

PN 11 PASS 3227 PRI14 #070 S/W SA.0 DSS 14A RCVR AGC -134.9 FILE 11-1374 TG  
 SPACECRAFT ATTITUDE ON DAY 27 JAN 27, 1982 1400 GMT

01/27  
*Broomhall*  
 (CSC)

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.9692 RCSPHAK = 155.1350  
 SPACECRAFT-EARTH DIRECTION: CLAT = -13.5710 CLON = 38.0550  
 SPACERAFT +Z AXIS ATTITUDE: CLAT = -14.3562 CLON = 38.0696

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PN 11 PASS 3227 PRI14 #070 S/W SA.0 DSS 14A RCVR AGC -134.9 FILE 11-1374 TG  
 SPACECRAFT ATTITUDE ON DAY 27 JAN 27, 1982 1400 GMT  
 SPIN PERIOD = 7.482937 SEC RTLT = 5 HR 8 MIN 53.88 SEC

01/27/82

|                 | CNA      | CKA      | CLAT     | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|----------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -14.3562 | 38.0696  | -              | -          |
| SUN             | 4.4627   | 170.2096 | -13.5551 | 33.5458  | 0.170083820 10 | 11.3692393 |
| EARTH           | 0.9692   | 54.0396  | -13.5710 | 38.0550  | 0.169890670 10 | 11.3563282 |
| JUPITER         | 139.7009 | 302.4339 | 0.0000   | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)       | 62.2397  | 322.4953 |          |          |                |            |
| BETELGEUSE(R)   | 48.4741  | 351.1347 |          |          |                |            |
| CANOPUS(B)      | 70.4359  | 283.7892 |          |          |                |            |
| ARCTURUS(R)     | 159.0497 | 53.8760  |          |          |                |            |
| RIGIL KENTAURUS | 119.8499 | 252.2205 |          |          |                |            |
| ANTARES(R)      | 143.6247 | 209.0804 |          |          |                |            |
| CAPELLA(R)      | 56.4972  | 40.5718  |          |          |                |            |
| VEGA(B)         | 113.4855 | 118.3507 |          |          |                |            |
| ALDEBARAN(R)    | 32.0970  | 12.8791  |          |          |                |            |
| RIGEL(B)        | 38.9112  | 327.8294 |          |          |                |            |
| GAMMA CRUCIS(R) | 117.7980 | 271.2843 |          |          |                |            |
| SPICA(B)        | 158.1321 | 312.5262 |          |          |                |            |
| ACHERNAK(B)     | 50.3714  | 241.7337 |          |          |                |            |
| DENEK(B)        | 89.6496  | 116.5609 |          |          |                |            |
| PROCYON(B)      | 74.2039  | 347.0825 |          |          |                |            |

STAR DELAY: 1.0650 SEC 272.6487 PULSES DECIMAL = 4, COARSE + 17, FINE  
 51.2108 DEG 04 21 PULSES OCTAL CKAH SUB C = 170.2096 EPSILON= 0.0000 SCN=11

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N 10 PASS 3 PR23 #070 S/W SK,0 DSS 63A RCVR AGC 7.2 FILE 10-1159 BD  
 \* SPACECRAFT ATTITUDE ON DAY 26 JAN 26,1982 0000 GMT

01/25

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.6965 RCSPHAK = 252.0500  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.1906 CLON = 242.1634  
 SPACERAFT +Z AXIS ATTITUDE: CLAT = -3.3082 CLON = 242.0510

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N 10 PASS 3623 PR23 #070 S/W SK,0 DSS 63A RCVR AGC -127.2 FILE 10-1159 BD  
 SPACECRAFT ATTITUDE ON DAY 26 JAN 26,1982 0000 GMT  
 SPIN PERIOD = 12.989980 SEC RTLT = 7 HR 11 MIN 44.98 SEC

01/25/82

|                 | RNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3082 | 242.0510 | -              | -          |
| SUN             | 1.2305   | 8.0567   | -3.1350 | 244.0712 | 0.395178460 10 | 26.4156725 |
| EARTH           | 0.6965   | 170.3047 | -3.1906 | 242.1634 | 0.388305930 10 | 25.9562787 |
| JUPITER         | 63.9000  | 178.3050 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)       | 123.0171 | 233.0357 |         |          |                |            |
| BETELGEUSE(R)   | 148.1916 | 218.1703 |         |          |                |            |
| CANOPUS(B)      | 97.2621  | 260.5401 |         |          |                |            |
| ARCTURUS(R)     | 50.4002  | 134.5550 |         |          |                |            |
| RIGIL KENTAURUS | 30.4169  | 265.7103 |         |          |                |            |
| ANTARES(R)      | 6.6526   | 348.8831 |         |          |                |            |
| CAPELLA(R)      | 153.3862 | 131.1122 |         |          |                |            |
| VEGA(B)         | 73.5447  | 70.5605  |         |          |                |            |
| ALDEBARAN(R)    | 160.0378 | 233.1755 |         |          |                |            |
| RIGEL(B)        | 143.2027 | 250.3417 |         |          |                |            |
| GAMMA CRUCIS(R) | 50.0042  | 247.0040 |         |          |                |            |
| SPICA(B)        | 36.3472  | 179.2027 |         |          |                |            |
| ACHERNAR(B)     | 93.2594  | 299.9271 |         |          |                |            |
| DENEK(B)        | 93.9245  | 59.8522  |         |          |                |            |
| PROCYON(B)      | 124.5575 | 202.0467 |         |          |                |            |

STAR DELAY: 9.6868 SEC 687.8096 PULSES DECIMAL = 10, COARSE + 48, FINE  
 74.4599 DEC 12 60 PULSES OCTAL CKAH SUB C = -1.0204 EPSILON= 9.0771 SCN=10

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PN 11 PASS 3220 PRI4 #070 S/W SK.0 DSS 43A RCVR AGC -134.9 FILE 11-1373 TS  
 SPACECRAFT ATTITUDE ON DAY 20 JAN 20, 1982 2000 GMT

01/20/82

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ELLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.9792 RCSPHAK = 174.4700  
 SPACECRAFT-EARTH DIRECTION: CLAT = -13.3916 CLON = 38.3283  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -14.3436 CLON = 38.0925

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PN 11 PASS 3220 PRI4 #070 S/W SK.0 DSS 43A RCVR AGC -134.9 FILE 11-1373 TS  
 SPACECRAFT ATTITUDE ON DAY 20 JAN 20, 1982 2000 GMT  
 SPIN PERIOD = 7.486937 SLC RTLT = 3 HR 10 MIN 12.39 SEC

01/20/82

|                 | RNA      | CKA      | CLAT     | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|----------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -14.3436 | 38.0925  | -              | -          |
| SUN             | 0.7630   | 170.4782 | -13.5075 | 33.2613  | 0.16962177D 10 | 11.3383536 |
| EARTH           | 0.9792   | 76.4475  | -13.3916 | 38.3283  | 0.17106743D 10 | 11.4349886 |
| JUPITER         | 139.6836 | 342.4616 | 0.0000   | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 62.2298  | 322.4886 |          |          |                |            |
| BETELGEUSE(R)   | 48.4541  | 351.1263 |          |          |                |            |
| CANOPUS(B)      | 70.0429  | 283.7861 |          |          |                |            |
| ARCTURUS(R)     | 156.0265 | 53.8544  |          |          |                |            |
| RIGIL KENTAURUS | 119.8687 | 252.2361 |          |          |                |            |
| ANTARES(R)      | 143.6502 | 209.0857 |          |          |                |            |
| CAPELLA(R)      | 56.4722  | 40.5806  |          |          |                |            |
| VEGA(B)         | 113.4849 | 118.3453 |          |          |                |            |
| ALDEBARAN(R)    | 32.0726  | 12.8731  |          |          |                |            |
| RIGEL(B)        | 38.8991  | 327.8072 |          |          |                |            |
| GAMMA CRUCIS(R) | 117.8191 | 271.3018 |          |          |                |            |
| SPICA(B)        | 154.1264 | 312.5938 |          |          |                |            |
| ACHERNAK(B)     | 59.3930  | 241.7313 |          |          |                |            |
| DENER(B)        | 89.6982  | 116.5666 |          |          |                |            |
| PROCYON(B)      | 74.1852  | 347.0832 |          |          |                |            |

STAR DELAY: 1.0651 SEC 272.6649 PULSES DECIMAL = 4. COARSE + 17. FINE  
 51.2139 DEG 04 21 PULSES OCTAL CKAH SUB C = 170.4782 EPSILON= 0.0000 SCN=11

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PN 10 PASS 3620 PR23 #070 S/W SK.0 DSS 63A RCVR AGC -123.9 FILE 10-1158 TS  
 SPACECRAFT ATTITUDE ON DAY 19 JAN 19, 1982 1830 GMT

01/19/82

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.5810 RCSPHAK = 253.1660  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.2024 CLON = 242.2493  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3004 CLON = 242.8229

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PN 10 PASS 3620 PR23 #070 S/W SK.0 DSS 63A RCVR AGC -123.9 FILE 10-1158 TS  
 SPACECRAFT ATTITUDE ON DAY 19 JAN 19, 1982 1830 GMT  
 SPIN PERIOD = 12.988888 SEC KILT = 7 HR 9 MIN 23.71 SEC

01/19/82

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3004 | 242.8229 |                |            |
| SUN             | 1.2248   | 7.7261   | -3.1350 | 244.0384 | 0.394458990 10 | 26.3675795 |
| EARTH           | 0.5810   | 170.3011 | -3.2024 | 242.2493 | 0.386188300 10 | 25.8147259 |
| JUPITER         | 62.8717  | 178.3069 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)       | 123.0063 | 233.0165 |         |          |                |            |
| BETELGEUSE(R)   | 148.1743 | 218.1309 |         |          |                |            |
| CANOPUS(B)      | 97.2651  | 260.5348 |         |          |                |            |
| ARCTURUS(K)     | 50.3750  | 134.5413 |         |          |                |            |
| RIGIL KENTAURUS | 36.4225  | 265.7435 |         |          |                |            |
| ANTARES(R)      | 7.6816   | 348.8631 |         |          |                |            |
| CAPELLA(R)      | 153.3619 | 131.1427 |         |          |                |            |
| VEGA(B)         | 72.5468  | 70.5497  |         |          |                |            |
| ALDEBARAN(R)    | 109.0271 | 233.0339 |         |          |                |            |
| RIGEL(B)        | 143.2005 | 250.3013 |         |          |                |            |
| GAMMA CRUCIS(R) | 50.0003  | 247.0267 |         |          |                |            |
| SPICA(B)        | 36.3189  | 179.2100 |         |          |                |            |
| ACHEKAD(B)      | 93.2801  | 299.9243 |         |          |                |            |
| DENEK(B)        | 93.9319  | 59.8525  |         |          |                |            |
| PRUCYON(B)      | 124.5349 | 202.0329 |         |          |                |            |

STAR DELAY: 3.6867 SEC 687.8010 PULSES DECIMAL = 10. COARSE + 48. FINE  
 74.4652 DEG 12 60 PULSES OCTAL CKAH SUB C = -1.3689 EPSILON= 9.0950 SCN=10

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PN 10 P 3613 PR23 #070 S/W SK.0 DSS 63P RCVR -128.7 FILE 10-1157 PS  
 SPACECRAFT ATTITUDE ON DAY 12 JAN 12, 1982 1930 GMT 0 2/82

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRHS = 0 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.4661 RCSPHAK = 249.5400  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.2146 CLON = 242.5716  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3172 CLON = 242.8270

