 1998 03 19.1 | 11 54.24 +03 02.0 17.4 | -0.94 + 4.3 | 0.7/18.5 | 29896 |
| 3286 T-1              | 1998 03 17.2 | 11 46.90 +06 25.0 17.5 | -1.04 + 0.1 | 1.9/15.9  | 31436 | 1992 CT <sub>2</sub>  | 1998 03 19.2 | 11 54.51 -03 36.7 17.9 | -0.75 + 5.5 | 1.2/20.7 | 25650 |
| 2074 T-2              | 1998 03 17.2 | 11 47.11 +01 13.2 20.3 | -0.72 + 4.8 | 0.0/17.3  | 26416 | 1994 AX <sub>10</sub> | 1998 03 19.2 | 11 54.62 +00 32.8 19.5 | -0.99 + 5.0 | 0.0/19.3 | 28074 |
| 3249 T-1              | 1998 03 17.2 | 11 47.30 +00 46.1 17.3 | -0.96 + 4.3 | 0.2/17.5  | 29129 | 1988 SD               | 1998 03 19.3 | 11 54.94 +03 02.4 16.8 | -1.00 + 4.5 | 0.9/18.6 | 29656 |
| 1981 EU <sub>27</sub> | 1998 03 17.3 | 11 47.32 +02 26.8 18.5 | -0.93 +10.4 | 0.5/16.9  | 26920 | 1990 RF <sub>6</sub>  | 1998 03 19.4 | 11 54.95 +02 02.0 18.9 | -0.73 + 5.7 | 0.4/18.9 | 23780 |
| 1982 SJ <sub>7</sub>  | 1998 03 17.3 | 11 47.32 +01 14.3 17.9 | -0.80 + 6.8 | 0.0/17.4  | 27324 | 1990 TC <sub>4</sub>  | 1998 03 19.6 | 11 55.85 -01 13.5 17.7 | -0.75 + 5.1 | 0.5/20.2 | 28844 |
| (8421)                | 1998 03 17.3 | 11 47.42 +02 38.6 17.7 | -0.78 + 5.9 | 0.4/16.9  | 31370 | 1981 EM <sub>10</sub> | 1998 03 19.6 | 11 55.85 -05 16.5 18.3 | -0.78 + 3.0 | 1.6/21.4 | 26899 |
| 1996 VB <sub>6</sub>  | 1998 03 17.3 | 11 47.47 +05 12.1 18.0 | -0.78 + 5.7 | 1.2/16.1  | 29320 | 1990 SC <sub>13</sub> | 1998 03 19.6 | 11 55.94 -01 03.8 16.3 | -0.79 + 5.1 | 0.5/20.2 | 31417 |
| 1981 EQ <sub>11</sub> | 1998 03 17.3 | 11 47.49 -06 31.3 19.3 | -0.98 + 6.2 | 2.8/19.9  | 26917 | 1995 WG <sub>7</sub>  | 1998 03 19.7 | 11 56.09 -22 24.5 18.2 | -0.72 + 4.9 | 5.3/27.9 | 29112 |
| 1981 EB <sub>12</sub> | 1998 03 17.4 | 11 47.71 -07 53.7 18.1 | -0.74 + 4.7 | 2.9/20.5  | 26917 | 1977 QL <sub>1</sub>  | 1998 03 19.7 | 11 56.30 -01 51.1 17.0 | -0.86 + 4.1 | 0.7/20.5 | 31414 |
| 1993 XP <sub>1</sub>  | 1998 03 17.4 | 11 47.71 +05 20.6 16.9 | -0.88 + 8.5 | 1.6/16.0  | 31419 | 1978 RK               | 1998 03 19.8 | 11 56.39 +01 58.8 17.5 | -0.84 + 1.8 | 0.4/19.3 | 30892 |
| 1991 ED               | 1998 03 17.4 | 11 47.72 +10 25.1 17.3 | -1.07 + 3.9 | 3.6/14.7  | 31417 | 1988 VM <sub>2</sub>  | 1998 03 19.8 | 11 56.50 +18 40.3 17.6 | -1.01 + 3.1 | 5.9/14.4 | 31416 |
| 1981 EO <sub>14</sub> | 1998 03 17.4 | 11 47.85 -06 42.0 19.0 | -0.99 + 1.9 | 2.6/19.7  | 22429 | 2040 P-L              | 1998 03 19.8 | 11 56.80 +00 38.5 20.1 | -1.05 + 5.1 | 8.8/28.0 | 22700 |
| 1981 EO <sub>16</sub> | 1998 03 17.5 | 11 48.17 -07 22.3 20.2 | -0.93 + 7.9 | 2.9/20.4  | 23132 | 1996 TP <sub>1</sub>  | 1998 03 19.9 | 11 56.75 +02 28.0 18.6 | -0.96 + 5.0 | 0.7/19.3 | 29666 |
| 1989 SV <sub>3</sub>  | 1998 03 17.5 | 11 48.19 +03 31.1 18.5 | -0.93 + 7.9 | 0.8/16.8  | 27911 | 1996 XW <sub>12</sub> | 1998 03 19.9 | 11 56.80 +13 11.5 17.8 | -0.95 + 5.8 | 4.3/15.7 | 31422 |
| 1993 FK <sub>23</sub> | 1998 03 17.6 | 11 48.46 +03 17.7 17.1 | -0.85 + 2.9 | 0.6/17.0  | 31419 | 1996 VZ <sub>7</sub>  | 1998 03 19.9 | 11 56.82 +07 10.5 17.4 | -0.95 + 6.7 | 2.4/17.7 | 29666 |
| 1992 EB <sub>5</sub>  | 1998 03 17.6 | 11 48.50 +15 07.3 16.0 | -0.66 +10.2 | 3.9/12.2  | 31382 | (7355)                | 1998 03 20.0 | 11 57.16 +12 16.7 16.8 | -1.03 + 5.0 | 4.2/16.3 | 28576 |

|                       |              |                        |             |           |       |                       |              |                        |             |           |       |
|-----------------------|--------------|------------------------|-------------|-----------|-------|-----------------------|--------------|------------------------|-------------|-----------|-------|
| 1120 T-3              | 1998 03 20.0 | 11 57.37 -10 32.1 18.3 | -0.85 + 4.3 | 3.2/23.5  | 28609 | 1990 UZ <sub>4</sub>  | 1998 03 22.5 | 12 06.38 +12 47.8 18.0 | -0.76 + 4.3 | 3.9/18.0  | 28844 |
| 1992 UK <sub>5</sub>  | 1998 03 20.1 | 11 57.46 +07 53.1 16.8 | -1.03 + 5.7 | 2.7/17.7  | 31418 | 1994 AV <sub>1</sub>  | 1998 03 22.5 | 12 06.45 -12 02.0 16.1 | -0.95 + 3.5 | 5.1/26.1  | 31419 |
| 1989 YL <sub>5</sub>  | 1998 03 20.3 | 11 58.19 -02 26.3 17.1 | -0.95 + 5.5 | 1.0/21.1  | 28885 | 1994 CZ <sub>11</sub> | 1998 03 22.6 | 12 06.59 +04 39.7 18.6 | -0.93 + 5.7 | 1.7/20.9  | 23982 |
| 1995 LJ               | 1998 03 20.3 | 11 58.23 -09 10.2 19.1 | -1.11 + 4.0 | 3.6/22.9  | 25652 | 1977 RK               | 1998 03 22.6 | 12 06.76 +37 48.0 16.3 | -1.67 - 6.5 | 18.9/12.9 | 31414 |
| 1992 EB <sub>2</sub>  | 1998 03 20.3 | 11 58.27 +03 54.8 19.0 | -0.70 + 6.5 | 1.1/19.0  | 31418 | 1976 YO <sub>2</sub>  | 1998 03 22.6 | 12 06.84 +19 36.4 17.1 | -1.06 + 3.8 | 7.9/16.4  | 31414 |
| 1996 XV <sub>28</sub> | 1998 03 20.3 | 11 58.43 -01 58.7 19.8 | -0.93 + 6.1 | 0.7/21.0  | 28874 | 1981 EK <sub>31</sub> | 1998 03 22.7 | 12 07.28 -04 24.1 19.3 | -0.96 + 2.7 | 1.2/23.8  | 26921 |
| 1997 XX <sub>3</sub>  | 1998 03 20.4 | 11 58.63 +02 45.1 18.7 | -0.59 + 4.7 | 0.6/19.5  | 31424 | 2480 T-3              | 1998 03 22.8 | 12 07.39 -03 11.0 15.7 | -1.07 + 1.4 | 1.0/23.5  | 31436 |
| 1992 PV               | 1998 03 20.4 | 11 58.94 -01 37.7 17.9 | -0.93 + 7.1 | 0.6/21.1  | 28886 | 1989 OM               | 1998 03 22.8 | 12 07.56 +11 37.2 18.5 | -0.90 + 2.4 | 3.3/19.0  | 29657 |
| 1988 QZ               | 1998 03 20.6 | 11 59.41 -08 54.1 19.9 | -1.01 + 3.4 | 2.7/23.2  | 29912 | 1993 YE               | 1998 03 22.9 | 12 07.80 +00 08.6 16.8 | -0.94 + 6.6 | 0.4/22.6  | 31276 |
| 1081 T-1              | 1998 03 20.6 | 11 59.67 -02 40.6 17.7 | -0.76 + 4.9 | 0.8/21.6  | 19877 | 1992 UR               | 1998 03 22.9 | 12 07.85 +15 36.3 17.7 | -1.04 + 2.7 | 5.2/18.0  | 31418 |
| 1995 NB               | 1998 03 20.7 | 11 59.69 +07 23.5 19.1 | -0.73 + 5.0 | 1.7/18.2  | 31420 | 1992 SP <sub>26</sub> | 1998 03 22.9 | 12 08.03 +05 48.9 18.9 | -0.92 + 5.8 | 2.1/20.8  | 31418 |
| 1990 YK               | 1998 03 20.7 | 11 59.71 +00 41.0 15.5 | -0.89 + 7.8 | 0.3/20.5  | 31417 | 1981 EA <sub>7</sub>  | 1998 03 22.9 | 12 08.11 -10 33.6 18.3 | -0.98 + 6.0 | 3.2/26.1  | 28611 |
| 1995 US <sub>11</sub> | 1998 03 20.7 | 11 59.95 +04 33.6 18.9 | -0.95 + 3.2 | 1.3/19.4  | 31420 | 1981 EE <sub>4</sub>  | 1998 03 23.0 | 12 08.05 -13 34.6 18.8 | -0.74 + 4.9 | 3.8/27.3  | 26915 |
| (7446)                | 1998 03 20.8 | 12 00.37 +00 05.1 16.0 | -0.74 + 5.4 | 0.0/20.8  | 28837 | 1994 CO <sub>17</sub> | 1998 03 23.0 | 12 08.29 +06 11.5 17.1 | -0.94 + 5.7 | 2.6/20.8  | 29137 |
| 1981 EL <sub>32</sub> | 1998 03 20.8 | 12 00.46 -08 33.7 18.9 | -1.03 + 1.0 | 3.1/23.2  | 22430 | 1991 GW <sub>8</sub>  | 1998 03 23.1 | 12 08.62 -03 21.7 18.3 | -0.94 + 5.3 | 1.1/23.9  | 25081 |
| (7419)                | 1998 03 20.9 | 12 00.41 -09 09.4 16.7 | -0.94 + 2.8 | 2.7/23.6  | 28831 | 1995 TG               | 1998 03 23.1 | 12 08.64 +15 23.9 17.8 | -0.77 + 3.4 | 4.1/17.7  | 31420 |
| 1992 UQ <sub>2</sub>  | 1998 03 20.9 | 12 00.64 +32 24.0 17.1 | -1.18 + 0.4 | 9.8/11.1  | 31383 | 1991 PY <sub>14</sub> | 1998 03 23.1 | 12 08.66 -15 12.8 17.5 | -0.90 + 3.9 | 4.2/27.7  | 27120 |
| 1996 XL <sub>29</sub> | 1998 03 20.9 | 12 00.66 +02 44.6 20.4 | -0.88 + 5.5 | 0.9/20.1  | 30786 | 1998 EF               | 1998 03 23.2 | 12 09.20 +14 40.4 17.4 | -0.86 + 8.5 | 6.1/17.6  | 31409 |
| 4801 P-L              | 1998 03 20.9 | 12 00.70 +03 16.3 19.4 | -0.73 + 4.9 | 0.9/19.8  | 23791 | 1988 SY <sub>1</sub>  | 1998 03 23.3 | 12 09.12 +09 35.8 17.0 | -1.01 + 4.0 | 4.1/20.1  | 31416 |
| 2563 P-L              | 1998 03 21.0 | 12 01.05 +01 14.9 16.6 | -0.73 + 5.2 | 0.4/20.6  | 31435 | 1997 AA <sub>1</sub>  | 1998 03 23.3 | 12 09.15 +01 12.6 17.6 | -0.71 + 4.4 | 0.5/22.6  | 31010 |
| 1996 TP <sub>3</sub>  | 1998 03 21.1 | 12 01.16 -02 08.7 19.0 | -1.24 0.0   | 0.7/21.6  | 29926 | 1981 EU <sub>39</sub> | 1998 03 23.3 | 12 09.48 -00 57.4 18.8 | -0.97 + 2.5 | 0.0/23.4  | 26922 |
| 1994 BN <sub>4</sub>  | 1998 03 21.1 | 12 01.21 -09 43.0 17.4 | -0.96 + 6.4 | 3.4/24.2  | 31419 | 1979 MA <sub>5</sub>  | 1998 03 23.4 | 12 09.73 -13 56.8 18.2 | -0.77 + 5.1 | 3.6/27.8  | 26187 |
| 1988 PN <sub>1</sub>  | 1998 03 21.2 | 12 01.66 +01 52.1 18.8 | -0.89 + 6.7 | 0.6/20.6  | 27306 | 1997 AY <sub>2</sub>  | 1998 03 23.4 | 12 09.76 +14 15.0 17.9 | -0.72 + 4.2 | 3.6/18.2  | 29120 |
| 1990 RM <sub>17</sub> | 1998 03 21.3 | 12 01.92 -05 28.3 17.1 | -0.83 + 2.9 | 1.5/22.9  | 31417 | 1996 VE <sub>1</sub>  | 1998 03 23.4 | 12 09.92 +09 10.3 18.7 | -0.85 + 6.9 | 3.4/20.0  | 29116 |
| 1992 BK <sub>2</sub>  | 1998 03 21.4 | 12 02.21 +05 30.8 16.5 | -0.72 + 7.2 | 1.6/19.3  | 28615 | (7454)                | 1998 03 23.5 | 12 09.98 -00 46.1 17.8 | -0.73 + 4.5 | 0.1/23.4  | 29077 |
| 1981 EC <sub>18</sub> | 1998 03 21.4 | 12 02.42 +00 21.4 18.8 | -0.70 + 6.3 | 0.2/21.2  | 31415 | 1994 VC <sub>7</sub>  | 1998 03 23.5 | 12 09.99 +15 23.1 16.8 | -0.64 + 2.6 | 3.4/17.8  | 31420 |
| 1990 UB <sub>1</sub>  | 1998 03 21.4 | 12 02.62 +13 17.9 16.4 | -0.84 + 2.1 | 3.7/17.3  | 31417 | 1989 UP <sub>1</sub>  | 1998 03 23.6 | 12 10.35 +10 17.0 17.7 | -0.97 + 5.5 | 3.8/20.0  | 28316 |
| 1991 AY <sub>2</sub>  | 1998 03 21.5 | 12 02.74 -01 08.4 16.8 | -0.97 + 5.8 | 0.4/21.8  | 29299 | (8423)                | 1998 03 23.6 | 12 10.47 +00 59.1 18.6 | -0.70 + 4.9 | 0.5/22.9  | 31370 |
| 1995 OE <sub>1</sub>  | 1998 03 21.5 | 12 02.97 +01 29.9 19.0 | -0.78 + 5.8 | 0.6/21.0  | 31420 | 1995 QC <sub>3</sub>  | 1998 03 23.6 | 12 10.55 -05 25.9 18.9 | -1.01 + 4.8 | 1.4/25.0  | 26192 |
| 1990 UZ               | 1998 03 21.6 | 12 02.97 +17 11.4 16.5 | -0.78 + 4.4 | 4.7/15.6  | 31379 | 1972 AU               | 1998 03 23.7 | 12 10.84 -09 11.0 17.0 | -0.96 + 2.6 | 2.5/26.1  | 22696 |
| 1981 EQ               | 1998 03 21.6 | 12 03.03 +03 38.0 16.9 | -0.86 + 1.9 | 1.3/20.5  | 31415 | 1985 UF <sub>5</sub>  | 1998 03 23.8 | 12 10.97 -03 55.4 17.1 | -0.91 + 7.6 | 1.0/25.0  | 31416 |
| 1996 PC <sub>3</sub>  | 1998 03 21.6 | 12 03.40 -28 19.3 19.8 | -1.28 + 0.3 | 9.0/30.1  | 30902 | 1979 TT <sub>2</sub>  | 1998 03 23.8 | 12 11.04 +02 35.9 18.5 | -0.86 + 4.9 | 1.1/22.6  | 22696 |
| 1996 RG <sub>5</sub>  | 1998 03 21.7 | 12 03.35 +11 58.1 17.5 | -0.95 + 7.6 | 4.3/17.6  | 30785 | 1978 SQ <sub>4</sub>  | 1998 03 23.8 | 12 11.27 -02 23.5 17.8 | -0.99 + 4.9 | 0.4/24.2  | 25077 |
| 1992 PV <sub>1</sub>  | 1998 03 21.8 | 12 03.85 +03 18.4 17.8 | -0.94 + 7.8 | 1.3/20.6  | 31418 | 1990 TU               | 1998 03 23.9 | 12 11.34 -09 06.4 17.3 | -0.71 + 7.1 | 2.1/26.7  | 31417 |
| 1989 QV               | 1998 03 21.8 | 12 03.95 +18 09.0 17.8 | -0.96 0.0   | 5.3/16.6  | 31416 | 1996 TM <sub>9</sub>  | 1998 03 23.9 | 12 11.49 -01 19.4 17.8 | -1.01 + 6.0 | 0.0/24.0  | 31390 |
| (7397)                | 1998 03 21.8 | 12 03.99 -03 38.4 16.7 | -0.89 + 3.3 | 1.0/22.8  | 28825 | 1995 SV <sub>52</sub> | 1998 03 23.9 | 12 11.67 +05 37.7 17.4 | -0.70 + 5.7 | 1.8/21.6  | 31420 |
| 1994 LJ <sub>1</sub>  | 1998 03 21.9 | 12 04.07 +24 13.1 15.2 | -0.86 + 3.4 | 10.3/13.1 | 31105 | 1995 TC               | 1998 03 23.9 | 12 11.71 -02 23.8 17.8 | -0.79 + 4.9 | 0.4/24.4  | 28889 |
| 1989 UV <sub>1</sub>  | 1998 03 21.9 | 12 04.43 -00 06.6 18.6 | -0.72 + 4.6 | 0.1/21.9  | 25973 | 1981 EQ <sub>3</sub>  | 1998 03 23.9 | 12 11.72 -17 26.3 19.2 | -0.80 + 2.7 | 4.2/29.1  | 26915 |
| 1985 RW               | 1998 03 22.0 | 12 04.44 -34 57.3 17.7 | -0.97 +10.5 | 15.2/06.4 | 22492 | (8376)                | 1998 03 24.0 | 12 11.70 +02 28.3 17.5 | -0.61 + 3.6 | 0.8/22.7  | 31360 |
| 1992 RG <sub>4</sub>  | 1998 03 22.0 | 12 04.49 +02 38.6 19.7 | -0.88 + 7.9 | 1.0/21.0  | 25650 | 1993 BM               | 1998 03 24.0 | 12 11.89 -10 55.5 15.9 | -0.92 + 2.5 | 3.5/26.9  | 28887 |
| 1982 SA <sub>4</sub>  | 1998 03 22.0 | 12 04.54 +04 21.5 16.9 | -1.02 + 5.1 | 1.7/20.6  | 31415 | 1991 UC <sub>3</sub>  | 1998 03 24.1 | 12 12.06 -01 54.3 18.4 | -0.79 + 5.9 | 0.2/24.3  | 30290 |
| (7593)                | 1998 03 22.0 | 12 04.54 -16 22.3 16.5 | -1.01 + 2.3 | 5.1/26.7  | 29599 | 1995 SR <sub>9</sub>  | 1998 03 24.1 | 12 12.16 -04 21.3 19.3 | -0.86 + 1.8 | 0.9/25.0  | 31420 |
| 1981 ET <sub>21</sub> | 1998 03 22.0 | 12 04.66 +01 41.2 18.7 | -0.83 + 7.9 | 0.8/21.3  | 26919 | 1996 YD <sub>3</sub>  | 1998 03 24.1 | 12 12.18 -04 45.4 17.0 | -0.86 + 2.4 | 1.1/25.0  | 30786 |
| 1981 EY <sub>4</sub>  | 1998 03 22.1 | 12 04.87 -12 40.2 18.6 | -0.92 + 3.5 | 3.9/25.8  | 26915 | (8359)                | 1998 03 24.1 | 12 12.49 +12 09.4 15.0 | -1.00 + 3.8 | 5.6/20.0  | 31356 |
| 1993 FQ <sub>10</sub> | 1998 03 22.1 | 12 05.12 +05 45.9 16.6 | -0.87 + 2.5 | 2.0/20.3  | 23522 | 1992 ER <sub>9</sub>  | 1998 03 24.2 | 12 12.52 -00 20.5 16.9 | -0.74 + 5.0 | 0.3/23.9  | 29943 |
| 1996 TY <sub>7</sub>  | 1998 03 22.2 | 12 05.23 +07 12.1 19.1 | -0.92 + 4.3 | 2.4/19.8  | 31389 | 7606 P-L              | 1998 03 24.2 | 12 12.57 +03 43.5 20.4 | -0.96 + 6.2 | 1.7/22.6  | 16242 |
| 1995 SB <sub>4</sub>  | 1998 03 22.2 | 12 05.25 -32 48.6 21.4 | -0.79 + 3.1 | 6.6/03.1  | 29922 | 1996 TH <sub>5</sub>  | 1998 03 24.2 | 12 12.62 -00 13.4 19.0 | -0.98 + 5.2 | 0.4/23.9  | 31389 |
| 1994 AR <sub>1</sub>  | 1998 03 22.2 | 12 05.37 -21 05.8 16.8 | -0.96 + 5.5 | 8.3/29.4  | 31237 | 1990 TS <sub>1</sub>  | 1998 03 24.2 | 12 12.64 -04 01.0 18.3 | -0.78 + 3.8 | 0.7/25.1  | 31005 |
| 1981 EJ <sub>7</sub>  | 1998 03 22.2 | 12 05.45 -10 52.9 17.1 | -0.78 + 3.5 | 2.9/25.6  | 23787 | 1981 EL <sub>17</sub> | 1998 03 24.2 | 12 12.73 -05 04.2 18.5 | -0.74 +11.5 | 1.3/25.7  | 26918 |
| 1996 UF               | 1998 03 22.3 | 12 05.73 +00 53.0 16.5 | -1.00 + 7.1 | 0.5/21.9  | 28865 | 1996 XT <sub>1</sub>  | 1998 03 24.4 | 12 13.55 +03 36.2 17.3 | -0.79 + 4.9 | 1.5/22.8  | 31422 |
| 5006 T-2              | 1998 03 22.4 | 12 06.22 -12 25.3 17.2 | -0.80 + 3.7 | 3.3/26.3  | 28088 | 1992 EC <sub>12</sub> | 1998 03 24.5 | 12 13.64 +04 51.0 17.6 | -0.67 + 7.4 | 1.7/22.2  | 31418 |

|                       |              |          |          |      |       |   |      |           |       |                       |              |          |          |      |       |   |      |           |       |
|-----------------------|--------------|----------|----------|------|-------|---|------|-----------|-------|-----------------------|--------------|----------|----------|------|-------|---|------|-----------|-------|
| 1996 VC <sub>2</sub>  | 1998 03 24.6 | 12 13.93 | -03 36.6 | 17.5 | -1.03 | + | 6.8  | 0.8/25.3  | 29140 | 3182 T-1              | 1998 03 27.3 | 12 23.70 | -06 14.9 | 17.9 | -0.75 | + | 4.9  | 1.1/28.5  | 28880 |
| 1996 VB <sub>5</sub>  | 1998 03 24.6 | 12 14.18 | +07 48.2 | 16.3 | -1.05 | + | 4.4  | 3.7/21.9  | 31422 | 1981 ER <sub>34</sub> | 1998 03 27.4 | 12 24.23 | -13 43.4 | 18.8 | -0.73 | + | 5.6  | 3.3/31.3  | 30780 |
| 1996 XB <sub>3</sub>  | 1998 03 24.8 | 12 14.70 | +02 11.3 | 17.6 | -0.91 | + | 6.8  | 1.3/23.6  | 29926 | (7607)                | 1998 03 27.4 | 12 24.36 | -01 09.6 | 16.6 | -0.78 | + | 6.4  | 0.4/27.0  | 29603 |
| 1997 AN <sub>17</sub> | 1998 03 24.9 | 12 15.27 | -37 03.9 | 17.7 | -1.11 | + | 2.9  | 10.3/06.0 | 29926 | 1981 ER <sub>45</sub> | 1998 03 27.5 | 12 24.45 | -04 02.9 | 18.4 | -0.86 | + | 10.2 | 0.6/28.0  | 26923 |
| 1990 DZ <sub>1</sub>  | 1998 03 25.0 | 12 15.35 | -10 24.0 | 15.8 | -0.97 | + | 3.8  | 3.5/27.7  | 31416 | 1997 XY <sub>8</sub>  | 1998 03 27.5 | 12 24.87 | -00 30.6 | 18.9 | -0.92 | + | 5.7  | 0.8/26.9  | 31424 |
| 1978 VN <sub>3</sub>  | 1998 03 25.0 | 12 15.48 | -05 52.3 | 19.6 | -0.81 | + | 6.3  | 1.4/26.5  | 19856 | 1992 EE <sub>13</sub> | 1998 03 27.6 | 12 25.01 | -01 57.4 | 16.8 | -0.69 | + | 7.3  | 0.2/27.4  | 25975 |
| 1991 GR <sub>1</sub>  | 1998 03 25.0 | 12 15.58 | +07 09.9 | 16.6 | -0.86 | + | 9.0  | 3.5/21.9  | 31417 | 1981 EY <sub>5</sub>  | 1998 03 27.6 | 12 25.11 | -16 50.0 | 19.4 | -0.78 | + | 3.1  | 3.5/01.2  | 30779 |
| 1981 ET <sub>18</sub> | 1998 03 25.1 | 12 15.92 | -04 42.3 | 18.2 | -0.93 | + | 4.0  | 1.2/26.1  | 26918 | 1996 VU <sub>7</sub>  | 1998 03 27.6 | 12 25.18 | +02 38.0 | 18.4 | -0.92 | + | 5.3  | 1.7/26.0  | 28891 |
| (7456)                | 1998 03 25.2 | 12 16.26 | +18 18.3 | 17.8 | -0.85 | + | 6.8  | 5.6/17.9  | 29078 | 2655 P-L              | 1998 03 27.7 | 12 25.16 | -00 49.5 | 20.2 | -0.78 | + | 2.5  | 0.5/27.1  | 25969 |
| 1996 XX <sub>5</sub>  | 1998 03 25.3 | 12 16.43 | -04 58.1 | 19.6 | -0.74 | + | 4.7  | 0.8/26.4  | 31010 | 2025 P-L              | 1998 03 27.7 | 12 25.27 | -05 02.8 | 16.0 | -0.87 | + | 1.5  | 0.8/28.4  | 31294 |
| 1997 AL <sub>1</sub>  | 1998 03 25.3 | 12 16.57 | -28 21.9 | 16.2 | -0.85 | + | 2.1  | 7.0/03.2  | 29947 | 1994 AL <sub>3</sub>  | 1998 03 27.7 | 12 25.31 | -02 57.3 | 16.0 | -0.87 | + | 9.2  | 0.1/27.8  | 28318 |
| 2245 T-1              | 1998 03 25.3 | 12 16.61 | +03 41.7 | 17.6 | -0.94 | + | 5.3  | 2.0/23.6  | 31436 | 1981 EP <sub>6</sub>  | 1998 03 27.7 | 12 25.32 | -20 16.4 | 18.0 | -0.97 | - | 0.4  | 5.9/01.6  | 25972 |