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PN 10 PASS 3613 PR23 #070 S/W SK.0 DSS 63P RCVR AGC -128.7 FILE 10-1157 PS 01/12/82  
 SPACECRAFT ATTITUDE ON DAY 12 JAN 12, 1982 1930 GMT  
 SPIN PERIOD = 12.987600 SEC RTLT = 7 HR 6 MIN 54.70 SEC

| S/C +Z AXIS     | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| SUN             | 0.0000   | 0.0000   | -3.3172 | 242.8270 |                |            |
| EARTH           | 1.1870   | 8.7891   | -3.1351 | 244.0018 | 0.393660220 10 | 26.3141858 |
| JUPITER         | 6.4661   | 167.3015 | -3.2146 | 242.5716 | 0.383954770 10 | 25.6654258 |
| SIRIUS(B)       | 62.8763  | 178.2986 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| BETELGEUSE(R)   | 122.9955 | 233.0254 |         |          |                |            |
| CANOPUS(B)      | 148.1672 | 218.1565 |         |          |                |            |
| ARCTURUS(H)     | 97.2493  | 260.5359 |         |          |                |            |
| RIGIL KENTAURUS | 50.3899  | 134.5343 |         |          |                |            |
| ANTARES(R)      | 39.4061  | 265.7372 |         |          |                |            |
| CAPELLA(R)      | 2.6743   | 348.9970 |         |          |                |            |
| VEGA(B)         | 152.3773 | 131.1587 |         |          |                |            |
| ALDEBARAN(R)    | 72.5612  | 70.5529  |         |          |                |            |
| RIGEL(B)        | 160.0162 | 233.1032 |         |          |                |            |
| GAMMA CRUCIS(R) | 143.1861 | 250.3143 |         |          |                |            |
| SPICA(B)        | 49.9865  | 247.8182 |         |          |                |            |
| ACHERNAB(B)     | 39.3233  | 177.898  |         |          |                |            |
| DENEAB(B)       | 93.2635  | 299.9242 |         |          |                |            |
| PRUCYON(B)      | 93.9443  | 59.8519  |         |          |                |            |
|                 | 124.5319 | 202.0449 |         |          |                |            |

STAR DELAY: 2.6864 SEC 687.7256 PULSES DECIMAL = 10. COARSE + 48. FINE  
 74.4641 DEG 12 60 PULSES OCTAL CKAH SUB C = -0.4267 EPSILON = 9.2158 SCNE=10

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N 11 PAS PR14 #070 S/W SK.0 DSS 63A RCVR AGC .2 FILE 11-1370 CJ  
 SPACECRAFT ATTITUDE ON DAY 11 JAN 11, 1982 0800 GMT

01/11

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

PRE-PRECESSION

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGHRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.5927 RCSPHAK = 42.7157  
 SPACECRAFT-EARTH DIRECTION: CLAT = -13.1465 CLON = 37.7580  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -12.7732 CLON = 37.2856

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N 11 PASS 3211 PR14 #070 S/W SK.0 DSS 63A RCVR AGC -133.2 FILE 11-1370 CJ 01/11/82  
 SPACECRAFT ATTITUDE ON DAY 11 JAN 11, 1982 0800 GMT  
 SPIN PERIOD = 7.490995 SEC RTLT = 3 HR 11 MIN 59.90 SEC

|                 | CNA      | CKA      | CLAT     | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|----------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -12.7732 | 37.2856  | -              | -          |
| SUN             | 0.3629   | 189.2844 | -13.4397 | 32.8585  | 0.16897579D 10 | 11.2951731 |
| EARTH           | 0.5927   | 320.9042 | -13.1465 | 37.7580  | 0.17267891D 10 | 11.5427079 |
| JUPITER         | 140.8900 | 343.8079 | 0.0000   | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 63.8121  | 321.9125 |          |          |                |            |
| BETELGEUSE(R)   | 46.4892  | 349.7033 |          |          |                |            |
| CANOPUS(B)      | 72.1547  | 283.7284 |          |          |                |            |
| ARCTURUS(R)     | 158.1702 | 57.5789  |          |          |                |            |
| RIGIL KENTAURUS | 121.1151 | 251.3190 |          |          |                |            |
| ANTARES(R)      | 143.6886 | 206.5098 |          |          |                |            |
| CAPELLA(R)      | 58.0861  | 39.2511  |          |          |                |            |
| VEGA(B)         | 111.7303 | 116.1345 |          |          |                |            |
| ALDEBARAN(R)    | 32.5301  | 10.0028  |          |          |                |            |
| RIGEL(B)        | 46.4097  | 326.5389 |          |          |                |            |
| GAMMA CRUCIS(R) | 119.3939 | 270.6999 |          |          |                |            |
| SPICA(B)        | 159.8087 | 313.7097 |          |          |                |            |
| ACHERNAH(B)     | 60.4127  | 242.3704 |          |          |                |            |
| DENEK(B)        | 87.9428  | 116.3779 |          |          |                |            |
| PROCYON(B)      | 75.3074  | 346.5259 |          |          |                |            |

WARNING: ROLL REFERENCE BODY IS NEAR EDGE OF FOV OF STAR SENSOR  
 STAR DELAY: 1.0669 SEC 273.1189 PULSES DECIMAL = 4, COARSE + 17, FINE  
 57.2716 DEG 04 21 PULSES OCTAL CKAH SUB C = 189.2844 EPSILON= 0.0000 SCN=11

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PN 11 PASS 11 PRI4 #077 S/W SK 0 DSS 63A RCVR AGC 10.1 FILE 11-1371 TS  
SPACECRAFT ATTITUDE ON DAY 11 JAN 11, 1981 1630 GMT

01/11/82

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

NEW ATTITUDE  
POST-PRECESSION

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.2533 RCSPHAK = 22.0010  
SPACECRAFT-EARTH DIRECTION: CLAT = -13.1555 CLON = 37.7815  
SPACECRAFT +Z AXIS ATTITUDE: CLAT = -12.1939 CLON = 36.9576

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PN 11 PASS 3211 PRI4 #077 S/W SK 0 DSS 63A RCVR AGC -138.1 FILE 11-1371 TS  
SPACECRAFT ATTITUDE ON DAY 11 JAN 11, 1981 1630 GMT  
SPIN PERIOD = 7.486937 SEC RTLI = 3 HR 11 MIN 55.99 SEC

01/11/82

|                 | CNA      | CKA      | CLAT     | CLON     | R (KM)         | R (AU)     |
|-----------------|----------|----------|----------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -12.1939 | 36.9576  |                |            |
| SUN             | 4.1731   | 197.8508 | -13.4422 | 32.8736  | 0.16899790 10  | 11.2967174 |
| EARTH           | 1.2533   | 309.8029 | -13.1555 | 37.7815  | 0.172620330 10 | 11.5387421 |
| JUPITER         | 141.3570 | 344.3189 | 0.0000   | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 64.4220  | 321.7167 |          |          |                |            |
| BETELGEUSE(R)   | 48.9101  | 349.1991 |          |          |                |            |
| CANOPUS(B)      | 72.7935  | 283.7124 |          |          |                |            |
| ARCTURUS(K)     | 157.8461 | 58.9351  |          |          |                |            |
| RIGIL KENTAURUS | 121.5597 | 250.9495 |          |          |                |            |
| ANIARES(R)      | 143.6550 | 205.5399 |          |          |                |            |
| CAPELLA(R)      | 55.9505  | 38.7407  |          |          |                |            |
| VEGA(B)         | 111.0684 | 118.0674 |          |          |                |            |
| ALDEBARAN(R)    | 32.7506  | 8.9574   |          |          |                |            |
| RIGEL(B)        | 40.9974  | 326.1140 |          |          |                |            |
| GAMMA CRUCIS(R) | 119.9764 | 270.4497 |          |          |                |            |
| SPICA(B)        | 160.4481 | 314.1120 |          |          |                |            |
| ACHERRAK(B)     | 60.7786  | 242.6104 |          |          |                |            |
| DENEK(B)        | 87.2816  | 116.3053 |          |          |                |            |
| PRUCYON(B)      | 75.7547  | 348.3291 |          |          |                |            |

WARNING: ROLL REFERENCE BODY IS NEAR EDGE OF FOV OF STAR SENSOR  
STAR DELAY: 1.0666 SEC 273.0574 PULSES DECIMAL = 4, COARSE + 17, FINE  
51.2876 DEC 04 21 PULSES OCTAL CNAH SUB C = 197.8508 EPSILON = 0.0000 SCN=11

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IN 11 PAS 3211 PR14 4070 S/W SK.0 DSS 42A RCVR AGC 4.8 FILE 11-1372 BD  
 SPACECRAFT ATTITUDE ON DAY 11 JAN 12 1982 0000 GMT

01/11/82

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.1687 RCSPHAK = 203.0900  
 SPACECRAFT-EARTH DIRECTION: CLAT = -13.1634 CLON = 37.7815  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -14.2865 CLON = 38.1143

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IN 11 PASS 3211 PR14 4070 S/W SK.0 DSS 42A RCVR AGC -154.8 FILE 11-1372 BD  
 SPACECRAFT ATTITUDE ON DAY 11 JAN 12 1982 0000 GMT  
 SPIN PERIOD = 7.486957 SEC RTLT = 3 HR 11 MIN 52.54 SEC

01/11/82

|                 | RNA      | CKA      | CLAT     | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|----------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -14.2865 | 38.1143  | -              | -          |
| SUN             | 2.1443   | 171.2131 | -13.4445 | 32.8869  | 0.16902096D 10 | 11.2981925 |
| EARTH           | 1.1687   | 106.1001 | -13.1634 | 37.7815  | 0.17256864D 10 | 11.5353369 |
| JUPITER         | 136.6806 | 342.5387 | 0.0000   | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 62.2478  | 322.4634 |          |          |                |            |
| BETELGEUSE(R)   | 48.4421  | 351.0788 |          |          |                |            |
| CANOPUS(B)      | 70.4933  | 283.7794 |          |          |                |            |
| ARCTURUS(R)     | 158.9678 | 53.9030  |          |          |                |            |
| RIGIL KENTAURUS | 119.9296 | 252.2431 |          |          |                |            |
| ANTARES(R)      | 147.6964 | 209.0372 |          |          |                |            |
| CAPELLA(R)      | 56.4189  | 40.5664  |          |          |                |            |
| VEGA(B)         | 113.4447 | 118.3309 |          |          |                |            |
| ALDEBARAN(R)    | 33.0393  | 12.7970  |          |          |                |            |
| RIGEL(B)        | 38.9117  | 327.7387 |          |          |                |            |
| GAMMA CRUCIS(R) | 117.8667 | 271.3190 |          |          |                |            |
| SPICA(B)        | 158.1541 | 312.7345 |          |          |                |            |
| ACHERNAK(B)     | 59.4534  | 241.7417 |          |          |                |            |
| DENEK(B)        | 89.6566  | 110.5723 |          |          |                |            |
| PROCYON(B)      | 71.1773  | 347.0715 |          |          |                |            |

STAR DELAY: 7.0652 SEC 272.7007 PULSES DECIMAL = 4, COARSE + 17, FINE  
 51.2206 DEG 04 21 PULSES OCTAL CKAH SUB C = 171.2131 EPSILON= 0.0000 SCN=11

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PN 10 PASS 1986 PR23 #00/00 S/W H.5 DSS 14A RCVR AGC -122.23 FILE 10-881 JOR  
 SPACECRAFT ATTITUDE ON DAY 216 JUL 4, 1977 1900 GMT

08/05/77

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.5874 RCSPHAK = 102.6700  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.0153 CLON = 231.6306  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.1392 CLON = 231.0556