| 1996 UJ <sub>1</sub>  | 1998 03 25.4 | 12 16.78 | +01 43.3 | 20.5 | -0.94 | + | 5.8  | 1.1/24.3  | 29116 | 1981 EU <sub>26</sub> | 1998 03 27.8 | 12 25.51 | -01 21.2 | 19.0 | -0.69 | + | 5.5  | 0.3/27.3  | 29315 |
| 2258 T-1              | 1998 03 25.4 | 12 16.85 | +03 40.1 | 16.7 | -0.95 | + | 4.1  | 1.7/23.7  | 23540 | 1981 EQ <sub>31</sub> | 1998 03 27.8 | 12 25.54 | +00 16.1 | 19.5 | -0.71 | + | 6.2  | 0.8/26.8  | 31271 |
| 1991 GO <sub>1</sub>  | 1998 03 25.5 | 12 17.25 | -06 56.4 | 16.0 | -0.87 | + | 18.5 | 1.9/27.6  | 31417 | 1988 TB <sub>1</sub>  | 1998 03 27.8 | 12 25.71 | -05 49.9 | 17.6 | -0.88 | + | 7.2  | 1.0/28.9  | 29941 |
| 1981 SD <sub>2</sub>  | 1998 03 25.5 | 12 17.43 | +04 00.0 | 17.0 | -0.99 | + | 4.2  | 2.0/23.8  | 31415 | 1997 ET <sub>1</sub>  | 1998 03 27.8 | 12 25.80 | +02 16.5 | 17.7 | -0.80 | + | 5.0  | 1.5/26.2  | 31423 |
| 1978 PE               | 1998 03 25.6 | 12 17.76 | +04 50.0 | 18.8 | -0.93 | + | 7.2  | 2.2/23.4  | 31003 | 1991 VN               | 1998 03 27.8 | 12 25.84 | -01 00.2 | 19.9 | -0.80 | + | 5.5  | 0.5/27.3  | 28886 |
| 1978 VC <sub>6</sub>  | 1998 03 25.7 | 12 18.13 | -14 22.2 | 19.2 | -0.85 | + | 6.0  | 3.5/29.9  | 26187 | 1995 SO <sub>1</sub>  | 1998 03 27.9 | 12 25.99 | -34 45.4 | 18.4 | -0.86 | + | 2.9  | 8.0/08.5  | 29664 |
| 1981 EV <sub>13</sub> | 1998 03 25.8 | 12 18.54 | -07 44.4 | 17.3 | -0.70 | + | 7.1  | 1.7/27.9  | 26917 | 1996 XJ <sub>2</sub>  | 1998 03 27.9 | 12 26.13 | +30 10.4 | 19.3 | -0.84 | + | 2.0  | 9.4/16.3  | 31391 |
| 1987 UW               | 1998 03 25.9 | 12 18.60 | -18 31.5 | 18.5 | -0.80 | + | 12.4 | 4.7/01.4  | 22969 | (7329)                | 1998 03 28.0 | 12 26.28 | -08 54.1 | 16.1 | -0.73 | + | 11.0 | 2.2/30.3  | 28569 |
| 1990 QV <sub>1</sub>  | 1998 03 25.9 | 12 18.68 | +02 20.5 | 17.8 | -0.77 | + | 5.4  | 1.3/24.5  | 31417 | (8388)                | 1998 03 28.0 | 12 26.68 | +01 29.5 | 17.0 | -0.79 | + | 4.7  | 1.3/26.7  | 31363 |
| 3187 T-2              | 1998 03 25.9 | 12 18.74 | +00 40.5 | 17.2 | -1.00 | + | 3.6  | 1.0/25.1  | 29142 | 1991 PC <sub>11</sub> | 1998 03 28.2 | 12 27.39 | +04 25.4 | 17.2 | -0.80 | + | 6.7  | 2.2/25.8  | 31006 |
| 1993 VB <sub>8</sub>  | 1998 03 25.9 | 12 18.91 | +10 59.2 | 17.5 | -0.95 | + | 6.3  | 5.1/21.7  | 31419 | 1996 RN <sub>2</sub>  | 1998 03 28.2 | 12 27.44 | -41 04.7 | 17.1 | -1.34 | + | 1.2  | 17.0/10.1 | 28864 |
| 1995 SG <sub>5</sub>  | 1998 03 26.0 | 12 19.15 | +05 56.0 | 17.9 | -0.90 | + | 2.4  | 2.2/23.7  | 26177 | 3237 T-2              | 1998 03 28.3 | 12 27.73 | +01 28.2 | 18.3 | -0.87 | + | 2.0  | 1.5/27.1  | 31410 |
| 1996 WT <sub>1</sub>  | 1998 03 26.2 | 12 19.69 | -02 20.2 | 20.2 | -0.78 | + | 5.2  | 0.1/26.3  | 28869 | 1996 TF <sub>5</sub>  | 1998 03 28.4 | 12 27.81 | -03 58.1 | 19.0 | -0.93 | + | 7.8  | 0.3/28.7  | 31389 |
| 1996 XV <sub>19</sub> | 1998 03 26.2 | 12 19.70 | -02 12.1 | 16.7 | -0.88 | + | 6.3  | 0.0/26.2  | 31422 | 1981 EZ <sub>12</sub> | 1998 03 28.4 | 12 28.07 | -11 20.6 | 18.1 | -1.00 | + | 6.2  | 3.1/31.1  | 26917 |
| 1996 VN <sub>8</sub>  | 1998 03 26.2 | 12 19.80 | +01 04.9 | 18.7 | -0.95 | + | 5.3  | 1.1/25.2  | 31010 | 1994 SH <sub>3</sub>  | 1998 03 28.5 | 12 28.34 | -03 44.7 | 19.0 | -0.69 | + | 4.7  | 0.2/28.8  | 28854 |
| (8325)                | 1998 03 26.2 | 12 19.96 | -01 53.2 | 18.8 | -0.79 | + | 3.1  | 0.1/26.2  | 31349 | 1990 TK <sub>8</sub>  | 1998 03 28.5 | 12 28.36 | +08 13.3 | 16.5 | -0.86 | + | 2.3  | 3.7/25.1  | 31417 |
| 1991 AJ <sub>3</sub>  | 1998 03 26.3 | 12 20.20 | -24 56.9 | 17.3 | -0.81 | + | 3.0  | 6.4/02.9  | 29658 | 3243 T-1              | 1998 03 28.5 | 12 28.50 | -04 19.7 | 19.1 | -1.03 | + | 4.9  | 0.5/29.0  | 26415 |
| 1981 EV <sub>15</sub> | 1998 03 26.4 | 12 20.42 | -08 47.1 | 18.2 | -1.01 | + | 1.5  | 2.5/28.2  | 26918 | 1981 EK <sub>41</sub> | 1998 03 28.6 | 12 28.58 | -03 57.1 | 16.5 | -0.90 | + | 9.1  | 0.3/28.9  | 28314 |
| 1974 OE               | 1998 03 26.4 | 12 20.45 | +00 22.3 | 16.7 | -1.06 | + | 3.3  | 1.0/25.7  | 31414 | 1981 EG <sub>39</sub> | 1998 03 28.6 | 12 28.85 | -05 29.5 | 19.5 | -0.75 | + | 3.8  | 0.6/29.5  | 29132 |
| 5056 T-2              | 1998 03 26.4 | 12 20.46 | -16 41.9 | 17.8 | -1.16 | + | 0.9  | 5.9/30.4  | 25085 | 1981 EN <sub>20</sub> | 1998 03 28.7 | 12 29.14 | +00 00.2 | 18.9 | -0.97 | + | 7.4  | 1.3/27.8  | 26918 |
| 1989 GS <sub>4</sub>  | 1998 03 26.4 | 12 20.48 | -01 34.2 | 16.9 | -0.82 | + | 6.3  | 0.2/26.2  | 17961 | 1995 SO <sub>29</sub> | 1998 03 28.9 | 12 29.66 | -00 57.8 | 18.7 | -0.71 | + | 4.8  | 0.5/28.2  | 31420 |
| 2547 P-L              | 1998 03 26.4 | 12 20.71 | +01 15.4 | 19.4 | -0.71 | + | 4.4  | 0.9/25.3  | 22700 | 1988 RK               | 1998 03 28.9 | 12 29.73 | +00 44.0 | 18.4 | -0.83 | + | 9.3  | 1.2/27.6  | 20502 |
| 3076 T-2              | 1998 03 26.4 | 12 20.72 | +01 05.7 | 16.2 | -0.77 | + | 4.6  | 1.1/25.4  | 29669 | 1995 UE <sub>11</sub> | 1998 03 28.9 | 12 29.91 | -05 53.4 | 19.4 | -0.71 | + | 6.7  | 0.7/29.9  | 30784 |
| 1981 EM <sub>23</sub> | 1998 03 26.5 | 12 20.99 | -02 56.1 | 19.4 | -0.79 | + | 3.0  | 0.2/26.8  | 26919 | 1981 DA <sub>2</sub>  | 1998 03 29.0 | 12 30.07 | -13 09.6 | 19.0 | -0.75 | + | 4.1  | 2.6/01.3  | 26914 |
| 1996 XC <sub>18</sub> | 1998 03 26.5 | 12 21.00 | +10 32.4 | 17.3 | -0.98 | + | 3.2  | 5.2/22.6  | 31392 | 1981 ES <sub>9</sub>  | 1998 03 29.0 | 12 30.20 | -06 16.4 | 17.7 | -0.69 | + | 7.1  | 0.9/30.1  | 26187 |
| 1992 UZ <sub>1</sub>  | 1998 03 26.5 | 12 21.21 | -10 16.6 | 17.8 | -0.94 | + | 4.9  | 2.6/29.1  | 29661 | 1996 VX <sub>5</sub>  | 1998 03 29.0 | 12 30.24 | -09 12.5 | 18.0 | -0.85 | + | 6.5  | 1.8/31.1  | 28601 |
| 1996 SO               | 1998 03 26.6 | 12 21.18 | -00 48.9 | 19.8 | -1.01 | + | 4.4  | 0.5/26.2  | 28596 | 1988 VH <sub>1</sub>  | 1998 03 29.0 | 12 30.29 | -09 01.6 | 17.9 | -0.90 | + | 6.7  | 1.8/31.0  | 28315 |
| 2727 P-L              | 1998 03 26.7 | 12 21.57 | +00 34.8 | 16.8 | -1.00 | + | 2.7  | 1.3/25.9  | 31409 | (7447)                | 1998 03 29.1 | 12 30.56 | -14 53.8 | 16.5 | -0.98 | + | 4.5  | 4.3/01.7  | 28837 |
| 1981 EE <sub>18</sub> | 1998 03 26.7 | 12 21.90 | -03 39.1 | 19.0 | -0.80 | + | 3.6  | 0.4/27.2  | 21967 | 1995 WC <sub>4</sub>  | 1998 03 29.2 | 12 30.79 | +15 37.7 | 17.4 | -0.78 | + | 3.1  | 4.7/22.9  | 31420 |
| 1989 WR               | 1998 03 26.9 | 12 22.47 | +01 49.3 | 17.0 | -1.03 | + | 4.3  | 1.5/25.7  | 31416 | (7505)                | 1998 03 29.2 | 12 30.80 | +06 08.2 | 17.1 | -0.82 | + | 4.9  | 2.4/26.2  | 29091 |
| 1995 SO <sub>5</sub>  | 1998 03 27.0 | 12 22.80 | +16 38.7 | 17.6 | -1.01 | + | 3.1  | 6.2/21.0  | 31420 | 1993 JL <sub>1</sub>  | 1998 03 29.2 | 12 31.01 | -02 31.0 | 16.2 | -0.74 | + | 5.1  | 0.3/29.0  | 28589 |
| 1981 EF <sub>24</sub> | 1998 03 27.0 | 12 22.87 | -00 08.2 | 18.1 | -0.77 | + | 3.7  | 0.6/26.3  | 29910 | 1995 SX <sub>51</sub> | 1998 03 29.3 | 12 31.26 | -01 24.7 | 21.0 | -0.78 | + | 3.2  | 0.5/28.8  | 26405 |
| 1991 PK <sub>3</sub>  | 1998 03 27.0 | 12 22.91 | +00 43.9 | 18.2 | -0.89 | + | 5.3  | 1.1/26.0  | 22083 | 1995 SD <sub>24</sub> | 1998 03 29.3 | 12 31.29 | +00 00.4 | 19.0 | -0.79 | + | 6.6  | 1.0/28.2  | 31387 |
| 1981 EB <sub>26</sub> | 1998 03 27.1 | 12 23.28 | -04 32.2 | 19.2 | -0.78 | + | 3.9  | 0.6/27.8  | 31376 | 1992 EJ <sub>9</sub>  | 1998 03 29.3 | 12 31.30 | +01 05.1 | 17.4 | -0.75 | + | 3.7  | 1.2/27.9  | 25975 |
| 1991 PY <sub>12</sub> | 1998 03 27.1 | 12 23.35 | -16 14.2 | 17.0 | -0.98 | + | 2.7  | 4.4/31.3  | 28316 | 1995 SM <sub>54</sub> | 1998 03 29.4 | 12 31.37 | +01 52.2 | 17.2 | -0.79 | + | 5.2  | 1.6/27.7  | 28858 |
| 1990 BJ               | 1998 03 27.2 | 12 23.41 | -38 25.3 | 17.6 | -1.16 | + | 3.0  | 10.7/08.9 | 29657 | 1981 DK               | 1998 03 29.6 | 12 32.32 | -17 51.0 | 17.8 | -0.75 | + | 4.3  | 3.6/03.5  | 29608 |
| 1981 EJ <sub>18</sub> | 1998 03 27.2 | 12 23.53 | -05 41.2 | 18.3 | -0.78 | + | 3.8  | 0.9/28.3  | 26918 | 1995 UJ <sub>1</sub>  | 1998 03 29.7 | 12 32.49 | -05 27.0 | 17.5 | -0.71 | + | 7.1  | 0.5/30.4  | 28618 |
| (7521)                | 1998 03 27.2 | 12 23.61 | +00 24.5 | 16.3 | -0.77 | + | 5.7  | 0.9/26.3  | 29291 | 1981 EB <sub>9</sub>  | 1998 03 29.7 | 12 32.79 | -14 25.0 | 16.5 | -1.05 | + | 1.1  | 3.9/01.7  | 31415 |
| 1996 TG <sub>15</sub> | 1998 03 27.2 | 12 23.75 | +02 21.4 | 18.1 | -0.96 | + | 5.5  | 1.7/25.8  | 30785 | 1993 FM <sub>7</sub>  | 1998 03 29.8 | 12 32.88 | +01 58.8 | 18.0 | -0.78 | + | 5.2  | 1.7/28.0  | 31419 |

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M.P.C. 31453

1991 LE<sub>2</sub> 1998 03 29.8 12 33.04 +08 39.0 17.5 -0.91 + 5.4 3.9/25.9 27728  
 5490 T-2 1998 03 29.9 12 33.24 -13 21.6 18.4 -0.91 + 7.0 3.5/02.1 22274  
 1996 VT<sub>30</sub> 1998 03 30.0 12 33.62 -05 30.2 17.8 -0.93 + 6.1 0.6/30.6 29140  
 3176 T-2 1998 03 30.0 12 33.74 -01 17.3 17.7 -0.97 + 4.0 0.9/29.3 31436  
 1981 ER<sub>8</sub> 1998 03 30.0 12 33.84 -10 00.9 18.7 -0.92 + 4.4 2.3/01.0 26916  
 1996 XF<sub>3</sub> 1998 03 30.0 12 33.89 -01 10.8 16.0 -0.79 + 5.4 0.8/29.3 31112  
 1981 DN<sub>3</sub> 1998 03 30.0 12 33.95 -11 59.6 19.3 -0.99 + 6.7 3.0/01.7 30779  
 1990 TR<sub>12</sub> 1998 03 30.1 12 34.07 -14 53.7 17.0 -0.75 + 6.0 3.2/03.0 29134  
 1996 AO<sub>3</sub> 1998 03 30.1 12 34.10 -11 10.4 16.2 -0.62 + 4.0 1.7/01.7 30689  
 1996 UG 1998 03 30.1 12 34.20 +03 30.0 18.1 -1.02 + 3.9 2.5/28.1 29631  
 1991 TW<sub>1</sub> 1998 03 30.1 12 34.26 +02 52.1 17.3 -0.85 + 4.2 1.9/28.1 31418  
 1994 PW<sub>17</sub> 1998 03 30.2 12 34.33 -02 43.1 18.5 -0.75 + 4.9 0.3/29.9 29945  
 4155 T-1 1998 03 30.3 12 34.84 +00 57.1 17.6 -0.84 + 4.9 1.6/28.8 31436  
 1989 UG<sub>2</sub> 1998 03 30.3 12 34.86 +28 43.2 18.4 -1.26 - 0.7 10.4/21.5 25329  
 4326 T-3 1998 03 30.4 12 35.17 +04 51.4 18.3 -0.94 + 5.0 2.9/27.7 28609  
 (7574) 1998 03 30.4 12 35.21 +09 49.3 16.9 -0.70 + 3.1 3.2/26.0 29595  
 1989 TA<sub>3</sub> 1998 03 30.4 12 35.22 +02 29.8 17.4 -0.72 + 6.3 2.0/28.3 31005  
 1997 AN<sub>22</sub> 1998 03 30.5 12 35.43 -18 21.2 16.4 -0.81 + 3.8 4.4/04.2 31279  
 2197 P-L 1998 03 30.5 12 35.64 -04 24.7 16.8 -0.88 + 7.7 0.2/30.8 25652  
 1996 VF<sub>9</sub> 1998 03 30.6 12 35.95 +00 59.6 18.4 -0.92 + 6.1 1.6/29.1 29666  
 1976 UP<sub>2</sub> 1998 03 30.7 12 36.35 -01 19.3 18.4 -1.03 + 4.8 0.9/30.0 28313  
 1995 SH<sub>2</sub> 1998 03 30.8 12 36.50 -04 47.3 19.7 -0.78 + 5.3 0.3/31.1 30783  
 (7596) 1998 03 30.8 12 36.65 +05 15.2 15.8 -0.85 + 2.5 2.8/28.0 29600  
 1994 CD<sub>9</sub> 1998 03 30.8 12 36.78 -07 37.4 17.2 -1.34 - 1.1 1.4/31.7 31385  
 1992 EY<sub>11</sub> 1998 03 30.9 12 36.80 -00 16.1 17.4 -0.75 + 4.4 1.2/29.7 31275  
 1978 VE<sub>10</sub> 1998 03 30.9 12 36.83 -01 51.3 18.9 -0.73 + 4.5 0.5/30.2 29939  
 1995 SH<sub>5</sub> 1998 03 30.9 12 36.97 -04 59.7 18.4 -0.76 + 4.8 0.3/31.3 28889  
 1992 YE<sub>1</sub> 1998 03 30.9 12 36.98 +04 08.1 17.9 -0.88 + 4.9 2.6/28.4 28587  
 1996 VM<sub>30</sub> 1998 03 30.9 12 37.14 +05 53.4 17.8 -1.03 + 3.9 3.3/28.1 31422  
 1984 SV<sub>5</sub> 1998 03 31.0 12 37.42 -06 19.9 18.0 -0.82 + 2.9 0.7/31.8 20331  
 1993 FT<sub>32</sub> 1998 03 31.1 12 37.77 +00 50.6 17.4 -0.77 + 4.8 1.4/29.5 31007  
 1996 XE<sub>12</sub> 1998 03 31.2 12 38.04 -01 52.9 18.3 -0.79 + 4.5 0.6/30.5 28891  
 1996 XM<sub>2</sub> 1998 03 31.2 12 38.09 +04 26.4 17.4 -1.03 + 6.1 3.0/28.6 29308  
 6833 P-L 1998 03 31.2 12 38.10 -05 06.1 17.3 -0.81 + 4.4 0.3/31.6 23532  
 1996 XV<sub>30</sub> 1998 03 31.2 12 38.26 +16 02.5 20.3 -0.82 + 4.9 5.3/24.4 29926  
 1981 EO<sub>10</sub> 1998 03 31.2 12 38.28 -06 27.1 19.2 -0.78 + 9.9 0.7/01.1 26916  
 1998 BL<sub>26</sub> 1998 03 31.2 12 38.30 -00 19.7 18.9 -0.81 + 6.1 1.3/30.0 31401  
 3105 T-3 1998 03 31.3 12 38.50 -02 37.7 18.0 -0.91 + 6.7 0.5/30.9 29669  
 1996 VO<sub>30</sub> 1998 03 31.3 12 38.67 -09 06.6 17.0 -0.96 + 6.7 1.7/02.0 29320  
 1996 PX<sub>8</sub> 1998 03 31.4 12 38.62 +02 00.8 19.2 -0.95 + 7.4 2.0/29.4 28596  
 1996 YY<sub>1</sub> 1998 03 31.4 12 38.63 +03 04.0 18.5 -0.83 + 5.2 2.1/29.1 30671  
 1984 SC<sub>6</sub> 1998 03 31.5 12 39.01 +01 44.2 17.2 -0.95 + 6.2 2.1/29.6 31415  
 1990 FG 1998 03 31.5 12 39.10 -21 43.2 15.5 -1.93 - 8.7 8.7/02.8 31273  
 1994 JS<sub>1</sub> 1998 03 31.5 12 39.11 +12 58.9 15.0 -0.17 +25.5 7.5/22.3 31420  
 1981 DB<sub>3</sub> 1998 03 31.5 12 39.20 -12 22.6 18.4 -0.83 + 6.6 2.4/03.3 25647  
 1988 LH 1998 03 31.6 12 39.44 -12 02.8 16.4 -0.72 + 6.5 3.0/03.4 29133  
 (7528) 1998 03 31.6 12 39.56 -03 16.8 16.8 -0.77 + 5.4 0.3/31.3 29293  
 1978 QA<sub>2</sub> 1998 03 31.6 12 39.76 -04 00.1 18.4 -0.94 + 7.3 0.1/31.6 29652  
 1995 SM<sub>29</sub> 1998 03 31.7 12 39.77 -01 17.8 17.6 -0.72 + 4.2 0.7/30.7 30456  
 1995 WV<sub>42</sub> 1998 03 31.7 12 39.94 +16 52.3 17.6 -0.72 + 4.6 5.0/24.2 28890  
 1996 VN 1998 03 31.7 12 40.00 -06 34.4 17.3 -0.95 + 3.3 0.9/01.4 28866

1981 EH<sub>22</sub> 1998 03 31.7 12 40.09 -05 20.9 17.9 -0.84 + 6.3 0.4/01.1 26919  
 1985 UH<sub>2</sub> 1998 03 31.9 12 40.66 +00 17.8 16.8 -0.96 + 5.4 1.7/30.5 31415  
 1990 SB<sub>6</sub> 1998 04 01.0 12 41.03 +00 14.0 18.0 -0.76 + 5.2 1.3/30.5 23515  
 1990 WN<sub>5</sub> 1998 04 01.1 12 41.25 +09 51.4 15.7 -0.84 + 2.6 4.5/27.7 28885  
 1995 RJ 1998 04 01.1 12 41.26 +10 44.3 19.2 -0.88 + 5.8 4.7/27.0 26422  
 1981 VF 1998 04 01.1 12 41.42 -01 27.3 17.4 -0.96 + 4.8 1.0/31.2 29654  
 2508 P-L 1998 04 01.1 12 41.57 -04 40.8 19.2 -0.99 + 4.4 0.1/01.2 31435  
 2636 P-L 1998 04 01.1 12 41.58 -02 01.0 16.3 -0.88 + 7.9 1.1/31.4 29668  
 1981 EO<sub>35</sub> 1998 04 01.3 12 42.14 -13 28.1 19.7 -0.99 + 6.4 3.3/04.0 22430  
 1991 GN<sub>9</sub> 1998 04 01.5 12 42.64 -01 01.5 17.8 -0.96 + 5.7 1.5/31.4 31138  
 1981 EF<sub>27</sub> 1998 04 01.5 12 42.90 -03 56.9 18.7 -0.81 + 7.3 0.3/01.3 23535  
 1991 PK<sub>11</sub> 1998 04 01.5 12 42.97 -14 36.8 16.4 -0.90 + 4.2 3.3/04.7 28886  
 1992 PA<sub>2</sub> 1998 04 01.7 12 43.58 -13 42.4 19.1 -1.02 + 5.1 3.1/04.5 29660  
 (7381) 1998 04 01.7 12 43.81 -02 51.9 16.3 -1.01 + 3.9 0.6/01.3 28821  
 4254 T-2 1998 04 01.9 12 44.14 +00 05.0 17.8 -0.95 + 5.5 1.6/31.4 22495  
 1993 FX<sub>81</sub> 1998 04 01.9 12 44.34 +06 23.3 15.5 -0.81 + 4.0 3.9/29.4 28887  
 1995 UW<sub>6</sub> 1998 04 01.9 12 44.52 -00 20.6 17.2 -0.82 + 2.8 1.3/31.6 29139  
 1995 ST<sub>54</sub> 1998 04 02.0 12 44.67 -23 01.7 16.6 -0.96 + 2.2 7.2/07.6 26568  
 1981 ET<sub>45</sub> 1998 04 02.0 12 44.78 -05 29.8 18.1 -0.71 + 9.3 0.2/02.3 26923  
 1974 WB 1998 04 02.1 12 44.95 -21 50.2 18.4 -0.87 + 6.0 5.0/08.0 28881  
 1981 EK<sub>7</sub> 1998 04 02.1 12 44.97 -08 07.8 17.4 -0.73 + 5.6 0.9/03.2 24238  
 1996 TO<sub>10</sub> 1998 04 02.1 12 45.24 +05 46.0 16.9 -1.00 + 5.6 3.8/29.9 31421  
 1996 XZ<sub>25</sub> 1998 04 02.1 12 45.25 +13 14.5 18.1 -0.73 + 4.6 4.8/27.0 31422  
 4068 T-2 1998 04 02.2 12 45.18 -00 50.5 19.7 -0.86 + 4.4 1.3/31.9 22701  
 1978 EU<sub>9</sub> 1998 04 02.2 12 45.22 -02 34.2 16.3 -0.77 + 5.6 0.7/01.4 26187  
 1996 VJ<sub>8</sub> 1998 04 02.2 12 45.41 -08 29.2 17.1 -0.94 + 4.5 1.2/03.4 29140  
 1992 UH<sub>2</sub> 1998 04 02.2 12 45.45 -09 37.7 18.2 -0.88 + 7.2 1.6/03.8 30290  
 1990 QE<sub>9</sub> 1998 04 02.2 12 45.62 -05 50.5 17.5 -0.81 + 4.6 0.3/02.6 30091  
 1978 UR<sub>4</sub> 1998 04 02.3 12 45.63 -08 55.4 18.0 -0.99 + 5.7 1.6/04.0 23245  
 1993 FO<sub>48</sub> 1998 04 02.3 12 45.87 -05 15.5 17.1 -0.80 + 5.1 0.1/02.5 25961  
 1992 ST 1998 04 02.3 12 45.96 -00 33.0 18.4 -0.95 + 4.1 1.3/01.1 31418  
 1994 JQ<sub>6</sub> 1998 04 02.3 12 45.96 -04 29.7 19.7 -0.83 + 6.0 0.1/02.2 23679  
 1981 EO<sub>3</sub> 1998 04 02.4 12 46.09 -25 55.1 18.4 -1.08 + 0.9 7.3/08.1 26915  
 1995 SN<sub>29</sub> 1998 04 02.5 12 46.34 -03 04.6 17.6 -0.70 + 4.7 0.5/01.9 29139  
 1995 QU<sub>3</sub> 1998 04 02.5 12 46.65 -38 24.4 19.8 -0.87 + 2.7 7.0/14.7 29623  
 1993 FH<sub>49</sub> 1998 04 02.6 12 46.73 -04 55.2 18.0 -0.78 + 5.4 0.0/02.6 31419  
 1993 VX<sub>3</sub> 1998 04 02.6 12 46.90 -11 17.4 16.2 -0.97 + 7.8 2.5/04.7 29662  
 1995 PF 1998 04 02.7 12 47.28 -23 29.8 20.0 -0.91 + 4.9 5.4/08.8 26176  
 1996 XS<sub>18</sub> 1998 04 02.7 12 47.29 -00 53.6 18.2 -0.76 + 4.5 1.3/01.4 29666  
 1995 SX<sub>19</sub> 1998 04 02.7 12 47.34 -04 39.1 16.6 -0.77 + 5.4 0.1/02.6 26422  
 1981 ED<sub>22</sub> 1998 04 02.7 12 47.36 -03 46.9 18.3 -0.83 + 6.4 0.5/02.3 31415  
 1996 UH<sub>1</sub> 1998 04 02.7 12 47.43 +04 39.3 17.9 -1.00 + 5.5 3.5/30.8 31144  
 1995 UJ<sub>6</sub> 1998 04 02.8 12 47.54 -15 18.9 17.2 -0.74 + 5.9 2.8/06.3 29923  
 1992 DM<sub>6</sub> 1998 04 02.8 12 47.74 -01 49.9 17.0 -0.72 + 4.7 0.8/01.8 31418  
 1995 TW 1998 04 02.9 12 47.93 -30 03.9 20.7 -0.77 + 6.7 6.4/12.4 26568  
 1992 YE<sub>4</sub> 1998 04 02.9 12 48.01 -00 51.7 18.3 -0.84 + 6.1 1.3/01.6 23341  
 3271 T-1 1998 04 02.9 12 48.14 -06 43.4 16.9 -0.85 + 4.6 0.5/03.5 30095  
 1995 SP<sub>1</sub> 1998 04 03.1 12 48.67 -41 44.0 18.5 -1.02 + 1.0 9.1/15.9 29664  
 1993 LD<sub>1</sub> 1998 04 03.1 12 48.74 -16 42.6 19.1 -0.86 + 2.4 3.4/06.6 28888  