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PN 10 PASS 1986 PR23 #00/00 S/W H.5 DSS 14A RCVR AGC -122.23 FILE 10-881 JOR  
 SPACECRAFT ATTITUDE ON DAY 216 JUL 4, 1977 1900 GMT  
 SPIN PERIOD = 12.794630 SEC RTLT = 3 HR 47 MIN 37.80 SEC

08/05/77

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.1392 | 231.0556 | -              | -          |
| SUN             | 3.6834   | 178.6419 | -3.0455 | 227.3681 | 0.202712280 10 | 13.5502861 |
| EARTH           | 0.5874   | 12.1606  | -3.0153 | 231.6306 | 0.204725230 10 | 13.6848416 |
| JUPITER         | 19.6933  | 184.7691 | -4.5618 | 211.3684 | 0.143359970 10 | 9.5828857  |
| SIRIUS(B)       | 115.5731 | 227.2186 |         |          |                |            |
| BETELGEUSE(R)   | 138.4095 | 208.5834 |         |          |                |            |
| CANOPUS(B)      | 95.2881  | 258.5930 |         |          |                |            |
| ARCTURUS(R)     | 42.6681  | 125.4006 |         |          |                |            |
| RIGIL KENTAUROS | 40.1037  | 279.2637 |         |          |                |            |
| ANTARES(R)      | 18.3568  | 354.9571 |         |          |                |            |
| CAPELLA(R)      | 144.5396 | 143.5768 |         |          |                |            |
| VEGA(B)         | 76.6793  | 66.6470  |         |          |                |            |
| ALDEBARAN(R)    | 159.7321 | 205.0923 |         |          |                |            |
| RIGEL(B)        | 138.0517 | 236.6672 |         |          |                |            |
| GAMMA CRUCIS(R) | 46.4438  | 256.4235 |         |          |                |            |
| SPICA(B)        | 27.5695  | 178.4219 |         |          |                |            |
| ACHERNAR(B)     | 99.1386  | 298.1480 |         |          |                |            |
| DENEK(B)        | 99.6586  | 60.4171  |         |          |                |            |
| PROCYON(B)      | 113.5795 | 198.9903 |         |          |                |            |

STAR DELAY: 2.7071 SEC 693.0083 PULSES DECIMAL = 10, COARSE + 53. FINE  
 76.4070 DEG 12 65 PULSES CTAL CKAN SUB C = 174.1159 EPSILON = 4.5260 SCN=10

PN 10 PASS 1994 PR23 #00/00 S/W SH,3 DSS63A RCVR AGC -123.08 FILE 10- 882 SLG  
 SPACECRAFT ATTITUDE ON DAY 224 AUG 12,1977 0600 GMT

08/13/77

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.7420 RCSPHAK = 97.2536  
 SPACECRAFT-EARTH DIPECTION: CLAT = -3.0447 CLON = 231.8126  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.1271 CLON = 231.0741

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PN 10 PASS 1994 PR23 #00/00 S/W SH,3 DSS63A RCVR AGC -123.08 FILE 10- 882 SLG  
 SPACECRAFT ATTITUDE ON DAY 224 AUG 12,1977 0600 GMT  
 SPIN PERIOD = 12.755970 SEC RTLT = 3 HR 46 MIN 34.43 SEC

08/13/77

|                 | RA       | DEC      | CLAT    | CLON     | R (KM)         | R (AU)     |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.1271 | 231.0741 | -              | -          |
| SUN             | 3.5278   | 178.8016 | -3.0475 | 227.5421 | 0.203605650 10 | 13.6100033 |
| EARTH           | 0.7420   | 6.3546   | -3.0447 | 231.8126 | 0.203775440 10 | 13.6213529 |
| JUPITER         | 19.6535  | 184.7290 | -4.5346 | 211.4262 | 0.144679320 10 | 9.6710775  |
| SIRIUS(B)       | 115.5945 | 227.2222 |         |          |                |            |
| BETELGEUSE(R)   | 138.4315 | 208.5824 |         |          |                |            |
| CANOPUS(B)      | 95.3036  | 258.5955 |         |          |                |            |
| ARCTURUS(R)     | 42.6690  | 125.4256 |         |          |                |            |
| RIGTL KENTAUROS | 40.1127  | 279.2408 |         |          |                |            |
| ANTARES(R)      | 18.3394  | 354.9169 |         |          |                |            |
| CAPELLA(F)      | 144.5472 | 143.5487 |         |          |                |            |
| VEGA(B)         | 76.6609  | 66.8509  |         |          |                |            |
| ALDEBARAN(R)    | 159.7539 | 205.0848 |         |          |                |            |
| RIGEL(B)        | 138.0719 | 236.6779 |         |          |                |            |
| GAMMA CRUCIS(R) | 46.4599  | 256.4101 |         |          |                |            |
| SPICA(B)        | 27.5876  | 178.4470 |         |          |                |            |
| ACHERNAR(B)     | 99.1405  | 298.1525 |         |          |                |            |
| DENEK(B)        | 99.6390  | 60.4164  |         |          |                |            |
| PROPYON(B)      | 113.6009 | 198.9889 |         |          |                |            |

STAG DELAY: 2.7073 SEC 693.0587 PULSE- DECIMAL = 10. COARSE + 53. FINE  
 76.4045 DEG 12 65 PULSES OCTAL CKAH SUB C = 174.1237 EPSILON= 4.6782 SCN=10

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PN 10 PASS 2001 PR23 #00/00 S/W SH,3 DSS148 RCVR AGC -120,4 FILE 10- 883 MID  
 SPACECRAFT ATTITUDE ON DAY 231 AUG 19,1977 1200 GMT

08/19/77

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,8535 RCSPHAK = 95,3366  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3,0738 CLON = 231,9261  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3,1345 CLON = 231,0735

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 PN 10 PASS 2001 PR23 #00/00 S/W SH,3 DSS148 RCVR AGC -120,4 FILE 10- 883 MID  
 SPACECRAFT ATTITUDE ON DAY 231 AUG 19,1977 1200 GMT  
 SPIN PERIOD = 12,757320 SEC RTLT = 3 HR 45 MIN 32,06 SEC

08/19/77

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -3,1345 | 231,0735 | -              | -          |
| SUN             | 3,3843   | 178,6496 | -3,0493 | 227,6852 | 0,20447408D 10 | 13,6680535 |
| EARTH           | 0,8535   | 4,0575   | -3,0738 | 231,9261 | 0,20284047D 10 | 13,5588549 |
| JUPITER         | 51,1427  | 177,4713 | 0,0000  | 180,0000 | 0,00000000     | 0,0000000  |
| SIRIUS(B)       | 115,5887 | 227,2243 |         |          |                |            |
| BETELGEUSE(R)   | 138,4274 | 208,5893 |         |          |                |            |
| CANOPUS(B)      | 95,2963  | 258,5955 |         |          |                |            |
| ARCTURUS(R)     | 42,6746  | 125,4203 |         |          |                |            |
| RIGIL KENTAURUS | 40,1056  | 279,2429 |         |          |                |            |
| ANTARES(R)      | 18,3394  | 354,9392 |         |          |                |            |
| CAPPELLA(R)     | 144,5511 | 143,5576 |         |          |                |            |
| VEGA(B)         | 76,6679  | 66,8515  |         |          |                |            |
| ALDEBARAN(R)    | 159,7502 | 205,1021 |         |          |                |            |
| RIGEL(B)        | 138,0654 | 236,6818 |         |          |                |            |
| GAMMA CRUCIS(R) | 46,4526  | 256,4091 |         |          |                |            |
| SPIKA(B)        | 27,5872  | 178,4328 |         |          |                |            |
| ACHERNAR(B)     | 99,1343  | 298,1518 |         |          |                |            |
| DENEBO(B)       | 99,6457  | 60,4159  |         |          |                |            |
| PROCVON(B)      | 113,5079 | 198,9919 |         |          |                |            |

STAR DELAY: 2,7875 SEC 693,1317 PULSES DECIMAL = 10, COARSE + 53, FINE  
 16,4000 SEC 12 65 PULSES OCTAL CKAM SUB C = 173,819 EPSILON = 4,8300 SCNR10  
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PN 10 PASS 2007 PR23 #00/00 S/W SH,3 DSS63A RCVR AGC =122,23 FILE 10= 884 MID 08/25/77  
 SPACECRAFT ATTITUDE ON DAY 237 AUG 25,1977 0400 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRR8 = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,9065 RCSPHAK = 93,2529  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3,0965 CLON = 231,9707  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3,1390 -CLON = 231,0639

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PN 10 PASS 2007 PR23 #00/00 S/W SH,3 DSS63A RCVR AGC =122,23 FILE 10= 884 MID 08/25/77  
 SPACECRAFT ATTITUDE ON DAY 237 AUG 25,1977 0400 GMT  
 SPIN PERIOD = 12,758290 SEC RTLT = 3 HR 44 MIN 43,97 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -3,1390 | 231,0639 | =              | =          |
| SUN             | 3,2640   | 178,5387 | -3,0507 | 227,7963 | 0,20515286D 10 | 13,7134265 |
| EARTH           | 0,9065   | 2,6667   | -3,0965 | 231,9707 | 0,20211967D 10 | 13,5106731 |
| JUPITER         | 19,5364  | 184,5769 | -4,4881 | 211,5300 | 0,14697664D 10 | 9,8246417  |
| SIRIUS(B)       | 115,5789 | 227,2219 |         |          |                |            |
| BETELGEUSE(R)   | 138,4169 | 208,5881 |         |          |                |            |
| CANOPUS(B)      | 95,2899  | 258,5942 |         |          |                |            |
| ARCTURUS(R)     | 42,6727  | 125,4085 |         |          |                |            |
| RIGIL KENTAURUS | 40,1026  | 279,2545 |         |          |                |            |
| ANTARES(R)      | 18,3486  | 354,9548 |         |          |                |            |
| CAPELLA(R)      | 144,5461 | 143,5701 |         |          |                |            |
| VEGA(B)         | 76,6759  | 66,8493  |         |          |                |            |
| ALDEBARAN(R)    | 159,7396 | 205,1017 |         |          |                |            |
| RIGEL(B)        | 138,0564 | 236,6752 |         |          |                |            |
| GAMMA CRUCIS(R) | 46,4459  | 256,4163 |         |          |                |            |
| SPICA(B)        | 27,5777  | 178,4231 |         |          |                |            |
| ACKERNAR(B)     | 99,1348  | 298,1496 |         |          |                |            |
| DENEK(B)        | 99,6544  | 60,4164  |         |          |                |            |
| PROCYON(B)      | 113,5874 | 198,9918 |         |          |                |            |

STAR DELAY: 2,7078 SEC 693,1963 PULSES DECIMAL = 10, COARSE + 53, FINE  
 76,4058 DEG 12 65 PULSES OCTAL CKAH SUB C = 173,5723 EPSILON= 4,9664 SCN=10

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PN 10 PASS 2015 PR23 #00/00 S/W SH,3 DSS14A RCVR AGC =144.50 FILE 10-885  
SPACECRAFT ATTITUDE ON DAY 245 SEP 2,1977 1400 GMT

MID

09/02/77

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.9033 RCSPHAK = 91.3426  
SPACECRAFT-EARTH DIRECTION: CLAT = -3.1297 CLON = 231.9657  
SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.1345 CLON = 231.0610

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PN 10 PASS 2015 PR23 #00/00 S/W SH,3 DSS14A RCVR AGC =144.50 FILE 10-885  
SPACECRAFT ATTITUDE ON DAY 245 SEP 2,1977 1400 GMT  
SPIN PERIOD = 12,759880 SEC RTLT = 3 HR 43 MIN 35.59 SEC

MID

09/02/77

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.1345 | 231.0610 | -              | -          |
| SUN             | 3.0977   | 178.5737 | -3.0528 | 227.9599 | 0.20616103D 10 | 13.7808175 |
| EARTH           | 0.9033   | 0.2760   | -3.1297 | 231.9657 | 0.20109466D 10 | 13.4421564 |
| JUPITER         | 19.4624  | 184.5127 | -4.4582 | 211.6002 | 0.14848193D 10 | 9.9252627  |
| SIRIUS(B)       | 115.5803 | 227.2193 |         |          |                |            |
| BETELGEUSE(R)   | 138.4165 | 208.5819 |         |          |                |            |
| CANOPUS(B)      | 95.2938  | 258.5937 |         |          |                |            |
| ARCTURUS(R)     | 42.6674  | 125.4087 |         |          |                |            |
| RIGYL KENTAURUS | 40.1076  | 279.2568 |         |          |                |            |
| ANTARES(R)      | 18.3518  | 354.9417 |         |          |                |            |
| CAPELLA(R)      | 144.5411 | 143.5672 |         |          |                |            |
| VEGA(B)         | 76.6728  | 66.8481  |         |          |                |            |
| ALDEBARAN(R)    | 159.7390 | 205.0871 |         |          |                |            |
| RIGFL(B)        | 138.0586 | 236.6696 |         |          |                |            |
| GAMMA CRUCIS(R) | 46.4497  | 256.4199 |         |          |                |            |
| SPICA(B)        | 27.5748  | 178.4315 |         |          |                |            |
| ACHERNAR(B)     | 99.1402  | 298.1494 |         |          |                |            |
| DENEVB(B)       | 99.6518  | 60.4170  |         |          |                |            |
| PROCYON(B)      | 113.5861 | 198.9894 |         |          |                |            |

STAR DELAY: 2.7082 SEC 693.2872 PULSES DECIMAL = 10, COARSE + 53, FINE  
76.4063 DEG 12 65 PULSES OCTAL CKAH SUB C = 173.4042 EPSILON = 5.1695 SON = 10

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PN 10 PASS 2022 PR23 #00/00 S/W SH.3 DSS63A RCVR AGC -123.96 FILE 10-886  
 SPACECRAFT ATTITUDE ON DAY 252 SEP 9, 1977 0300 GMT

MID

09/09/77

ROLI REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLI REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPITUDE AND PHASE ANGLE: RCSANGAK = 0.8152 RCSPHAK = 89.0650  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.1549 CLON = 231.9038  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.1209 CLON = 231.0881

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PN 10 PASS 2022 PR23 #00/00 S/W SH.3 DSS63A RCVR AGC -123.96 FILE 10-886  
 SPACECRAFT ATTITUDE ON DAY 252 SEP 9, 1977 0300 GMT  
 SPIN PERIOD = 12.761100 SEC RTLT = 3 HR 42 MIN 46.46 SEC

MID

09/09/77

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.1209 | 231.0881 | -              | -          |
| SUN             | 2.9986   | 178.8109 | -3.0544 | 208.0859 | 0.20694462D 10 | 13.8331965 |
| EARTH           | 0.8152   | 357.5893 | -3.1549 | 231.9038 | 0.20635820D 10 | 13.3929278 |
| JUPITER         | 19.4335  | 184.4869 | -4.4352 | 211.6560 | 0.14665639D 10 | 10.0037694 |
| SIRIUS(B)       | 115.6086 | 227.2259 |         |          |                |            |
| BETELGEUSE(R)   | 138.4468 | 208.5846 |         |          |                |            |
| CANOPUS(B)      | 95.3125  | 258.5974 |         |          |                |            |
| ARCTURUS(R)     | 42.6720  | 125.4426 |         |          |                |            |
| RIGIL KENTAURUS | 40.1166  | 279.2240 |         |          |                |            |
| ANTARES(R)      | 18.3260  | 354.8952 |         |          |                |            |
| CAPPELLA(R)     | 144.5548 | 143.5308 |         |          |                |            |
| VEGA(B)         | 76.6497  | 66.8542  |         |          |                |            |
| ALORBARAN(R)    | 159.7692 | 205.0863 |         |          |                |            |
| RIGEL(B)        | 138.0848 | 236.6879 |         |          |                |            |
| GAMMA CRUCIS(R) | 46.4692  | 256.3996 |         |          |                |            |
| SPICA(B)        | 27.6015  | 178.4604 |         |          |                |            |
| ACHERNAR(B)     | 99.1394  | 298.1558 |         |          |                |            |
| DENEB(B)        | 99.6267  | 60.4156  |         |          |                |            |
| PROCYON(B)      | 113.6161 | 198.9891 |         |          |                |            |

STAR DELAY: 2.7083 SEC 693,3200 PULSES DECIMAL = 10, COARSE + 53, FINE  
 76.4026 DEG 12 65 PULSES OCTAL CKAN SUR C = 173.5116 EPSILON = 5.2490 SOL = 10

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PN 10 PASS 2029 PR23 #00/00 S/W H.3 DSS 63A RCVR AGC -122.23 FILE 10-887 JOR  
SPACECRAFT ATTITUDE ON DAY 259 SEP 16,1977 0200 GMT

09/16/77

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.7243 RCSPHAK = 86.6650  
SPACECRAFT-EARTH DIRECTION: CLAT = -3.1805 CLON = 231.7836  
SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.1138 CLON = 231.0613

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PN 10 PASS 2029 PR23 #00/00 S/W H.3 DSS 63A RCVR AGC -122.23 FILE 10-887 JOR  
SPACECRAFT ATTITUDE ON DAY 259 SEP 16,1977 0200 GMT  
SPIN PERIOD = 12.762320 SEC RTLT = 3 HR 41 MIN 59.73 SEC

09/16/77

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.1138 | 231.0613 | -              | -          |
| SUN             | 2.8388   | 178.9127 | -3.0561 | 228.2189 | 0.20777811D 10 | 13.8889111 |
| EARTH           | 0.7243   | 354.6936 | -3.1805 | 231.7836 | 0.19965781D 10 | 13.3461103 |
| JUPITER         | 19.3457  | 184.4506 | -4.4115 | 211.7167 | 0.15090990D 10 | 10.0875602 |
| SIRIUS(B)       | 115.5957 | 227.2127 |         |          |                |            |
| BETELGEUSE(R)   | 138.4267 | 208.5616 |         |          |                |            |
| CANOPUS(B)      | 95.3142  | 258.5934 |         |          |                |            |
| ARCTURUS(R)     | 42.6506  | 125.4220 |         |          |                |            |
| RIGIL KENTAURUS | 40.1280  | 279.2525 |         |          |                |            |
| ANTARES(R)      | 18.3534  | 354.8794 |         |          |                |            |
| CAPPELLA(R)     | 144.5290 | 143.5436 |         |          |                |            |
| VEGA(B)         | 76.6536  | 66.8462  |         |          |                |            |
| ALDEBARAN(R)    | 159.7480 | 205.0366 |         |          |                |            |
| RIGEL(B)        | 138.0761 | 236.6572 |         |          |                |            |
| GAMMA CRUCIS(R) | 46.4699  | 256.4242 |         |          |                |            |
| SPICA(B)        | 27.5745  | 178.4712 |         |          |                |            |
| ACHERNAR(B)     | 99.1583  | 298.1510 |         |          |                |            |
| DENEVB(B)       | 99.6337  | 60.4187  |         |          |                |            |
| PROCYON(B)      | 113.5931 | 198.9809 |         |          |                |            |

STAR DELAY: 2.7087 SEC 693.4229 PULSES DECIMAL = 10, COARSE + 53, FINE  
76.4066 DEG 12 65 PULSES OCTAL CKAH SUB C = 173.3905 EPSILON = 5.5221 SCNB10

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PN 10 PASS 2036 PR23 #00/00 S/W SH.3 DSS14A RCVR AGC -121.32 FILE 10-888 MID  
SPACECRAFT ATTITUDE ON DAY 266 SEP 23,1977 1400 GMT

09/24/77

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.5407 RCSPHAK = 83.3730  
SPACECRAFT-EARTH DIRECTION: CLAT = -3.2063 CLON = 231.5944  
SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.1290 CLON = 231.0584

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PN 10 PASS 2036 PR23 #00/00 S/W SH.3 DSS14A RCVR AGC -121.32 FILE 10-888 MID  
SPACECRAFT ATTITUDE ON DAY 266 SEP 23,1977 1400 GMT  
SPIN PERIOD = 12.763660 SEC RTLT = 3 HR 41 MIN 17.64 SEC

09/24/77

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.1290 | 231.0584 | =              | =          |
| SUN             | 2.6943   | 178.5589 | -3.0578 | 228.3611 | 0.20867646D 10 | 13.9489612 |
| EARTH           | 0.5407   | 351.7715 | -3.2063 | 231.5944 | 0.19902687D 10 | 13.3039352 |
| JUPITER         | 19.2737  | 184.3388 | -4.3851 | 211.7835 | 0.15226587D 10 | 10.1781999 |
| SIRIUS(B)       | 115.5825 | 227.2165 |         |          |                |            |
| BETELGEUSE(R)   | 138.4169 | 208.5750 |         |          |                |            |
| CANOPUS(B)      | 95.2986  | 258.5932 |         |          |                |            |
| ARCTURUS(R)     | 42.6614  | 125.4097 |         |          |                |            |
| RIGIL KENTAURUS | 40.1134  | 279.2587 |         |          |                |            |
| ANTARES(R)      | 18.3549  | 354.9259 |         |          |                |            |
| CAPELLA(R)      | 144.5358 | 143.5631 |         |          |                |            |
| VEGA(B)         | 76.6688  | 66.8469  |         |          |                |            |
| ALDEBARAN(R)    | 159.7389 | 205.0706 |         |          |                |            |
| RIGEL(B)        | 138.0617 | 236.6637 |         |          |                |            |
| GAMMA CRUCIS(R) | 46.4544  | 256.4233 |         |          |                |            |
| SPICA(B)        | 27.5720  | 178.4417 |         |          |                |            |
| ACHERNAR(B)     | 99.1462  | 298.1493 |         |          |                |            |
| DENEK(B)        | 99.6484  | 60.4177  |         |          |                |            |
| PROCYON(B)      | 113.5855 | 198.9866 |         |          |                |            |

STAR DELAY: 2.7090 SEC 693.4969 PULSES DECIMAL = 10. COARSE + 53. FINE  
76.4068 DEG 12-65 PULSES OCTAL CKAH SUB C = 172.8188 EPSILON = 5.7401 SCN#10  
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PN 10 PASS 2043 PR23 #00/00 S/W SH.3 DSS14B RCVR AGC -120.40 FILE 10-889 MID  
SPACECRAFT ATTITUDE CN DAY 273 SEP 29,1977 0600 GMT

09/30/77

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C,

REFERENCE FOR RCSPFAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,3279 RCSPFAK = 73,5005

SPACECRAFT-EARTH DIRECTION: CLAT = -3,2242 CLON = 231,4136

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3,1192 CLON = 231,1025

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PN 10 PASS 2043 PR23 #00/00 S/W SH.3 DSS14B RCVR AGC -120.40 FILE 10-889 MID  
SPACECRAFT ATTITUDE CN DAY 273 SEP 29,1977 0600 GMT  
SPIN PERIOD = 12.764890 SEC RLTL = 3 HR 40 MIN 52.60 SEC