 1991 RE<sub>10</sub> 1998 04 03.2 12 48.85 -15 40.0 17.2 -0.88 + 4.5 3.2/06.5 28615  
 1989 TY<sub>10</sub> 1998 04 03.2 12 48.86 -05 53.4 18.5 -0.93 + 7.5 0.2/03.4 28085

|                       |              |                        |              |           |       |                       |              |                        |              |          |       |
|-----------------------|--------------|------------------------|--------------|-----------|-------|-----------------------|--------------|------------------------|--------------|----------|-------|
| 5162 T-2              | 1998 04 03.2 | 12 49.02 -17 13.5 17.0 | -0.82 + 3.3  | 3.5/07.0  | 29321 | 1989 SC <sub>8</sub>  | 1998 04 05.7 | 12 57.98 -12 38.6 18.1 | -0.99 + 5.7  | 2.2/07.7 | 29316 |
| 1996 XF <sub>2</sub>  | 1998 04 03.2 | 12 49.25 +16 55.9 18.9 | -0.89 + 2.6  | 6.9/27.4  | 30786 | 1997 AF               | 1998 04 05.7 | 12 58.04 +05 23.6 18.3 | -0.85 + 5.0  | 3.2/02.0 | 30690 |
| 1996 VX <sub>15</sub> | 1998 04 03.3 | 12 49.57 -05 55.4 15.6 | -0.84 + 6.7  | 0.3/03.6  | 31279 | 1994 CJ <sub>17</sub> | 1998 04 05.7 | 12 58.23 +06 04.4 18.4 | -0.91 + 6.1  | 4.2/01.8 | 29104 |
| 1997 AT <sub>1</sub>  | 1998 04 03.4 | 12 49.71 -25 10.6 16.1 | -0.82 + 3.4  | 5.8/10.1  | 29667 | 4306 T-2              | 1998 04 05.7 | 12 58.41 -05 22.1 16.6 | -1.08 + 2.7  | 0.3/05.6 | 26416 |
| 1997 AA               | 1998 04 03.4 | 12 49.84 +00 00.2 17.6 | -0.79 + 4.8  | 1.6/01.7  | 31422 | 1992 PU <sub>3</sub>  | 1998 04 05.8 | 12 58.48 -02 38.6 18.0 | -1.00 + 6.0  | 1.3/04.7 | 29660 |
| 1981 ER <sub>11</sub> | 1998 04 03.5 | 12 49.99 -09 41.0 19.1 | -0.87 + 5.3  | 1.6/04.9  | 22429 | 1981 EQ <sub>18</sub> | 1998 04 05.9 | 12 59.02 -04 13.5 18.5 | -0.72 + 4.7  | 0.5/05.3 | 31415 |
| 1978 RU <sub>8</sub>  | 1998 04 03.5 | 12 50.00 +02 10.0 18.7 | -0.68 + 6.2  | 1.9/31.9  | 24406 | 1981 EP <sub>37</sub> | 1998 04 06.0 | 12 59.22 -10 16.3 19.4 | -0.86 + 5.6  | 1.2/07.3 | 21562 |
| 1996 XT <sub>5</sub>  | 1998 04 03.7 | 12 51.04 -19 46.9 17.1 | -0.82 + 4.3  | 4.4/08.5  | 28871 | (7399)                | 1998 04 06.0 | 12 59.33 -12 47.8 17.5 | -0.98 + 6.2  | 2.2/08.1 | 29587 |
| 1978 UL <sub>6</sub>  | 1998 04 03.7 | 12 51.10 -07 35.7 20.0 | -0.94 + 6.3  | 0.7/04.5  | 28882 | 1995 UG <sub>11</sub> | 1998 04 06.0 | 12 59.44 -07 43.8 20.0 | -0.79 + 6.5  | 0.4/06.6 | 30784 |
| 1994 CQ               | 1998 04 03.8 | 12 51.33 -08 16.8 16.9 | -0.97 + 5.4  | 1.1/04.7  | 28617 | 1995 SK <sub>53</sub> | 1998 04 06.1 | 12 59.63 -01 59.7 17.5 | -0.85 + 2.7  | 1.3/04.9 | 31277 |
| 1990 VX <sub>6</sub>  | 1998 04 03.8 | 12 51.33 +11 53.1 18.2 | -0.76 + 4.5  | 4.8/29.0  | 28844 | 1992 EN <sub>9</sub>  | 1998 04 06.2 | 13 00.05 -03 43.3 16.9 | -0.73 + 4.9  | 0.7/05.4 | 29660 |
| 1981 EZ <sub>33</sub> | 1998 04 03.9 | 12 51.60 -11 11.9 18.8 | -0.73 + 4.9  | 1.5/05.8  | 25972 | 1993 FH <sub>5</sub>  | 1998 04 06.3 | 13 00.59 -04 07.5 16.6 | -0.82 + 4.3  | 0.7/05.7 | 28587 |
| 1997 BE <sub>3</sub>  | 1998 04 04.0 | 12 52.05 -00 00.8 17.0 | -0.75 + 4.1  | 1.4/02.3  | 29947 | 1993 LG <sub>2</sub>  | 1998 04 06.4 | 13 00.80 -07 08.7 17.0 | -0.70 + 6.0  | 0.2/06.7 | 28317 |
| 1981 EU <sub>9</sub>  | 1998 04 04.0 | 12 52.13 -08 27.5 18.1 | -0.96 + 8.2  | 1.1/05.0  | 26916 | 1991 PT <sub>10</sub> | 1998 04 06.5 | 13 00.95 -11 25.6 19.8 | -0.89 + 5.4  | 1.5/08.1 | 28886 |
| 1995 SZ <sub>4</sub>  | 1998 04 04.1 | 12 52.15 -06 17.6 18.2 | -0.85 + 6.2  | 0.2/04.3  | 28889 | 1980 FY <sub>4</sub>  | 1998 04 06.6 | 13 01.38 -05 00.2 17.9 | -0.91 + 7.6  | 0.5/06.1 | 27930 |
| 1992 SV <sub>12</sub> | 1998 04 04.1 | 12 52.23 -07 39.9 16.4 | -1.13 + 2.5  | 0.9/04.7  | 31006 | 1996 WC <sub>2</sub>  | 1998 04 06.7 | 13 01.63 +06 07.4 16.9 | -0.98 + 3.3  | 5.1/03.0 | 29140 |
| 2100 T-2              | 1998 04 04.1 | 12 52.45 -03 34.2 19.2 | -0.68 + 8.1  | 0.5/03.4  | 26186 | (7538)                | 1998 04 06.7 | 13 01.63 -05 41.1 17.5 | -0.92 + 6.5  | 0.3/06.4 | 29295 |
| 1990 SE <sub>11</sub> | 1998 04 04.2 | 12 52.50 -18 00.3 17.1 | -0.89 + 3.6  | 3.9/08.0  | 29134 | 7603 P-L              | 1998 04 06.7 | 13 01.88 -04 10.2 17.4 | -0.98 + 1.9  | 0.8/06.1 | 26192 |
| 1981 EP <sub>19</sub> | 1998 04 04.2 | 12 52.53 -03 03.9 18.0 | -0.95 + 7.2  | 0.9/03.4  | 31415 | (7568)                | 1998 04 06.7 | 13 01.92 -08 46.4 18.1 | -0.87 + 6.7  | 0.6/07.5 | 29593 |
| (7468)                | 1998 04 04.2 | 12 52.73 -00 44.7 16.8 | -0.76 + 4.1  | 1.3/02.7  | 29081 | 1981 EJ <sub>42</sub> | 1998 04 06.8 | 13 02.05 -02 45.6 19.0 | -0.67 + 8.5  | 1.2/05.4 | 24100 |
| 1335 T-2              | 1998 04 04.2 | 12 52.85 -05 21.7 18.1 | -0.75 + 4.9  | 0.1/04.2  | 31436 | 1995 OJ               | 1998 04 06.8 | 13 02.15 -00 08.2 17.1 | -0.83 + 6.1  | 3.1/04.7 | 31420 |
| (7424)                | 1998 04 04.3 | 12 52.96 -13 22.4 16.6 | -0.93 + 7.2  | 2.8/06.9  | 28832 | 1990 KE               | 1998 04 06.8 | 13 02.30 -03 55.7 16.8 | -0.78 + 9.7  | 0.8/05.9 | 23514 |
| 1992 OV <sub>2</sub>  | 1998 04 04.4 | 12 53.23 +08 13.8 17.7 | -0.91 + 7.0  | 5.2/30.8  | 29136 | 1993 FQ <sub>73</sub> | 1998 04 06.8 | 13 02.31 -08 07.5 18.2 | -0.80 + 4.8  | 0.5/07.3 | 26743 |
| (7333)                | 1998 04 04.4 | 12 53.61 -19 56.8 17.6 | -0.91 + 4.7  | 4.3/09.0  | 28570 | 1992 YH               | 1998 04 06.9 | 13 02.47 +12 35.7 17.3 | -0.94 + 2.7  | 6.0/01.2 | 31418 |
| (7376)                | 1998 04 04.4 | 12 53.64 -08 49.5 16.6 | -0.95 + 5.3  | 1.1/05.4  | 28820 | 2506 P-L              | 1998 04 06.9 | 13 02.81 -10 19.1 18.4 | -0.99 + 2.1  | 1.2/08.0 | 22086 |
| 1995 TQ               | 1998 04 04.5 | 12 53.64 -18 22.1 17.7 | -0.76 + 6.3  | 3.6/08.9  | 30901 | 1981 EE <sub>7</sub>  | 1998 04 07.0 | 13 02.80 -19 23.6 18.4 | -1.03 + 2.6  | 6.1/10.6 | 26916 |
| 1992 ER <sub>28</sub> | 1998 04 04.5 | 12 53.89 -01 55.9 19.4 | -0.74 + 4.7  | 1.0/03.3  | 27913 | 1981 ED <sub>16</sub> | 1998 04 07.0 | 13 03.16 -14 16.6 18.1 | -0.89 + 6.2  | 3.6/09.5 | 26918 |
| 1992 ER <sub>6</sub>  | 1998 04 04.5 | 12 53.95 +00 56.2 16.7 | -0.78 + 3.6  | 2.0/02.5  | 29943 | 4529 P-L              | 1998 04 07.1 | 13 03.32 -09 10.6 19.2 | -0.76 + 3.6  | 0.7/07.9 | 22694 |
| 1996 WS <sub>2</sub>  | 1998 04 04.7 | 12 54.35 -06 21.4 19.0 | -0.95 + 6.5  | 0.2/04.9  | 30786 | 1988 TE               | 1998 04 07.2 | 13 03.52 -08 30.6 17.3 | -0.92 + 5.8  | 0.6/07.8 | 29134 |
| 1989 RG               | 1998 04 04.7 | 12 54.55 -12 03.2 17.2 | -1.01 + 5.4  | 2.3/06.6  | 23133 | 1981 DL <sub>1</sub>  | 1998 04 07.3 | 13 04.04 -24 54.1 19.2 | -0.84 + 2.5  | 4.7/12.9 | 28882 |
| (7452)                | 1998 04 04.7 | 12 54.55 -01 54.8 18.3 | -0.71 + 4.6  | 1.0/03.5  | 29077 | 1994 HA               | 1998 04 07.4 | 13 04.29 -08 31.2 15.8 | -0.77 + 11.8 | 0.6/08.0 | 29318 |
| 1989 UM <sub>1</sub>  | 1998 04 04.7 | 12 54.61 -02 19.5 17.2 | -0.99 + 5.4  | 1.2/03.7  | 28583 | 1996 YF <sub>2</sub>  | 1998 04 07.4 | 13 04.40 -14 24.1 17.3 | -0.89 + 5.2  | 2.3/09.8 | 29141 |
| 1993 FM <sub>19</sub> | 1998 04 04.7 | 12 54.62 +04 38.2 16.8 | -0.76 + 5.1  | 2.9/01.3  | 25975 | 2665 P-L              | 1998 04 07.4 | 13 04.47 -03 59.6 20.2 | -0.90 + 6.8  | 0.9/06.5 | 31436 |
| 1981 EK <sub>5</sub>  | 1998 04 04.8 | 12 54.74 -16 51.0 18.0 | -0.79 + 3.9  | 3.5/08.3  | 29315 | 2043 P-L              | 1998 04 07.5 | 13 04.81 -11 34.3 18.1 | -1.05 + 3.0  | 1.9/08.8 | 23984 |
| 1995 LK               | 1998 04 04.8 | 12 54.86 -51 07.0 17.9 | -1.47 - 1.9  | 16.4/17.6 | 28318 | 1996 VF <sub>1</sub>  | 1998 04 07.5 | 13 04.99 -05 17.3 19.7 | -0.98 + 4.5  | 0.6/07.1 | 30785 |
| 1981 EN <sub>24</sub> | 1998 04 04.9 | 12 55.18 -08 51.6 17.5 | -0.98 + 6.6  | 1.2/05.9  | 26919 | 1991 PW <sub>16</sub> | 1998 04 07.6 | 13 05.13 -01 27.8 17.1 | -0.90 + 6.6  | 2.1/05.9 | 31417 |
| 1981 ED <sub>7</sub>  | 1998 04 04.9 | 12 55.19 -13 59.4 19.2 | -0.69 + 8.0  | 2.4/07.9  | 26916 | 4119 P-L              | 1998 04 07.6 | 13 05.31 -06 05.9 18.3 | -0.99 + 8.2  | 0.3/07.4 | 29141 |
| 1978 SS <sub>7</sub>  | 1998 04 04.9 | 12 55.33 -09 25.8 17.1 | -1.03 + 4.5  | 1.3/06.0  | 28314 | 1996 VH <sub>8</sub>  | 1998 04 07.7 | 13 05.32 -05 25.3 16.7 | -1.05 + 3.6  | 0.6/07.3 | 29117 |
| 1995 TN               | 1998 04 05.1 | 12 55.91 -10 07.8 18.3 | -0.85 + 2.3  | 1.2/06.4  | 28889 | 1978 VP <sub>11</sub> | 1998 04 07.7 | 13 05.32 -02 26.0 17.6 | -0.72 + 4.3  | 1.1/06.2 | 29132 |