09/30/77

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -3,1192 | 231,1025 | -              | -          |
| SUN             | 2,6317   | 178,7636 | -3,0591 | 228,4677 | 0,209355210 10 | 13,9943322 |
| EARTH           | 0,3279   | 341,3170 | -3,2242 | 231,4136 | 0,198651560 10 | 13,2788476 |
| JUPITER         | 19,2661  | 184,3094 | -4,3658 | 211,8350 | 0,153293680 10 | 10,2469037 |
| SIRIUS(B)       | 115,6196 | 227,2312 |         |          |                |            |
| BETELGEUSE(R)   | 138,4603 | 208,5914 |         |          |                |            |
| CANOPUS(B)      | 95,3170  | 258,5995 |         |          |                |            |
| ARCTURUS(R)     | 42,6790  | 125,4572 |         |          |                |            |
| RIGIL KENTAURUS | 40,1160  | 279,2076 |         |          |                |            |
| ANTARES(R)      | 18,3119  | 354,8870 |         |          |                |            |
| CAPELLA(R)      | 144,5654 | 143,5176 |         |          |                |            |
| VEGA(B)         | 76,6425  | 66,8580  |         |          |                |            |
| ALDEBARAN(R)    | 159,7830 | 205,0995 |         |          |                |            |
| RIGEL(B)        | 138,0941 | 236,7011 |         |          |                |            |
| GAMMA CRUCIS(R) | 46,4743  | 256,3872 |         |          |                |            |
| SPICA(B)        | 27,6158  | 178,4652 |         |          |                |            |
| ACHERNAR(B)     | 99,1341  | 298,1587 |         |          |                |            |
| DENEK(B)        | 99,6181  | 60,4144  |         |          |                |            |
| PROCYON(B)      | 113,6303 | 198,9913 |         |          |                |            |

STAR DELAY: 2,7090 SEC 693,5072 PULSES DECIMAL = 10, COARSE + 54, FINE  
76,4005 DEG 12 66 PULSES OCTAL CKAH SUB C = 172,9239 EPSILON = 5,8397 SCN#10

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PN 10 PASS 2050 PR23 #00/00 S/W SH.3 DSS 638 RCVR AGC-122.23 FILE 10-890 RVK  
 SPACECRAFT ATTITUDE ON DAY 280 OCT 7,1977 0100 GMT

10/07/77

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.1821 RCSPHAK = 359.9620  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.2462 CLON = 231.1169  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.0641 CLON = 231.1176

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PN 10 PASS 2050 PR23 #00/00 S/W SH.3 DSS 638 RCVR AGC-122.23 FILE 10-890 RVK  
 SPACECRAFT ATTITUDE ON DAY 280 OCT 7,1977 0100 GMT  
 SPIN PERIOD = 12.766110 SEC RTLT = 3 HR 40 MIN 29.16 SEC

10/07/77

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.0641 | 231.1176 | -              | -          |
| SUN             | 2.5008   | 179.9932 | -3.0609 | 228.6132 | 0.210288460 10 | 14.0567152 |
| EARTH           | 0.1821   | 269.7988 | -3.2462 | 231.1169 | 0.198300120 10 | 13.2553556 |
| JUPITER         | 19.2120  | 184.3962 | -4.3394 | 211.9070 | 0.154711530 10 | 10.3416798 |
| SIRIUS(B)       | 115.6702 | 227.2193 |         |          |                |            |
| BETELGEUSE(R)   | 138.4998 | 208.5457 |         |          |                |            |
| CANOPUS(B)      | 95.3739  | 258.6006 |         |          |                |            |
| ARCTURUS(R)     | 42.6428  | 125.5059 |         |          |                |            |
| RIGIL KENTAURUS | 40.1680  | 279.1804 |         |          |                |            |
| ANTARES(R)      | 18.3019  | 354.7179 |         |          |                |            |
| CAPELLA(R)      | 144.5446 | 143.4437 |         |          |                |            |
| VEGA(B)         | 76.5859  | 66.8509  |         |          |                |            |
| ALDEBARAN(R)    | 159.8199 | 204.9820 |         |          |                |            |
| RIGEL(B)        | 138.1484 | 236.6821 |         |          |                |            |
| GAMMA CRUCIS(R) | 46.5313  | 256.3865 |         |          |                |            |
| SPICA(B)        | 27.6294  | 178.5719 |         |          |                |            |
| ACHERNAR(B)     | 99.1756  | 298.1658 |         |          |                |            |
| DENEK(B)        | 99.5628  | 60.4176  |         |          |                |            |
| PROCYON(B)      | 113.6624 | 198.9714 |         |          |                |            |

STAR DELAY: 2.7092 SEC 093.5628 PULSES DECIMAL = 10. COARSE + 54. FINE  
 76.3994 DEG 12 66 PULSES OCTAL CKAH SUB C = 173.9353 EPSILON= 6.0580 SCN=10

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PN 10 PASS 063 PR23 #00/00 S/W SH.3 DSS14A RCVR AGC -122.2 FILE 10-891 MID 10/21/77  
 SPACECRAFT ATTITUDE ON DAY 293 OCT 20, 1977 0800 GMT

POLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

POLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: PCSANGAK = 0.7133 RCSPHAK = 288.5900

SPACECRAFT-EARTH DEFLECTION: CLAT = -3.2755 CLON = 230.5033

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.0509 CLON = 231.1814

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PN 10 PASS 2063 PR23 #00/00 S/W SH.3 DSS14A RCVR AGC -122.2 FILE 10-891 MID 10/21/77  
 SPACECRAFT ATTITUDE ON DAY 293 OCT 20, 1977 0800 GMT  
 SPIN PERIOD = 12.768550 SEC RTIT = 3 HR 40 MIN 23.47 SEC

|                  | CMA      | CKA      | CLAT    | CLON     | R (KM)         | R (AU)     |
|------------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS      | 0.0000   | 0.0000   | -3.0509 | 231.1814 | -              | -          |
| SUN              | 2.3107   | 180.3819 | -3.0638 | 228.8584 | 0.211880390 10 | 14.1631277 |
| EARTH            | 0.7133   | 198.3685 | -3.2755 | 230.5033 | 0.198214930 10 | 13.2496611 |
| JUPITER          | 19.1482  | 184.3097 | -4.2951 | 212.0336 | 0.157142330 10 | 10.5041664 |
| SITIOS (R)       | 115.7233 | 277.2409 |         |          |                |            |
| RETEL CRUSE (R)  | 130.5621 | 208.5704 |         |          |                |            |
| CANCORUS (R)     | 95.3995  | 258.6097 |         |          |                |            |
| ARCTOPUS (R)     | 42.6691  | 125.5740 |         |          |                |            |
| PIGIL KENTAURUS  | 40.1709  | 270.1068 |         |          |                |            |
| ANTARES (R)      | 18.2397  | 354.6635 |         |          |                |            |
| CAPELLA (R)      | 144.5879 | 143.3788 |         |          |                |            |
| VEGA (R)         | 76.5487  | 66.8731  |         |          |                |            |
| ALDEBARAN (R)    | 150.8833 | 205.0261 |         |          |                |            |
| RIGEL (R)        | 138.1945 | 236.7370 |         |          |                |            |
| GAMMA CRUCIS (R) | 46.5592  | 256.3342 |         |          |                |            |
| SPICA (R)        | 27.6928  | 178.6036 |         |          |                |            |
| ACHEFNAR (R)     | 99.1572  | 298.1773 |         |          |                |            |
| DENERB (R)       | 92.5198  | 60.4128  |         |          |                |            |
| PROCYON (R)      | 113.7270 | 198.9784 |         |          |                |            |

STAR DELAY: 2.7094 SEC 693.6182 PULSES DECIMAL = .10. COARSE + 54. FINE  
 76.3903 PFG --- 12 66 PULSES OCTAL CKAH SUB C = 173.9976 FPSILON = 6.3843 SCN=10

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PN 10 PASS 2067 PR23 400/00 S/W H.3 DSS 43A RCVR AGC - FILE 10-892 JOR 10/25/77  
 SPACECRAFT ATTITUDE ON DAY 297 OCT 24,1977 1600 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.  
 REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGPRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.9583 RCSPHAK = 286.4800  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.2824 CLON = 230.2812  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.9963 CLON = 231.1971

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PN 10 PASS 2067 PR23 400/00 S/W H.3 DSS 43A RCVR AGC - FILE 10-892 JOR 10/25/77  
 SPACECRAFT ATTITUDE ON DAY 297 OCT 24,1977 1600 GMT  
 SPIN PERIOD = 12.769400 SEC RTLT = 3 HR 40 MIN 32.02 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -2.9963 | 231.1971 | -              | -          |
| SUN             | 2.2575   | 181.7976 | -3.0648 | 228.9376 | 0.21239937D 10 | 14.1978189 |
| EARTH           | 0.9583   | 197.3928 | -3.2824 | 230.2812 | 0.19834301D 10 | 13.2562226 |
| JUPITER         | 19.1253  | 184.4275 | -4.2808 | 212.0757 | 0.15793809D 10 | 10.5573590 |
| SIRIUS(R)       | 115.7740 | 227.2294 |         |          |                |            |
| BETELGEUSE(R)   | 138.6020 | 208.5254 |         |          |                |            |
| CANOPUS(B)      | 95.4561  | 258.6110 |         |          |                |            |
| ARCTURUS(R)     | 42.6339  | 125.6232 |         |          |                |            |
| RIGIL KENTAURUS | 40.2223  | 279.0790 |         |          |                |            |
| ANTARES(R)      | 18.2292  | 354.4949 |         |          |                |            |
| CAPELLA(R)      | 144.5680 | 143.3049 |         |          |                |            |
| VEGA(R)         | 76.4923  | 66.8722  |         |          |                |            |
| ALDEBARAN(R)    | 159.9206 | 204.9098 |         |          |                |            |
| RIGEL(B)        | 138.2487 | 236.7190 |         |          |                |            |
| GAMMA CRUCIS(R) | 46.6160  | 256.3328 |         |          |                |            |
| SPICA(B)        | 27.7072  | 178.7090 |         |          |                |            |
| ACHERNAR(B)     | 99.1979  | 298.1866 |         |          |                |            |
| DENER(B)        | 99.4646  | 60.4159  |         |          |                |            |
| PROCYON(B)      | 113.7596 | 196.9588 |         |          |                |            |

STAR DELAY: 2.7096 SEC 693.6479 PULSES DECIMAL = 10, COARSE + 54, FINE  
 76.3890 DEG 12 66 PULSES OCTAL CKAH SUB C = 175.2942 EPSILON= 6.5034 SCN=10

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PN 10 PASS 2069 PR23 400/00 S/W F.3 DSS 148 RCVR AGC -120.46 FILE 10-893 JAF  
 SPACECRAFT ATTITUDE ON DAY 299 OCT 26, 1977 0800 GMT

10/27/77

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR HOSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

*PRE-Precession*

ROLL REFERENCE PARAMETERS: ASPSGRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.0059 HCSPHAK = 285.2600  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.2847 CLON = 230.1917  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.0053 CLON = 231.1595

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 PN 10 PASS 2069 PR23 400/00 S/W F.3 DSS 148 RCVR AGC -120.46 FILE 10-893 JAF  
 SPACECRAFT ATTITUDE ON DAY 299 OCT 26, 1977 0800 GMT  
 SPIN PERIOD = 12.769650 SEC RTLT = 3 HR 40 MIN 36.75 SEC

10/27/77

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.0053 | 231.1595 | -              | -          |
| SUN             | 2.1833   | 181.0270 | -3.0651 | 228.9740 | 0.212598970 10 | 14.2111611 |
| EARTH           | 1.0059   | 196.1463 | -3.2847 | 230.1917 | 0.198413880 10 | 13.2629599 |
| JUPITER         | 19.0705  | 184.3939 | -4.2753 | 212.0921 | 0.158244590 10 | 10.5778469 |
| SIRIUS(B)       | 115.7412 | 227.2171 |         |          |                |            |
| DEIFLGEUSE(R)   | 136.5646 | 208.5121 |         |          |                |            |
| CANOPUS(B)      | 95.4308  | 256.6056 |         |          |                |            |
| ARCTURUS(R)     | 42.6193  | 125.5823 |         |          |                |            |
| RIGIL KENTAURUS | 40.2193  | 279.1227 |         |          |                |            |
| ANTARES(R)      | 18.2658  | 354.5311 |         |          |                |            |
| CAPELLA(R)      | 144.5432 | 143.3446 |         |          |                |            |
| VEGA(B)         | 76.5154  | 66.2628  |         |          |                |            |
| ALDEBARAN(R)    | 159.8826 | 204.8870 |         |          |                |            |
| RIGEL(B)        | 138.2205 | 236.0874 |         |          |                |            |
| GAMMA CRUCIS(R) | 46.5993  | 256.3633 |         |          |                |            |
| SPICA(B)        | 27.6698  | 178.6882 |         |          |                |            |
| ACHERNAR(B)     | 99.2077  | 298.1785 |         |          |                |            |
| DENEVB(B)       | 99.4910  | 60.4186  |         |          |                |            |
| PROCYON(B)      | 113.7211 | 198.9552 |         |          |                |            |

STAR DELAY: 2.7098 SEC 693.7097 PULSES DECIMAL = 10. COARSE + 54. FINE  
 76.3944 SEC 12 00 PULSES ( ) AL CNAH SUB C = 174.9769 EPSILON = 6.65 SCN=10

PN 10 PASS 2069 PR23 #10/12 S/W H.3 DSS 148 RCVR AGC -120.46 FILE 10-894 JAF  
 SPACECRAFT ATTITUDE ON DAY 299 OCT 26,1977 1300 GMT

10/27/77

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.8369 RCSPHAK = 149.8800  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.2849 CLON = 230.1795  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.4817 CLON = 229.3646

NEW ATTITUDE  
 POST-PRECESSION

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PN 10 PASS 2069 PR23 #10/12 S/W H.3 DSS 148 RCVR AGC -120.46 FILE 10-894 JAF  
 SPACECRAFT ATTITUDE ON DAY 299 OCT 26,1977 1300 GMT  
 SPIN PERIOD = 12.767210 SEC RTLT = 3 HR 40 MIN 37.39 SEC

10/27/77

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.4817 | 229.3646 | -              | -          |
| SUN             | 0.5722   | 133.2930 | -3.0652 | 228.9717 | 0.21262392D 10 | 14.2128289 |
| EARTH           | 0.8369   | 13.5764  | -3.2849 | 230.1795 | 0.19842358D 10 | 13.2636083 |
| JUPITER         | 17.2487  | 183.2032 | -4.2746 | 212.0941 | 0.15828289D 10 | 10.5804071 |
| SIRIUS(B)       | 114.1702 | 226.6576 |         |          |                |            |
| BETFLGEUSE(R)   | 136.7604 | 207.9409 |         |          |                |            |
| CANCUS(B)       | 94.6152  | 258.3580 |         |          |                |            |
| ARCTURUS(R)     | 41.9946  | 123.5623 |         |          |                |            |
| RIGIL KENTAURUS | 40.0668  | 281.2126 |         |          |                |            |
| ANTARS(R)       | 20.0137  | 356.2144 |         |          |                |            |
| CAPELLA(R)      | 143.3662 | 145.2124 |         |          |                |            |
| VEGA(B)         | 77.5632  | 66.4274  |         |          |                |            |
| ALDEBARAN(R)    | 158.0541 | 203.9853 |         |          |                |            |
| RIGEL(B)        | 136.8222 | 235.2548 |         |          |                |            |
| GAMMA CRUCIS(R) | 45.7338  | 257.8369 |         |          |                |            |
| SPICA(B)        | 25.8944  | 177.5260 |         |          |                |            |
| ACHERNAR(B)     | 99.6277  | 297.7774 |         |          |                |            |
| DENFB(B)        | 100.7884 | 60.5540  |         |          |                |            |
| PROCYON(B)      | 111.8714 | 198.7994 |         |          |                |            |

STAR DELAY: 2.7181 SEC 695.8258 PULSES DECIMAL = 10. COARSE + 56. FINE  
 76.6420 DFG 12 70 PULSES ( ) AL CKAH SUB C = 121.8005 EPSILON=11.49 SCN=10

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PN 10 PASS 2077 PR23 #00/00 SW F.3 DSS 43B RCVR AGC -120.4 FILE 10-895 JOR  
 SPACECRAFT ATTITUDE ON DAY 307 NOV 3,1977 1500 GMT

11/03/77

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.3784 RCSPHAK = 175.1500  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.2930 CLON = 229.7447  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.4898 CLON = 229.4209

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PN 10 PASS 2077 PR23 #00/00 SW F.3 DSS 43B RCVR AGC -120.4 FILE 10-895 JOR  
 SPACECRAFT ATTITUDE ON DAY 307 NOV 3,1977 1500 GMT  
 SPIN PERIOD = 12.769650 SEC RTLT = 3 HR 41 MIN 12.49 SEC

11/03/77

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.4898 | 229.4209 | -              | -          |
| SUN             | 0.5199   | 125.5814 | -3.0669 | 229.1180 | 0.21359197D 10 | 14.2775381 |
| EARTH           | 0.3784   | 31.3145  | -3.2930 | 229.7447 | 0.19894963D 10 | 13.2987721 |
| JUPITER         | 17.2235  | 183.0914 | -4.2483 | 212.1744 | 0.15977276D 10 | 10.6799973 |
| SIRIUS(R)       | 114.2029 | 226.6818 |         |          |                |            |
| BETELGEUSE(R)   | 136.8063 | 207.9799 |         |          |                |            |
| CANCPUS(B)      | 94.6187  | 258.3660 |         |          |                |            |
| ARCTURUS(R)     | 42.0323  | 123.0127 |         |          |                |            |
| RIGIL KENTALRUS | 40.0480  | 281.1523 |         |          |                |            |
| ANTARES(R)      | 19.9571  | 356.2296 |         |          |                |            |
| CAPELLA(R)      | 143.4169 | 145.1815 |         |          |                |            |
| VEGA(B)         | 77.6481  | 66.4428  |         |          |                |            |
| ALDEBARAN(R)    | 158.1021 | 204.0638 |         |          |                |            |
| RIGEL(B)        | 136.8482 | 235.3124 |         |          |                |            |
| GAMMA CRUCIS(R) | 45.7378  | 257.7852 |         |          |                |            |
| SPICA(B)        | 25.9509  | 177.5180 |         |          |                |            |
| ACHERNAR(B)     | 99.5944  | 297.7886 |         |          |                |            |
| DENEK(B)        | 100.7677 | 60.5474  |         |          |                |            |
| PROCYON(B)      | 111.9220 | 198.8131 |         |          |                |            |

STAR DELAY: 2.7183 SEC 695.8862 PULSES DECIMAL = 10. COARSE + 56. FINE  
 76.6340 DEG 12 70 PULSES OCTAL CKAH SUB C = 113.8652 EPSILON=11.7162 SCN=10

PN 10 PASS 2083 PR23 #00/00 S/A SH.3 DSS148 RCVR AGC -122.20 FILE 10-896  
SPACECRAFT ATTITUDE ON DAY 313 NOV 8, 1977 0600 GMT

11/09/77

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRKS = 180 RCSTPOS = 180  
AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.1368 RCSPHAK = 264.0540  
SPACECRAFT-EARTH DIRECTION: CLAT = -3.2954 CLON = 229.4886  
SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3912 CLON = 229.5858

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PN 10 PASS 2083 PR23 #00/00 S/A SH.3 DSS148 RCVR AGC -122.20 FILE 10-896  
SPACECRAFT ATTITUDE ON DAY 313 NOV 8, 1977 0600 GMT  
SPIN PERIOD = 12.770620 SEC RTLT = 3 HR 41 MIN 41.51 SEC

11/09/77

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3918 | 229.5858 | -              | -          |
| SUN             | 0.5025   | 139.8673 | -3.0678 | 229.2011 | 0.21414582D 10 | 14.3145602 |
| EARTH           | 0.1368   | 135.2123 | -3.2954 | 229.4886 | 0.19938463D 10 | 13.3278496 |
| JUPITER         | 17.3463  | 183.5412 | -4.2334 | 212.2211 | 0.16062764D 10 | 10.7371417 |
| SIRIUS(B)       | 114.3871 | 226.7155 |         |          |                |            |
| BETELGEUSE(R)   | 136.9976 | 207.9799 |         |          |                |            |
| CANOPUS(B)      | 90.7472  | 258.3874 |         |          |                |            |
| ARCTURUS(R)     | 42.0423  | 123.8348 |         |          |                |            |
| RIGIL KENTARUS  | 40.1126  | 280.9479 |         |          |                |            |
| ANTARES(R)      | 19.7995  | 355.9382 |         |          |                |            |
| CAPELLA(R)      | 143.4958 | 144.9559 |         |          |                |            |
| VEGA(B)         | 77.4925  | 66.4773  |         |          |                |            |
| ALDEBARAN(R)    | 158.2924 | 204.0177 |         |          |                |            |
| RIGEL(B)        | 137.0223 | 235.4076 |         |          |                |            |
| GAMMA CRUCIS(R) | 45.8685  | 257.6589 |         |          |                |            |
| SPICA(B)        | 26.1114  | 177.7422 |         |          |                |            |
| ACHERNAR(B)     | 99.6042  | 297.8308 |         |          |                |            |
| DENEK(B)        | 100.6015 | 60.5393  |         |          |                |            |
| PROCYON(B)      | 112.1094 | 198.8070 |         |          |                |            |

STAR DELAY: 2.7177 SEC 695.7439 PULSES DECIMAL = 10. COARSE + 56. FINE  
76.6126 DEG 12 70 PULSES OCTAL CKAM SUB C = 128.0755 EPSILON=11.7918 SCN=10



NOTE -

ATTITUDE SHEET 10-897 CONTAINS NO  
DATA. 10-898 & 10-899 ARE NOT RELIABLE  
DUE TO LOW SUN ANGLE CONDITIONS.