| 5016 T-3              | 1998 04 05.1 | 12 55.94 +08 33.6 16.6 | -0.74 + 7.5  | 5.5/30.9  | 31437 | 1993 FJ <sub>10</sub> | 1998 04 07.7 | 13 05.59 -03 09.9 15.9 | -0.81 + 4.4  | 1.2/06.6 | 29662 |
| 1989 FL               | 1998 04 05.1 | 12 56.06 -14 58.8 16.3 | -0.96 + 0.8  | 3.7/07.6  | 28315 | 1996 VG <sub>2</sub>  | 1998 04 07.8 | 13 05.80 -06 42.3 18.6 | -0.91 + 6.2  | 0.1/07.7 | 31422 |
| 1981 EO <sub>30</sub> | 1998 04 05.1 | 12 56.13 +01 33.2 17.7 | -0.74 + 11.5 | 2.9/02.3  | 26920 | 1983 RT <sub>3</sub>  | 1998 04 07.9 | 13 06.01 -21 51.9 18.4 | -0.98 + 3.1  | 4.6/12.3 | 22076 |
| 1993 FW <sub>8</sub>  | 1998 04 05.2 | 12 56.36 -02 48.5 18.1 | -0.80 + 4.4  | 1.0/04.2  | 28887 | (7369)                | 1998 04 08.1 | 13 06.81 -39 34.3 17.8 | -1.09 + 4.7  | 9.2/19.4 | 28818 |
| 1995 UR <sub>8</sub>  | 1998 04 05.2 | 12 56.40 -03 33.9 19.2 | -0.94 + 4.4  | 0.8/04.5  | 26423 | 1994 BW               | 1998 04 08.1 | 13 06.83 +07 38.8 16.5 | -0.92 + 5.4  | 6.3/03.3 | 31419 |
| 1992 PY               | 1998 04 05.3 | 12 56.52 -38 37.1 18.7 | -1.20 + 2.2  | 9.6/15.7  | 29660 | 1976 UB <sub>16</sub> | 1998 04 08.1 | 13 06.98 +00 01.4 18.9 | -0.89 + 2.5  | 2.1/06.1 | 26556 |
| 1990 QY <sub>8</sub>  | 1998 04 05.3 | 12 56.60 -00 00.9 17.2 | -0.78 + 5.2  | 1.8/03.4  | 28885 | 1981 EN <sub>45</sub> | 1998 04 08.4 | 13 07.95 -12 44.4 18.8 | -1.02 + 5.8  | 2.0/10.1 | 28882 |
| 1990 TE <sub>7</sub>  | 1998 04 05.3 | 12 56.76 -09 46.7 18.5 | -0.73 + 6.7  | 1.0/06.6  | 26189 | 1988 RZ <sub>5</sub>  | 1998 04 08.4 | 13 08.29 -04 31.3 17.1 | -0.91 + 7.0  | 1.0/07.6 | 30780 |
| (7384)                | 1998 04 05.3 | 12 56.78 -10 05.4 17.6 | -0.79 + 5.9  | 1.2/06.7  | 28822 | 1162 T-1              | 1998 04 08.5 | 13 08.58 -17 46.9 17.3 | -0.89 + 1.5  | 3.5/11.6 | 24909 |
| 1990 RG <sub>3</sub>  | 1998 04 05.4 | 12 57.08 -05 29.6 16.5 | -0.78 + 5.4  | 0.2/05.2  | 28844 | 1981 ET <sub>23</sub> | 1998 04 08.7 | 13 09.18 -09 45.7 18.7 | -1.06 + 4.1  | 0.9/09.4 | 15703 |
| 1992 VR               | 1998 04 05.5 | 12 57.31 -05 19.7 18.1 | -0.89 + 6.1  | 0.3/05.3  | 29943 | 1981 EW <sub>10</sub> | 1998 04 08.7 | 13 09.20 -19 45.1 19.0 | -1.03 + 2.8  | 5.8/12.3 | 26916 |
| 1977 UM <sub>4</sub>  | 1998 04 05.5 | 12 57.67 -05 48.6 16.9 | -0.97 + 5.1  | 0.1/05.5  | 29939 | 1978 VX <sub>4</sub>  | 1998 04 08.7 | 13 09.37 -01 40.5 18.8 | -0.98 + 4.9  | 2.1/07.1 | 29652 |

|                       |              |          |          |      |       |   |      |           |       |                       |              |          |          |      |       |   |     |           |       |
|-----------------------|--------------|----------|----------|------|-------|---|------|-----------|-------|-----------------------|--------------|----------|----------|------|-------|---|-----|-----------|-------|
| 1986 TR               | 1998 04 08.8 | 13 09.45 | -19 10.2 | 18.0 | -0.87 | + | 6.0  | 3.4/12.6  | 27119 | 1996 TG <sub>5</sub>  | 1998 04 10.9 | 13 17.25 | -03 59.4 | 17.3 | -1.03 | + | 5.7 | 1.6/09.7  | 28890 |
| 1991 RT <sub>26</sub> | 1998 04 08.8 | 13 09.51 | -05 57.2 | 17.0 | -0.79 | + | 8.7  | 0.4/08.3  | 30656 | 1996 PZ <sub>6</sub>  | 1998 04 10.9 | 13 17.33 | +35 40.9 | 18.2 | -1.35 | - | 0.5 | 17.6/26.9 | 28319 |
| 1994 EB               | 1998 04 08.8 | 13 09.71 | -02 09.9 | 16.8 | -0.83 | + | 8.2  | 2.0/07.1  | 31420 | 1992 WX               | 1998 04 10.9 | 13 17.41 | +00 55.7 | 17.1 | -0.93 | + | 6.5 | 3.1/08.1  | 30274 |
| 1991 QF               | 1998 04 08.9 | 13 10.06 | +04 34.4 | 19.2 | -0.97 | + | 2.5  | 3.4/05.5  | 29135 | (7662)                | 1998 04 11.0 | 13 17.57 | -07 34.6 | 16.0 | -0.67 | + | 8.5 | 0.2/10.8  | 29902 |
| 1991 GR <sub>2</sub>  | 1998 04 09.0 | 13 10.15 | -07 28.4 | 17.2 | -1.02 | + | 5.1  | 0.0/09.0  | 31417 | 1994 RN               | 1998 04 11.0 | 13 17.71 | -00 26.2 | 18.8 | -0.69 | + | 6.7 | 2.3/08.4  | 30783 |
| 1992 SC <sub>24</sub> | 1998 04 09.1 | 13 10.53 | -13 50.1 | 17.0 | -0.91 | + | 7.3  | 2.2/11.2  | 29660 | 1989 TR <sub>3</sub>  | 1998 04 11.1 | 13 17.88 | -00 33.6 | 17.8 | -0.69 | + | 6.7 | 2.3/08.5  | 25062 |
| 1981 EX <sub>15</sub> | 1998 04 09.1 | 13 10.66 | -12 22.4 | 18.3 | -0.90 | + | 4.5  | 1.6/10.6  | 25536 | 1993 HJ <sub>3</sub>  | 1998 04 11.1 | 13 18.00 | -02 59.1 | 16.9 | -0.79 | + | 4.7 | 1.7/09.5  | 26903 |
| 2275 T-2              | 1998 04 09.2 | 13 10.99 | -05 18.5 | 16.8 | -0.75 | + | 5.7  | 0.8/08.5  | 31436 | 1978 VA <sub>5</sub>  | 1998 04 11.2 | 13 18.41 | -04 15.6 | 19.7 | -0.69 | + | 4.1 | 0.9/10.0  | 31223 |
| 1995 VR               | 1998 04 09.2 | 13 11.04 | -15 28.5 | 17.6 | -0.83 | + | 7.9  | 2.4/12.0  | 28890 | 1992 WH <sub>1</sub>  | 1998 04 11.2 | 13 18.45 | +02 44.0 | 16.8 | -0.90 | + | 6.1 | 3.6/07.8  | 29661 |
| 6588 P-L              | 1998 04 09.2 | 13 11.13 | -06 36.0 | 18.3 | -0.72 | + | 4.3  | 0.2/09.0  | 29141 | 1992 EG <sub>8</sub>  | 1998 04 11.2 | 13 18.53 | -07 52.4 | 17.8 | -0.74 | + | 4.6 | 0.1/11.2  | 30687 |
| (7519)                | 1998 04 09.3 | 13 11.19 | -05 03.0 | 18.3 | -0.69 | + | 4.5  | 0.6/08.5  | 29291 | 4125 T-3              | 1998 04 11.2 | 13 18.55 | -04 34.9 | 19.8 | -0.87 | + | 3.3 | 1.0/10.2  | 27124 |
| 1993 FC <sub>51</sub> | 1998 04 09.3 | 13 11.25 | -09 13.7 | 18.6 | -0.81 | + | 4.7  | 0.5/09.9  | 28850 | 1995 OX <sub>1</sub>  | 1998 04 11.2 | 13 18.55 | +00 04.5 | 17.2 | -1.01 | + | 4.7 | 3.1/08.8  | 29318 |
| 1981 EY <sub>45</sub> | 1998 04 09.4 | 13 11.63 | -13 11.5 | 18.1 | -0.75 | + | 4.0  | 1.4/11.2  | 22271 | 1990 RD               | 1998 04 11.4 | 13 18.89 | -03 40.5 | 17.9 | -0.74 | + | 5.9 | 1.2/09.9  | 29658 |
| 1989 SB <sub>4</sub>  | 1998 04 09.4 | 13 11.69 | +00 01.9 | 17.7 | -0.95 | + | 6.0  | 3.1/07.1  | 31136 | 1989 TO <sub>15</sub> | 1998 04 11.5 | 13 19.30 | -08 13.3 | 18.6 | -0.96 | + | 6.7 | 0.0/11.5  | 25080 |
| 1990 WC <sub>9</sub>  | 1998 04 09.5 | 13 12.21 | +07 18.6 | 17.2 | -0.81 | + | 2.5  | 4.3/05.0  | 29942 | 1992 SW <sub>3</sub>  | 1998 04 11.5 | 13 19.61 | -07 06.1 | 18.9 | -0.96 | + | 5.1 | 0.4/11.2  | 31418 |
| 1995 UP <sub>6</sub>  | 1998 04 09.6 | 13 12.35 | -18 29.0 | 18.2 | -0.85 | + | 8.7  | 3.6/13.4  | 29139 | 1992 WH               | 1998 04 11.6 | 13 19.72 | -13 27.6 | 16.4 | -0.93 | + | 7.4 | 1.9/13.2  | 29943 |
| 1980 FJ <sub>1</sub>  | 1998 04 09.7 | 13 12.63 | -20 46.0 | 17.1 | -0.86 | + | 1.3  | 3.5/13.4  | 24116 | 1986 AT <sub>2</sub>  | 1998 04 11.6 | 13 19.76 | +13 39.2 | 16.5 | -0.69 | + | 6.3 | 5.9/03.7  | 27709 |
| 1996 XA <sub>18</sub> | 1998 04 09.7 | 13 12.88 | -00 43.7 | 17.7 | -0.92 | + | 2.8  | 2.8/07.8  | 28872 | 2395 T-3              | 1998 04 11.7 | 13 20.11 | -12 37.8 | 18.1 | -0.73 | + | 4.4 | 1.2/13.1  | 24757 |
| 1981 EY <sub>3</sub>  | 1998 04 09.7 | 13 12.91 | -15 03.4 | 17.8 | -0.75 | + | 6.4  | 2.2/12.3  | 26915 | (7409)                | 1998 04 11.7 | 13 20.11 | -05 05.1 | 16.8 | -0.95 | + | 4.9 | 1.1/10.7  | 30250 |
| 1996 XJ <sub>15</sub> | 1998 04 09.7 | 13 12.99 | +03 43.8 | 17.2 | -0.94 | + | 5.4  | 4.2/06.2  | 29119 | 1990 HP               | 1998 04 11.7 | 13 20.19 | +03 03.1 | 16.0 | -1.73 | - | 9.7 | 6.1/10.4  | 29657 |
| 1995 QZ <sub>4</sub>  | 1998 04 09.8 | 13 13.00 | -20 01.7 | 19.0 | -0.97 | + | 4.5  | 5.7/13.5  | 25733 | 1994 AG               | 1998 04 11.8 | 13 20.42 | -08 03.7 | 17.7 | -0.98 | + | 6.6 | 0.2/11.7  | 28851 |
| 1981 EO <sub>7</sub>  | 1998 04 09.8 | 13 13.06 | -07 49.3 | 17.3 | -0.79 | + | 9.4  | 0.0/09.8  | 25423 | 1991 NA               | 1998 04 11.8 | 13 20.78 | -28 48.8 | 18.3 | -1.10 | + | 4.9 | 7.7/17.8  | 30781 |
| (7402)                | 1998 04 09.8 | 13 13.13 | +02 02.3 | 17.2 | -0.80 | + | 6.4  | 3.1/06.6  | 28827 | 1994 AC <sub>13</sub> | 1998 04 11.9 | 13 21.12 | -06 11.2 | 18.0 | -0.89 | + | 3.0 | 1.2/11.3  | 23529 |
| (7372)                | 1998 04 09.8 | 13 13.23 | -03 51.7 | 16.3 | -0.79 | + | 5.4  | 1.3/08.6  | 28819 | 1994 CE <sub>2</sub>  | 1998 04 12.1 | 13 21.70 | -08 17.0 | 16.7 | -0.95 | + | 5.4 | 0.1/12.1  | 28888 |
| 1997 AU               | 1998 04 09.8 | 13 13.25 | -07 42.3 | 18.1 | -0.81 | + | 4.3  | 0.0/09.8  | 31422 | 1995 UF <sub>6</sub>  | 1998 04 12.2 | 13 22.23 | +01 32.2 | 17.5 | -0.95 | + | 2.3 | 3.3/09.4  | 29319 |
| 1996 TU <sub>11</sub> | 1998 04 09.8 | 13 13.27 | +04 00.6 | 18.7 | -1.02 | + | 3.7  | 4.5/06.5  | 31390 | 1991 RD <sub>7</sub>  | 1998 04 12.2 | 13 22.24 | -18 14.7 | 17.6 | -1.06 | + | 1.2 | 3.1/14.8  | 28615 |