*[Handwritten signature]*

LCCCN PALJRP,CCPPI,R10,T7350 AGPAWA STOP 14 PM 5703

CALL MAIN\$

PN 10 PASS 2091 PR23 #00/00 S/W SH,3 DSS14B RCVR AGC -122,20 FILE 10-897 MID

&INPUT OPTION=1,SCN=10, SIDE='RIGHT', SPNP=12,77209 ;

&INPUT OPTION=1,SCN=10, SIDE='LEFT', SPNP=12,77209 ;

ADCSAT='IND',

MC='NOV', DAY=17, YR=1977, HRMIN=0600, YDAY=321,

REFRCD='SUN', RANGK=.52642, RPHAK=357,995, ASPGRS=180, RCPCS=180,

ERF=0.20037349D10, EDECP=0.32956219D1, ERAP=0.49045060D2,

HRF=0.21510381D10, HDECP=0.30694845D1, HRAP=0.49343849D2,

JRF=0.16211052D10, JDECP=0.42077883D1, JRAP=0.32302902D2,

CHK=1.500, ATR=180.0,

CCCF='STOP' &FAC

LOGOFF

← Separate Trials

CONSCAN

DONE on 16 NOV, 1977

NO CONVERGED SOLUTION FOR THIS SET OF INPUT DATA

PN 10 PASS 2097 PR23 #00/00 S/W H,3 DSS 148 RCVR AGC -120.4 FILE 10-898 JOR  
SPACECRAFT ATTITUDE ON DAY 327 NOV 23,1977 0900 GMT

11/28/77

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD NORTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.8577 RCSPHAK = 203.0600  
SPACECRAFT-EARTH DIRECTION: CLAT = -3.2916 CLON = 228.6594  
SPACECRAFT +Z AXIS ATTITUDE: GLAT = -2.5396 CLON = 229.0724

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PN 10 PASS 2097 PR23 #00/00 S/W H,3 DSS 148 RCVR AGC -120.4 FILE 10-898 JOR  
SPACECRAFT ATTITUDE ON DAY 327 NOV 23,1977 0900 GMT  
SPIN PERIOD = 12.773190 SEC RTLT = 3 HR 44 MIN 4.10 SEC

11/28/77

|                 | CNA      | LNA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -2.5396 | 229.0724 | -              | -          |
| SUN             | 0.6632   | 306.7603 | -3.0709 | 229.4699 | 0.215956960 10 | 14.4356257 |
| EARTH           | 0.8577   | 241.2630 | -3.2916 | 228.6594 | 0.201522010 10 | 13.4707226 |
| JUPITER         | 16.7469  | 186.0921 | -4.1852 | 212.3771 | 0.163435580 10 | 10.9248382 |
| SIRIUS(B)       | 114.6520 | 226.2516 |         |          |                |            |
| BETELGEUSE(B)   | 136.9352 | 206.8902 |         |          |                |            |
| CANOPUS(B)      | 95.4788  | 258.3005 |         |          |                |            |
| ARCTURUS(B)     | 41.0490  | 123.8634 |         |          |                |            |
| RIGIL KENTAUROS | 41.0477  | 281.3166 |         |          |                |            |
| ANTARES(B)      | 20.3871  | 353.7178 |         |          |                |            |
| CAPELLA(B)      | 142.5848 | 144.3992 |         |          |                |            |
| REGA(B)         | 76.9173  | 66.2665  |         |          |                |            |
| ALDEBARAN(B)    | 158.1494 | 201.5276 |         |          |                |            |
| RIGEL(B)        | 137.4248 | 234.3981 |         |          |                |            |
| GAMMA CRUCIS(B) | 46.5951  | 258.2828 |         |          |                |            |
| SPICA(B)        | 25.5778  | 179.4485 |         |          |                |            |
| ACHERNAR(B)     | 100.5972 | 297.7943 |         |          |                |            |
| GENEB(B)        | 100.1107 | 60.6708  |         |          |                |            |
| PROCYON(B)      | 111.8952 | 198.3880 |         |          |                |            |

STAR DELAY: 2.7214 SEC 696,6732 PULSES DECIMAL = 10, COARSE + 57, FINE  
76,6995 DEG 12 71 PULSES OCTAL CNAH SUB C = 295,6452 EPSILON=11,1151 SCN=10

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PN 10 PASS 2100 PR23 #00/00 S/W SH.3 DSS14B RCVR AGC -120.40 FILE 10-899 MI  
 SPACECRAFT ATTITUDE ON DAY 330 NOV 25,1977 0500 GMT

11/28/77

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD NORTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: HCSANGAK = 1.0350 HCSPHAK = 32.1740  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.2900 CLON = 228.5628  
 SPACECRAFT +Z AXIS ATTITUDE: GLAT = -2.9315 CLON = 229.5351

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PN 10 PASS 2100 PR23 #00/00 S/W SH.3 DSS14B RCVR AGC -120.40 FILE 10-899 MI  
 SPACECRAFT ATTITUDE ON DAY 330 NOV 25,1977 0500 GMT  
 SPIN PERIOD = 12.773200 SEC TILT = 3 HR 44 MIN 24.97 SEC

11/28/77

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -2.9315 | 229.5351 | -              | -          |
| SUN             | 0.1436   | 256.7611 | -3.0713 | 229.5022 | 0.216176460 10 | 14.4502981 |
| EARTH           | 1.0350   | 200.2913 | -3.2900 | 228.5628 | 0.201834850 10 | 13.4916344 |
| JUPITER         | 17.1507  | 184.6770 | -4.1795 | 212.3963 | 0.163777170 10 | 10.9476718 |
| SIRIUS(R)       | 119.6870 | 226.6516 |         |          |                |            |
| BETELGEUSE(R)   | 137.1671 | 207.5157 |         |          |                |            |
| CANOPUS(H)      | 95.1885  | 258.3723 |         |          |                |            |
| ARCTURUS(R)     | 41.6322  | 124.0723 |         |          |                |            |
| RIGIL KENTAURUS | 40.5742  | 280.9009 |         |          |                |            |
| ANTARES(R)      | 19.8877  | 354.6756 |         |          |                |            |
| CAPPELLA(R)     | 143.1826 | 144.4874 |         |          |                |            |
| VEGA(B)         | 77.0908  | 66.4226  |         |          |                |            |
| ALDEBARAN(R)    | 158.4292 | 202.8997 |         |          |                |            |
| RIGEL(R)        | 137.3717 | 235.0765 |         |          |                |            |
| GAMMA CRUCIS(R) | 46.3076  | 257.7974 |         |          |                |            |
| SPICA(B)        | 26.0464  | 176.6762 |         |          |                |            |
| ACHERNAR(B)     | 100.0349 | 297.8575 |         |          |                |            |
| DENEK(B)        | 100.2255 | 60.5862  |         |          |                |            |
| PROCYON(B)      | 112.2091 | 198.6200 |         |          |                |            |

STAR DELAY: 2.7190 SEC 696.0549 PULSES DECIMAL = 10, COARSE + 56, FINE.  
 76.6277 DEG 12 70 PULSES OCTAL CKAH SUB C = 243,2780 EPSILON=13,4831 SCN=10

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NOTE -

ATTITUDE SHEETS 10-900 & 10-901 WERE  
NOT DISTRIBUTED DUE TO LOW SUN ANGLE  
(BAD DATA).

R.P. [Signature]

PN 10 PASS 2111 PR23 #00/00 S/W SH,3 DSS148 RCVR AGC -123.96 FILE 10-902 MID  
SPACECRAFT ATTITUDE ON DAY 341 DEC 6,1977 0500 GMT

12/07/77

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180  
AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.5350 RCSPHAK = 238.8800  
SPACECRAFT-EARTH DIRECTION: CLAT = -3.2752 CLON = 228.0165  
SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.1749 CLON = 229.5506

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PN 10 PASS 2111 PR23 #00/00 S/W SH,3 DSS148 RCVR AGC -123.96 FILE 10-902 MID  
SPACECRAFT ATTITUDE ON DAY 341 DEC 6,1977 0500 GMT  
SPIN PERIOD = 12.775750 SEC RTLT = 3 HR 46 MIN 57.69 SEC

12/07/77

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.1749 | 229.5506 | -              | -          |
| SUN             | 0.1759   | 35.2367  | -3.0734 | 229.6945 | 0.21749348D 10 | 14.5383342 |
| EARTH           | 1.5350   | 183.7893 | -3.2752 | 228.0165 | 0.20412412D 10 | 13.6446604 |
| JUPITER         | 17.0296  | 183.7899 | -4.1452 | 212.5135 | 0.16583244D 10 | 11.0850561 |
| SIRIUS(B)       | 114.5208 | 226.6341 |         |          |                |            |
| BETELGEUSE(R)   | 137.0679 | 207.7544 |         |          |                |            |
| CANOPUS(B)      | 94.9532  | 258.3788 |         |          |                |            |
| ARCTURUS(R)     | 41.8426  | 123.9349 |         |          |                |            |
| RIGTL KENTAURUS | 40.3322  | 280.9380 |         |          |                |            |
| ANTARES(R)      | 19.8511  | 355.3437 |         |          |                |            |
| CAPELLA(R)      | 143.3422 | 144.7421 |         |          |                |            |
| VEGA(B)         | 77.3077  | 66.4487  |         |          |                |            |
| ALDEBARAN(R)    | 158.3476 | 203.4807 |         |          |                |            |
| RIGEL(B)        | 137.1807 | 235.2417 |         |          |                |            |
| GAMMA CRUCIS(R) | 46.0730  | 257.7348 |         |          |                |            |
| SPICA(B)        | 26.0685  | 178.1803 |         |          |                |            |
| ACHERNAR(B)     | 99.8124  | 297.8408 |         |          |                |            |
| DENEVB(B)       | 100.4299 | 60.5628  |         |          |                |            |
| PROCYON(B)      | 112.1459 | 198.7169 |         |          |                |            |

STAR DELAY: 2.7191 SEC 696.1019 PULSES DECIMAL = 10, COARSE + 56, FINE  
76.6212 DEG 12 70 PULSES OCTAL CKAH SUB C = 21.9164 EPSILON=13.3202 SCN=10  
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PN 10 PASS 2111 PR23 #08/13 S/W SH,3 DSS148 RCVR AGC -118,6 FILE 10-903 MID  
 SPACECRAFT ATTITUDE ON DAY 341 DEC 6,1977 1000 GMT

12/07/77

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,2636 RCSPHAK = 55,4462  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3,2748 CLON = 228,0068  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3,1357 CLON = 227,7826

NEW ATTITUDE  
 POST-PRECESSION

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 PN 10 PASS 2111 PR23 #08/13 S/W SH,3 DSS148 RCVR AGC -118,6 FILE 10-903 MID  
 SPACECRAFT ATTITUDE ON DAY 341 DEC 6,1977 1000 GMT  
 SPIN PERIOD = 12,775260 SEC RTLT = 3 HR 47 MIN 0,94 SEC

12/07/77

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -3,1357 | 227,7826 | -              | -          |
| SUN             | 1,9137   | 1,8126   | -3,0735 | 229,6981 | 0,21751843D 10 | 14,5400020 |
| EARTH           | 0,2636   | 328,1430 | -3,2748 | 228,0068 | 0,20417274D 10 | 13,6479104 |
| JUPITER         | 15,2690  | 184,2532 | -4,1445 | 212,5158 | 0,16587148D 10 | 11,0876658 |
| SIRIUS(B)       | 113,3293 | 225,9585 |         |          |                |            |
| BETELGEUSE(R)   | 135,5166 | 206,7745 |         |          |                |            |
| CANOPUS(B)      | 94,6322  | 258,1359 |         |          |                |            |
| ARCTURUS(R)     | 40,8466  | 122,1801 |         |          |                |            |
| RIGIL KENTAURUS | 40,7345  | 282,8517 |         |          |                |            |
| ANTARES(R)      | 21,6140  | 355,5149 |         |          |                |            |
| CAPELLA(R)      | 141,8679 | 145,9165 |         |          |                |            |
| VEGA(B)         | 77,9837  | 65,9941  |         |          |                |            |
| ALDEBARAN(R)    | 156,7322 | 201,6567 |         |          |                |            |
| RIGEL(B)        | 136,1853 | 233,5973 |         |          |                |            |
| GAMMA CRUCIS(R) | 45,7602  | 259,3208 |         |          |                |            |
| SPICA(B)        | 24,3028  | 178,0425 |         |          |                |            |
| ACHERNAR(B)     | 100,6665 | 297,4643 |         |          |                |            |
| DENEVB(B)       | 101,2607 | 60,7640  |         |          |                |            |
| PROCYON(B)      | 110,4847 | 198,3859 |         |          |                |            |

NEW ATTITUDE  
 POST-PRECESSION

STAR DELAY: 2,7277 SEC 698,2821 PULSES DECIMAL = 10, COARSE + 58, FINE  
 76,8641 DEG 12 72 PULSES OCTAL CKAH SUB C = -5,4171 EPSILON = 7,2297 SCN=10