| 1994 JK <sub>9</sub>  | 1998 04 09.8 | 13 13.42 | +18 51.2 | 15.9 | -0.97 | + | 0.2  | 11.1/01.7 | 29318 | 1995 VT <sub>1</sub>  | 1998 04 12.3 | 13 22.34 | -16 55.8 | 16.7 | -0.72 | + | 5.5 | 2.1/15.1  | 26407 |
| 1981 EB <sub>6</sub>  | 1998 04 09.9 | 13 13.43 | -23 12.9 | 19.5 | -0.80 | + | 3.0  | 3.8/14.7  | 30779 | 1992 QS <sub>1</sub>  | 1998 04 12.4 | 13 22.58 | +04 47.5 | 16.7 | -0.97 | + | 3.9 | 4.7/08.5  | 29100 |
| 1996 VM <sub>5</sub>  | 1998 04 09.9 | 13 13.45 | +01 18.6 | 16.7 | -0.92 | + | 4.5  | 3.7/07.2  | 31279 | 1996 XU <sub>18</sub> | 1998 04 12.4 | 13 22.84 | -04 59.5 | 17.4 | -0.74 | + | 4.6 | 1.1/11.3  | 29308 |
| 1996 XD <sub>6</sub>  | 1998 04 10.0 | 13 14.12 | +18 15.9 | 18.4 | -0.80 | + | 1.9  | 7.4/01.8  | 28871 | 1996 XV <sub>1</sub>  | 1998 04 12.5 | 13 23.17 | -18 59.8 | 16.2 | -0.99 | + | 5.5 | 3.8/15.6  | 28891 |
| 1990 VV <sub>11</sub> | 1998 04 10.1 | 13 14.24 | -05 29.1 | 18.4 | -0.74 | + | 4.2  | 0.6/09.4  | 29098 | 6602 P-L              | 1998 04 12.6 | 13 23.39 | -11 06.7 | 19.5 | -1.10 | + | 3.6 | 0.9/13.3  | 22701 |
| 1993 AJ               | 1998 04 10.2 | 13 14.62 | +13 43.5 | 17.1 | -0.84 | + | 4.9  | 6.4/03.1  | 22085 | 1982 SO <sub>5</sub>  | 1998 04 12.6 | 13 23.41 | -09 44.3 | 19.4 | -0.87 | + | 4.7 | 0.3/12.9  | 28883 |
| 1981 ER <sub>29</sub> | 1998 04 10.3 | 13 15.07 | -05 01.3 | 17.3 | -0.75 | + | 11.5 | 1.1/09.3  | 26920 | 1988 XQ               | 1998 04 12.6 | 13 23.41 | -21 01.4 | 18.3 | -0.91 | + | 6.6 | 3.7/16.6  | 28884 |
| 1988 BH               | 1998 04 10.3 | 13 15.24 | -20 10.5 | 16.1 | -0.88 | + | 4.9  | 4.3/14.3  | 28315 | 1990 EA <sub>5</sub>  | 1998 04 12.6 | 13 23.46 | -12 09.1 | 16.8 | -0.95 | + | 5.2 | 1.3/13.6  | 29657 |
| 1989 AW <sub>5</sub>  | 1998 04 10.4 | 13 15.25 | -02 43.9 | 17.7 | -0.87 | + | 4.9  | 1.8/08.8  | 22226 | 1996 WY               | 1998 04 12.6 | 13 23.70 | -00 05.0 | 17.4 | -1.01 | + | 3.8 | 3.2/10.2  | 29118 |
| 2765 P-L              | 1998 04 10.5 | 13 15.58 | -08 10.9 | 20.2 | -0.84 | + | 4.8  | 0.1/10.6  | 22694 | 1981 EU <sub>20</sub> | 1998 04 12.7 | 13 23.64 | -10 31.0 | 18.3 | -0.89 | + | 5.1 | 0.6/13.2  | 28882 |
| 1990 OT <sub>4</sub>  | 1998 04 10.5 | 13 15.67 | +06 36.5 | 17.4 | -0.79 | + | 8.7  | 5.2/05.2  | 31273 | 1230 T-1              | 1998 04 12.7 | 13 23.72 | -12 30.3 | 18.0 | -1.01 | + | 4.7 | 1.7/13.8  | 25076 |
| 1990 UT <sub>10</sub> | 1998 04 10.5 | 13 15.81 | -06 17.1 | 17.6 | -0.76 | + | 4.7  | 0.5/10.0  | 29942 | 1987 RQ <sub>2</sub>  | 1998 04 12.8 | 13 24.39 | -05 52.2 | 18.7 | -0.89 | + | 4.7 | 0.9/12.0  | 29316 |
| 1991 PH <sub>10</sub> | 1998 04 10.5 | 13 15.87 | -05 19.6 | 17.7 | -0.85 | + | 5.2  | 0.8/09.7  | 28584 | 1995 QO               | 1998 04 12.8 | 13 24.43 | -16 40.4 | 21.1 | -0.85 | + | 3.5 | 2.0/15.2  | 26176 |
| (7530)                | 1998 04 10.5 | 13 15.90 | +07 17.4 | 16.9 | -0.79 | + | 8.0  | 4.6/05.1  | 29293 | 1991 PW               | 1998 04 12.9 | 13 24.40 | -14 20.4 | 18.3 | -0.95 | + | 5.8 | 2.0/14.6  | 28845 |
| 1992 DO <sub>7</sub>  | 1998 04 10.5 | 13 15.90 | -02 22.7 | 19.1 | -0.75 | + | 4.5  | 1.8/08.8  | 27713 | 1977 RQ <sub>19</sub> | 1998 04 12.9 | 13 24.57 | -05 03.0 | 18.2 | -0.91 | + | 6.4 | 1.4/11.7  | 23347 |
| 1996 TC <sub>15</sub> | 1998 04 10.6 | 13 15.96 | +06 41.5 | 18.4 | -0.85 | + | 3.9  | 4.5/06.0  | 31421 | (8407)                | 1998 04 13.0 | 13 24.74 | +04 47.2 | 16.4 | -0.88 | + | 7.0 | 6.1/08.4  | 31367 |
| 1993 KB <sub>2</sub>  | 1998 04 10.6 | 13 16.08 | +03 21.2 | 15.1 | -0.68 | + | 9.9  | 3.5/06.3  | 23790 | 1981 FC <sub>1</sub>  | 1998 04 13.0 | 13 24.93 | -15 25.7 | 16.4 | -0.87 | + | 2.1 | 2.2/14.9  | 28882 |
| 1981 DE <sub>3</sub>  | 1998 04 10.6 | 13 16.22 | -27 26.2 | 18.0 | -1.02 | + | 1.7  | 7.8/16.3  | 26914 | 1997 AL <sub>6</sub>  | 1998 04 13.0 | 13 24.99 | -43 17.4 | 19.2 | -1.06 | + | 3.8 | 11.2/25.3 | 30786 |
| 1981 EG <sub>1</sub>  | 1998 04 10.6 | 13 16.34 | -07 53.0 | 16.4 | -0.91 | + | 3.7  | 0.1/10.6  | 31415 | 1993 FR <sub>58</sub> | 1998 04 13.0 | 13 25.10 | -09 51.0 | 18.0 | -0.81 | + | 5.0 | 0.3/13.4  | 31419 |
| 1996 YD <sub>2</sub>  | 1998 04 10.7 | 13 16.37 | -14 15.6 | 16.1 | -0.90 | + | 1.5  | 2.0/12.4  | 31144 | 1981 EQ <sub>30</sub> | 1998 04 13.1 | 13 25.17 | -17 39.5 | 18.1 | -1.08 | + | 1.3 | 3.1/15.3  | 27304 |
| 1994 AP <sub>2</sub>  | 1998 04 10.7 | 13 16.47 | +21 45.3 | 16.2 | -0.88 | + | 8.8  | 10.5/30.6 | 27730 | 6600 P-L              | 1998 04 13.1 | 13 25.17 | -06 11.3 | 16.8 | -1.00 | + | 4.8 | 1.3/12.3  | 29141 |
| 1981 DT <sub>2</sub>  | 1998 04 10.7 | 13 16.58 | -28 42.9 | 17.0 | -1.06 | + | 1.9  | 6.9/16.8  | 28882 | 1995 UP <sub>11</sub> | 1998 04 13.2 | 13 25.63 | -08 39.9 | 19.7 | -0.78 | + | 6.4 | 0.1/13.1  | 30784 |
| 1981 EF <sub>14</sub> | 1998 04 10.8 | 13 16.87 | -12 56.2 | 18.0 | -0.95 | + | 6.1  | 2.2/12.3  | 29132 | 1996 PA <sub>7</sub>  | 1998 04 13.2 | 13 25.84 | +29 07.3 | 18.9 | -1.08 | + | 1.3 | 11.1/01.5 | 31388 |
| 1997 AL <sub>13</sub> | 1998 04 10.8 | 13 16.96 | -18 38.4 | 15.2 | -0.89 | + | 1.5  | 3.3/13.8  | 29667 | 1994 EG <sub>7</sub>  | 1998 04 13.3 | 13 26.24 | +03 30.7 | 17.7 | -0.91 | + | 5.5 | 4.8/09.5  | 23992 |
| 1997 AD <sub>7</sub>  | 1998 04 10.9 | 13 17.19 | -05 37.8 | 17.0 | -0.89 | + | 6.1  | 0.8/10.1  | 29667 | 1994 PV               | 1998 04 13.4 | 13 26.29 | -01 30.8 | 17.8 | -0.72 | + | 5.2 | 2.1/10.9  | 29945 |

|                       |              |          |          |      |       |   |     |           |       |                       |              |          |          |      |       |   |      |           |       |
|-----------------------|--------------|----------|----------|------|-------|---|-----|-----------|-------|-----------------------|--------------|----------|----------|------|-------|---|------|-----------|-------|
| 1991 TE <sub>4</sub>  | 1998 04 13.4 | 13 26.31 | -08 58.7 | 19.3 | -0.95 | + | 1.9 | 0.0/13.4  | 31381 | (7423)                | 1998 04 16.6 | 13 38.28 | -13 50.3 | 17.3 | -0.96 | + | 6.7  | 1.3/17.8  | 28832 |
| 1993 FS <sub>29</sub> | 1998 04 13.4 | 13 26.60 | -15 18.5 | 17.8 | -0.83 | + | 4.7 | 2.1/15.4  | 28887 | 1989 UP <sub>4</sub>  | 1998 04 16.7 | 13 38.81 | -11 12.0 | 17.8 | -0.73 | + | 3.9  | 0.2/17.1  | 26560 |
| (7624)                | 1998 04 13.5 | 13 26.88 | -17 17.0 | 17.5 | -0.83 | + | 2.8 | 2.3/16.0  | 29606 | 1990 QR <sub>1</sub>  | 1998 04 16.8 | 13 38.87 | -08 27.2 | 17.2 | -0.83 | + | 4.9  | 0.6/16.3  | 29316 |
| 1981 EV <sub>34</sub> | 1998 04 13.5 | 13 27.01 | -06 14.5 | 18.9 | -0.87 | + | 5.8 | 0.9/12.7  | 31415 | 1995 PQ               | 1998 04 16.8 | 13 39.10 | +10 58.5 | 19.6 | -0.77 | + | 4.4  | 5.2/09.9  | 29318 |
| 1991 DJ <sub>1</sub>  | 1998 04 13.6 | 13 27.25 | +02 28.6 | 14.8 | -0.97 | + | 4.4 | 5.2/10.3  | 25538 | 1992 PQ <sub>2</sub>  | 1998 04 16.9 | 13 39.40 | -19 06.2 | 17.8 | -1.00 | + | 6.3  | 3.2/19.6  | 28848 |
| 1991 RP <sub>1</sub>  | 1998 04 13.6 | 13 27.34 | -25 28.9 | 17.2 | -1.12 | + | 0.4 | 5.8/17.7  | 25734 | 1993 FT <sub>41</sub> | 1998 04 16.9 | 13 39.40 | -11 28.7 | 16.8 | -0.83 | + | 4.2  | 0.4/17.3  | 31419 |
| 1997 AS <sub>16</sub> | 1998 04 13.7 | 13 27.48 | -07 30.9 | 17.0 | -0.79 | + | 3.9 | 0.5/13.2  | 29635 | (7425)                | 1998 04 16.9 | 13 39.48 | -05 02.1 | 17.8 | -0.95 | + | 4.8  | 1.9/15.4  | 28832 |
| 1995 OT               | 1998 04 13.7 | 13 27.74 | -07 48.8 | 16.4 | -1.07 | + | 4.0 | 0.6/13.4  | 31420 | 1997 AQ <sub>12</sub> | 1998 04 17.0 | 13 39.80 | +08 30.0 | 17.1 | -0.73 | + | 3.8  | 5.1/11.0  | 29124 |
| 1991 RA               | 1998 04 13.8 | 13 27.78 | -35 03.5 | 16.4 | -1.95 | - | 9.2 | 13.4/17.0 | 29943 | 1981 EP <sub>12</sub> | 1998 04 17.0 | 13 39.86 | -17 43.0 | 16.9 | -0.99 | + | 6.9  | 2.9/19.3  | 27708 |
| 4631 P-L              | 1998 04 13.8 | 13 27.92 | -11 46.5 | 16.7 | -1.07 | + | 1.8 | 1.1/14.5  | 25085 | 2181 T-2              | 1998 04 17.0 | 13 39.94 | -08 43.1 | 16.8 | -0.83 | + | 6.0  | 0.6/16.6  | 29949 |
| 1993 YJ               | 1998 04 13.8 | 13 28.12 | -15 22.9 | 17.3 | -1.05 | + | 5.8 | 2.2/15.7  | 29137 | 1992 UM <sub>2</sub>  | 1998 04 17.1 | 13 40.29 | -04 40.9 | 18.1 | -0.98 | + | 4.5  | 2.0/15.6  | 29661 |
| 1989 TO               | 1998 04 13.9 | 13 28.11 | -38 02.0 | 17.0 | -1.39 | + | 0.7 | 9.8/22.1  | 28613 | (7395)                | 1998 04 17.2 | 13 40.42 | -03 57.2 | 16.8 | -0.93 | + | 8.5  | 2.7/15.1  | 28824 |
| 1982 UX <sub>5</sub>  | 1998 04 13.9 | 13 28.39 | -15 26.3 | 17.6 | -0.85 | + | 5.3 | 2.0/15.9  | 22697 | (7588)                | 1998 04 17.2 | 13 40.61 | -43 43.4 | 15.3 | -1.06 | - | 0.4  | 11.3/27.3 | 29598 |
| 1989 YU <sub>5</sub>  | 1998 04 13.9 | 13 28.42 | -12 20.4 | 18.9 | -0.97 | + | 5.8 | 1.0/14.9  | 29657 | 1995 SW <sub>29</sub> | 1998 04 17.3 | 13 40.78 | -47 01.3 | 18.7 | -1.05 | + | 1.4  | 8.9/29.6  | 29946 |
| 1986 QJ <sub>1</sub>  | 1998 04 14.1 | 13 28.89 | +07 09.9 | 18.3 | -0.81 | + | 6.9 | 5.1/08.4  | 23236 | 1304 T-2              | 1998 04 17.3 | 13 41.02 | -11 03.8 | 17.7 | -0.75 | + | 4.5  | 0.2/17.6  | 31436 |
| 6531 P-L              | 1998 04 14.1 | 13 28.99 | -10 31.2 | 17.6 | -1.08 | + | 3.9 | 0.5/14.5  | 28088 | 1995 WM <sub>2</sub>  | 1998 04 17.3 | 13 41.03 | -18 11.6 | 19.1 | -0.75 | + | 6.8  | 2.0/20.0  | 29305 |
| 5491 T-2              | 1998 04 14.2 | 13 29.39 | -26 09.0 | 17.8 | -0.89 | + | 2.0 | 5.3/19.1  | 25652 | 1997 AC <sub>8</sub>  | 1998 04 17.3 | 13 41.07 | -23 09.2 | 19.1 | -0.83 | + | 4.3  | 3.7/21.3  | 30786 |
| 1981 ED <sub>40</sub> | 1998 04 14.4 | 13 30.14 | -02 16.9 | 18.9 | -0.72 | + | 6.9 | 2.1/12.1  | 25647 | 1995 QB <sub>10</sub> | 1998 04 17.3 | 13 41.11 | -33 59.3 | 18.2 | -1.06 | + | 2.1  | 8.5/24.3  | 27719 |
| 1991 RV <sub>4</sub>  | 1998 04 14.4 | 13 30.33 | -11 29.3 | 18.8 | -0.85 | + | 5.7 | 0.7/15.1  | 28846 | 1997 AY <sub>5</sub>  | 1998 04 17.4 | 13 41.07 | -19 54.3 | 18.0 | -0.92 | + | 5.8  | 3.3/20.3  | 30786 |
| 1996 VR <sub>7</sub>  | 1998 04 14.5 | 13 30.43 | -02 52.0 | 18.0 | -0.95 | + | 4.2 | 2.3/12.6  | 29666 | 1981 EF <sub>5</sub>  | 1998 04 17.4 | 13 41.23 | -15 30.1 | 17.7 | -0.86 | + | 8.4  | 1.7/19.1  | 28611 |
| (7503)                | 1998 04 14.5 | 13 30.53 | -12 40.8 | 16.8 | -1.02 | + | 5.3 | 1.3/15.5  | 29091 | 1989 YX <sub>6</sub>  | 1998 04 17.4 | 13 41.31 | -01 28.7 | 17.9 | -0.96 | + | 5.1  | 3.3/14.9  | 29657 |
| 1997 AK <sub>6</sub>  | 1998 04 14.6 | 13 30.76 | -07 45.6 | 17.4 | -0.76 | + | 4.0 | 0.6/14.1  | 31422 | 1992 SC <sub>4</sub>  | 1998 04 17.4 | 13 41.38 | -09 15.0 | 20.4 | -0.97 | + | 4.8  | 0.4/17.1  | 29300 |
| 1997 AU <sub>19</sub> | 1998 04 14.7 | 13 31.12 | -15 06.8 | 20.5 | -0.75 | + | 4.4 | 1.5/16.5  | 30786 | 1097 T-3              | 1998 04 17.5 | 13 41.69 | -18 05.2 | 18.1 | -0.82 | + | 6.2  | 2.2/20.0  | 24405 |
| 1996 UD               | 1998 04 14.7 | 13 31.24 | -05 05.4 | 16.9 | -1.02 | + | 3.7 | 1.6/13.5  | 28619 | 1995 QP               | 1998 04 17.6 | 13 41.83 | -17 58.0 | 18.8 | -0.87 | + | 3.4  | 2.1/19.7  | 29664 |
| 1105 T-1              | 1998 04 14.8 | 13 31.81 | -06 14.9 | 17.6 | -0.80 | + | 7.2 | 1.1/13.8  | 21121 | 1997 AQ <sub>16</sub> | 1998 04 17.6 | 13 41.93 | -10 00.1 | 18.4 | -1.01 | + | 5.7  | 0.2/17.5  | 29947 |
| 1992 EH <sub>11</sub> | 1998 04 14.9 | 13 31.78 | -07 01.6 | 17.2 | -0.75 | + | 4.8 | 0.8/14.1  | 28585 | 1994 JN               | 1998 04 17.6 | 13 41.95 | -08 13.5 | 15.8 | -0.80 | + | 11.5 | 0.9/16.8  | 26581 |
| 6543 P-L              | 1998 04 14.9 | 13 31.96 | -06 55.2 | 17.8 | -0.74 | + | 4.1 | 0.7/14.1  | 31436 | 1982 SC <sub>8</sub>  | 1998 04 17.6 | 13 41.97 | -15 06.4 | 16.5 | -1.08 | + | 4.3  | 1.9/18.9  | 23970 |
| 1990 SO <sub>7</sub>  | 1998 04 14.9 | 13 32.01 | -00 34.7 | 19.4 | -0.77 | + | 6.0 | 2.7/12.0  | 29316 | 4822 P-L              | 1998 04 17.6 | 13 42.10 | -06 22.9 | 19.0 | -0.79 | + | 4.8  | 1.3/16.4  | 20515 |
| 1995 UL               | 1998 04 15.1 | 13 32.50 | -13 22.3 | 16.3 | -0.88 | + | 3.6 | 1.2/16.2  | 29139 | (7389)                | 1998 04 17.6 | 13 42.14 | -04 23.1 | 17.5 | -0.99 | + | 5.0  | 2.1/15.9  | 28823 |
| 1996 XD <sub>20</sub> | 1998 04 15.2 | 13 33.01 | +01 18.1 | 19.2 | -0.92 | + | 4.7 | 3.8/12.0  | 31392 | 1996 RG <sub>1</sub>  | 1998 04 17.7 | 13 42.20 | -13 56.2 | 17.6 | -1.10 | + | 3.9  | 1.2/18.6  | 31278 |
| 6683 P-L              | 1998 04 15.2 | 13 33.10 | -02 37.5 | 18.1 | -0.72 | + | 5.2 | 2.2/13.0  | 29129 | 4521 P-L              | 1998 04 17.7 | 13 42.24 | -12 12.8 | 17.6 | -0.81 | + | 4.3  | 0.5/18.2  | 30914 |
| (7378)                | 1998 04 15.3 | 13 33.38 | -10 09.4 | 15.7 | -0.76 | + | 4.8 | 0.1/15.5  | 28820 | 1996 VK <sub>30</sub> | 1998 04 17.7 | 13 42.26 | -02 37.1 | 17.8 | -0.86 | + | 5.0  | 2.5/15.4  | 28868 |
| 1996 VA <sub>6</sub>  | 1998 04 15.3 | 13 33.58 | +11 41.7 | 18.2 | -0.93 | + | 2.5 | 7.0/09.1  | 28891 | (7339)                | 1998 04 17.7 | 13 42.35 | -02 45.2 | 16.9 | -0.85 | + | 4.8  | 2.7/15.4  | 28572 |
| (7597)                | 1998 04 15.4 | 13 33.64 | -04 41.3 | 16.8 | -0.78 | + | 4.8 | 1.6/13.8  | 29600 | 1996 YB <sub>1</sub>  | 1998 04 17.7 | 13 42.39 | -14 07.7 | 17.0 | -0.85 | + | 4.2  | 1.1/18.8  | 31422 |
| 1992 DO <sub>6</sub>  | 1998 04 15.5 | 13 34.09 | -05 04.7 | 17.5 | -0.75 | + | 4.5 | 1.4/14.0  | 29099 | 1990 KC <sub>1</sub>  | 1998 04 17.7 | 13 42.39 | +15 46.1 | 16.8 | -0.87 | + | 3.1  | 10.2/09.4 | 28614 |
| 1996 VW               | 1998 04 15.7 | 13 34.87 | -11 30.3 | 17.4 | -0.97 | + | 7.1 | 0.6/16.2  | 30785 | 1995 SO <sub>26</sub> | 1998 04 17.8 | 13 42.71 | -07 53.2 | 18.5 | -0.73 | + | 7.3  | 0.8/16.9  | 31387 |
| 1988 TN               | 1998 04 15.7 | 13 34.90 | -12 02.1 | 16.2 | -0.99 | + | 3.5 | 0.8/16.3  | 29941 | 1981 EW <sub>39</sub> | 1998 04 17.8 | 13 42.88 | -19 11.6 | 19.6 | -0.88 | + | 1.5  | 2.8/20.2  | 21967 |
| 1981 EA <sub>10</sub> | 1998 04 15.7 | 13 35.05 | -27 58.6 | 18.6 | -0.95 | + | 0.8 | 5.5/20.7  | 26916 | 1976 UN <sub>14</sub> | 1998 04 17.9 | 13 43.27 | -06 07.1 | 17.6 | -1.06 | + | 3.4  | 1.9/16.8  | 28580 |
| 1981 EO <sub>13</sub> | 1998 04 15.8 | 13 35.23 | -18 57.2 | 18.7 | -1.04 | + | 3.9 | 4.0/18.4  | 26917 | 1989 TT <sub>2</sub>  | 1998 04 17.9 | 13 43.28 | -01 29.6 | 18.1 | -0.72 | + | 4.4  | 2.4/15.1  | 28884 |
| 1989 SD <sub>3</sub>  | 1998 04 15.9 | 13 35.73 | -07 28.6 | 18.5 | -1.03 | + | 4.2 | 0.9/15.3  | 24582 | 1994 PL <sub>9</sub>  | 1998 04 18.0 | 13 43.44 | -23 49.7 | 17.5 | -0.82 | + | 2.7  | 3.6/21.9  | 29663 |
| 1981 DL               | 1998 04 16.0 | 13 35.95 | -16 29.7 | 18.7 | -0.73 | + | 6.6 | 2.0/18.2  | 26914 | (8313)                | 1998 04 18.0 | 13 43.56 | +12 33.0 | 17.4 | -0.86 | + | 4.2  | 7.0/10.6  | 31221 |
| 1987 XC               | 1998 04 16.1 | 13 36.31 | +04 50.0 | 17.8 | -1.00 | + | 1.9 | 4.7/12.0  | 28315 | 1995 VJ <sub>16</sub> | 1998 04 18.2 | 13 43.99 | -13 44.0 | 19.4 | -0.83 | + | 5.7  | 0.9/19.0  | 30784 |
| 1991 NS <sub>1</sub>  | 1998 04 16.1 | 13 36.51 | -03 38.5 | 16.9 | -0.88 | + | 8.2 | 2.5/14.1  | 30091 | 1996 XC <sub>1</sub>  | 1998 04 18.2 | 13 44.04 | -10 05.3 | 17.4 | -0.95 | + | 6.6  | 0.3/18.0  | 29320 |
| 1985 TZ <sub>3</sub>  | 1998 04 16.1 | 13 36.63 | -20 35.2 | 16.4 | -1.05 | + | 4.2 | 4.6/19.0  | 30469 | 1981 EZ <sub>15</sub> | 1998 04 18.2 | 13 44.38 | -20 04.7 | 18.7 | -1.05 | + | 5.3  | 3.6/21.0  | 25078 |
| 1997 AP <sub>17</sub> | 1998 04 16.2 | 13 36.62 | +06 32.1 | 17.8 | -0.80 | + | 3.3 | 5.2/11.1  | 31392 | 1985 VG               | 1998 04 18.3 | 13 44.46 | -04 09.2 | 16.6 | -0.96 | + | 4.8  | 2.5/16.4  | 29655 |
| 9509 P-L              | 1998 04 16.2 | 13 36.64 | -04 35.3 | 18.6 | -0.83 | + | 9.0 | 1.9/14.4  | 16036 | (7491)                | 1998 04 18.3 | 13 44.64 | -17 17.6 | 17.3 | -0.84 | + | 5.0  | 2.0/20.3  | 29088 |
| 1978 NS               | 1998 04 16.3 | 13 37.10 | -09 37.4 | 19.2 | -0.77 | + | 4.4 | 0.1/16.2  | 29131 | 1991 OM <sub>1</sub>  | 1998 04 18.3 | 13 44.81 | -14 00.2 | 15.5 | -0.94 | + | 5.0  | 1.4/19.0  | 25974 |
| 1981 EU <sub>38</sub> | 1998 04 16.3 | 13 37.14 | -09 53.4 | 16.1 | -0.89 | + | 7.7 | 0.1/16.3  | 27304 | 1988 RZ <sub>11</sub> | 1998 04 18.4 | 13 44.96 | -13 44.7 | 18.2 | -0.78 | + | 3.4  | 0.7/19.0  | 29656 |
| 1981 EB <sub>40</sub> | 1998 04 16.4 | 13 37.59 | -10 00.3 | 18.6 | -0.77 | + | 4.2 | 0.0/16.4  | 28611 | 5585 P-L              | 1998 04 18.5 | 13 45.24 | -11 15.6 | 19.5 | -0.81 | + | 4.1  | 0.1/18.6  | 26415 |
| 1988 RC <sub>7</sub>  | 1998 04 16.5 | 13 37.91 | -01 59.9 | 17.1 | -0.86 | + | 7.8 | 2.6/13.9  | 30686 | 1989 SN <sub>3</sub>  | 1998 04 18.5 | 13 45.34 | -06 26.5 | 18.9 | -0.72 | + | 5.1  | 1.2/17.2  | 31377 |
| 4096 T-2              | 1998 04 16.6 | 13 38.22 | -01 37.7 | 19.3 | -0.71 | + | 6.1 | 2.3/13.8  | 23867 | 1981 EM <sub>8</sub>  | 1998 04 18.5 | 13 45.39 | -15 02.4 | 18.3 | -0.75 | + | 4.7  | 1.1/19.8  | 29653 |