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PN 10 PASS 2117 PR 23 #00/00 S/W H.3 DSS 43A RCVR AGC -120.4 FILE 10-904 NW  
SPACECRAFT ATTITUDE ON DAY 347 DEC 13,1977 1300 GMT

12/14/77

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRKS = 0 RCSTPOS = 180  
AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.1890 RCSPHAK = 324.1400  
SPACECRAFT-EARTH DIRECTION: CLAT = -3.2609 CLON = 227.6945  
SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.1059 CLON = 227.8027

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PN 10 PASS 2117 PR 23 #00/00 S/W H.3 DSS 43A RCVR AGC -120.4 FILE 10-904 NW  
SPACECRAFT ATTITUDE ON DAY 347 DEC 13,1977 1300 GMT  
SPIN PERIOD = 12.775260 SEC RTLT = 3 HR 48 MIN 58.66 SEC

12/14/77

|                 | CKA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.1059 | 227.8027 | -              | -          |
| SUN             | 2.0160   | 0.8281   | -3.0748 | 229.8214 | 0.21837143D 10 | 14.5970207 |
| EARTH           | 0.1890   | 235.1370 | -3.2609 | 227.6945 | 0.20593732D 10 | 13.7658636 |
| JUPITER         | 15.2129  | 184.2918 | -0.1226 | 212.5931 | 0.16720792D 10 | 11.1770000 |
| SIRIUS(B)       | 113.3647 | 225.9569 |         |          |                |            |
| BETELGEUSE(R)   | 135.5479 | 206.7577 |         |          |                |            |
| CANOPUS(B)      | 94.6656  | 258.1381 |         |          |                |            |
| ARCTURUS(R)     | 40.8321  | 122.2193 |         |          |                |            |
| RIGIL KENTAURUS | 40.7592  | 282.8224 |         |          |                |            |
| ANTARES(R)      | 21.5963  | 355.4368 |         |          |                |            |
| CAPELLA(R)      | 141.8678 | 145.8718 |         |          |                |            |
| VEGA(B)         | 77.9483  | 65.9965  |         |          |                |            |
| ALDEBARAN(R)    | 156.7619 | 201.6104 |         |          |                |            |
| RIGEL(B)        | 136.2212 | 233.5968 |         |          |                |            |
| GAMMA CRUCIS(R) | 45.7932  | 259.3081 |         |          |                |            |
| SPICA(B)        | 24.3219  | 178.1111 |         |          |                |            |
| ACHERNAR(B)     | 100.6838 | 297.4713 |         |          |                |            |
| DENEK(B)        | 101.2249 | 60.7645  |         |          |                |            |
| PROCYON(B)      | 110.5131 | 198.3788 |         |          |                |            |

STAR DELAY: 2.7276 SEC 698.2622 PULSES DECIMAL = 10, COARSE + 58, FINE  
76.8619 DEG 12 72 PULSES OCTAL CKAH SUB C = -6.1728 EPSILON= 7.0008 SCN=10  
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PN 10 PASS 2125 PR 23 #00/00 S/W H,3 DSS 43B RCVR AGC -120,4 FILE 10-905 NW 12/21/77

SPACECRAFT ATTITUDE ON DAY 355 DEC 21,1977 1200 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,4783 RCSPHAK = 285,1200.

SPACECRAFT-EARTH DIRECTION: CLAT = -3,2420 CLON = 227,3943

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3,1118 CLON = 227,8552

PN 10 PASS 2125 PR 23 #00/00 S/W H,3 DSS 43B RCVR AGC -120,4 FILE 10-905 NW 12/21/77

SPACECRAFT ATTITUDE ON DAY 355 DEC 21,1977 1200 GMT

SPIN PERIOD = 12,776730 SEC RTLT = 3 HR 51 MIN 25,68 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -3,1118 | 227,8552 | -              | -          |
| SUN             | 2,1000   | 0,9103   | -3,0763 | 229,9580 | 0,219324110 10 | 14,6607025 |
| EARTH           | 0,4783   | 195,8174 | -3,2420 | 227,3943 | 0,208141190 10 | 13,9131811 |
| JUPITER         | 15,1761  | 184,1856 | -4,0984 | 212,6809 | 0,168705300 10 | 11,2770922 |
| SIRIUS(B)       | 113,3969 | 225,9778 |         |          |                |            |
| BETELGEUSE(R)   | 135,5921 | 206,7900 |         |          |                |            |
| CANOPUS(B)      | 94,6706  | 258,1452 |         |          |                |            |
| ARCTURUS(R)     | 40,8650  | 122,2698 |         |          |                |            |
| RIGIL KENTAURUS | 40,7418  | 282,7673 |         |          |                |            |
| ANTARES(R)      | 21,5435  | 355,4440 |         |          |                |            |
| CAPELLA(R)      | 141,9145 | 145,8433 |         |          |                |            |
| VEGA(B)         | 77,9323  | 60,0101  |         |          |                |            |
| ALDEBARAN(R)    | 156,8085 | 201,6711 |         |          |                |            |
| RIGEL(B)        | 136,2476 | 233,6474 |         |          |                |            |
| GAMMA CRUCIS(R) | 45,7972  | 259,2597 |         |          |                |            |
| SPICA(B)        | 24,3745  | 178,1048 |         |          |                |            |
| ACHERNAR(B)     | 100,6543 | 297,4824 |         |          |                |            |
| DENFB(B)        | 101,2044 | 60,7577  |         |          |                |            |
| PROCYON(B)      | 110,5611 | 198,3899 |         |          |                |            |

STAR DELAY: 2,7276 SEC 698,2776 PULSES DECIMAL = 10, COARSE + 58, FINE  
76,8548 DEG 12 72 PULSES DECIMAL CKAH SUB C = -5,9109 EPSILON= 6,821 SCN=10

PN 10 PASS 2132 PR23 #00/00 S/W SH,3 DSS14B RCVR AGC =123.1 FILE 10-906 MID 12/28/77  
 SPACECRAFT ATTITUDE ON DAY 362 DEC 27,1977 0900 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON ~~RIGHT~~ SIDE OF S/C,  
 LEFT

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,6918 RCSPHAK = 278,3000  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3,2261 CLON = 227,2103  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3,1271 CLON = 227,8960

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PN 10 PASS 2132 PR23 #00/00 S/W SH,3 DSS14B RCVR AGC =123.1 FILE 10-906 MID 12/28/77  
 SPACECRAFT ATTITUDE ON DAY 362 DEC 27,1977 0900 GMT  
 SPIN PERIOD = 12,777950 SEC RTLT = 3 HR 53 MIN 23,65 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -3,1271 | 227,8960 | -              | -          |
| SUN             | 2,1554   | 1,2594   | -3,0774 | 230,0580 | 0,220027350 10 | 14,7077106 |
| EARTH           | 0,6918   | 188,2519 | -3,2261 | 227,2103 | 0,209909480 10 | 14,0313824 |
| JUPITER         | 15,1492  | 184,0669 | -4,0807 | 212,7465 | 0,169813800 10 | 11,3511898 |
| SIRIUS(B)       | 113,4142 | 225,9973 |         |          |                |            |
| BETFLGEUSE(R)   | 135,6215 | 206,8249 |         |          |                |            |
| CANOPUS(B)      | 94,6640  | 258,1509 |         |          |                |            |
| ARCTURUS(R)     | 40,8997  | 122,3023 |         |          |                |            |
| RIGTL KENTAURUS | 40,7179  | 282,7274 |         |          |                |            |
| ANTARES(R)      | 21,5018  | 355,4767 |         |          |                |            |
| CAPELLA(R)      | 141,9568 | 145,8325 |         |          |                |            |
| VEGA(B)         | 77,9297  | 66,0216  |         |          |                |            |
| ALDFBARAN(R)    | 156,8406 | 201,7417 |         |          |                |            |
| RIGEL(B)        | 136,2594 | 233,6933 |         |          |                |            |
| GAMMA CRUCIS(R) | 45,7898  | 259,2203 |         |          |                |            |
| SPICA(B)        | 24,4157  | 178,0763 |         |          |                |            |
| ACHERNAR(B)     | 100,6220 | 297,4901 |         |          |                |            |
| DENEB(B)        | 101,1978 | 60,7514  |         |          |                |            |
| PROCYON(B)      | 110,5949 | 198,4024 |         |          |                |            |

STAR DELAY: 2,7277 SEC 698,2923 PULSES DECIMAL = 10, COARSE + 58, FINE  
 76,8491 DEG 12 72 PULSES CENTRAL CKAH SUB C = -5,4389 EPSILON= 6,698 SCN=10

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42 321 50 SHEETS 5 SQUARE  
42 362 100 SHEETS 5 SQUARE  
42 396 200 SHEETS 5 SQUARE

3-20-78

ATTITUDE SHEETS 10-906A THRU 10-914A HAVE  
BEEN REVISED TO CORRECT SUN POSITION REL-  
ATIVE TO THE SK. SUN IS ON THE LEFT SIDE &  
HAS BEEN SINCE LATE NOVEMBER 1977.

PN 10 PASS 2132 PR23 #00/00 S/W SH,3 DSS14B RCVR AGC =123,1 FILE 10-906A MID  
 SPACECRAFT ATTITUDE ON DAY 362 DEC 27,1977 0900 GMT

03/13/78

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,6918 RCSPHAK = 278,3000  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3,2261 CLON = 227,2103  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3,1028 CLON = 227,8920

REVISED

REPLACES FILE NO. 906

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PN 10 PASS 2132 PR23 #00/00 S/W SH,3 DSS14B RCVR AGC =123,1 FILE 10-906 MID  
 SPACECRAFT ATTITUDE ON DAY 362 DEC 27,1977 0900 GMT  
 SPIN PERIOD = 12,777950 SEC RTLT = 3 HR 53 MIN 23,65 SEC

03/13/78

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -3,1028 | 227,8920 | =              | =          |
| SUN             | 2,1630   | 0,6145   | -3,0774 | 230,0580 | 0,220027350 10 | 14,7077106 |
| EARTH           | 0,6918   | 190,2882 | -3,2261 | 227,2103 | 0,209909480 10 | 14,0313824 |
| JUPITER         | 15,1470  | 184,1572 | -4,0807 | 212,7465 | 0,169813800 10 | 11,3511898 |
| SIRIUS(B)       | 113,4289 | 225,9886 |         |          |                |            |
| BETELGEUSE(R)   | 135,6290 | 206,8007 |         |          |                |            |
| CANOPUS(B)      | 94,6869  | 258,1500 |         |          |                |            |
| ARCTURUS(R)     | 40,8771  | 122,3132 |         |          |                |            |
| RIGIL KENTAURUS | 40,7424  | 282,7254 |         |          |                |            |
| ANTARES(R)      | 21,5076  | 355,4159 |         |          |                |            |
| CAPELLA(R)      | 141,9399 | 145,8095 |         |          |                |            |
| VEGA(B)         | 77,9092  | 66,0185  |         |          |                |            |
| ALDEBARAN(R)    | 156,8459 | 201,6854 |         |          |                |            |
| RIGEL(B)        | 136,2766 | 233,6747 |         |          |                |            |
| GAMMA CRUCIS(R) | 45,8129  | 259,2283 |         |          |                |            |
| SPICA(B)        | 24,4109  | 178,1292 |         |          |                |            |
| ACHERNAR(B)     | 100,6453 | 297,4913 |         |          |                |            |
| DENEK(B)        | 101,1786 | 60,7542  |         |          |                |            |
| PROCYON(B)      | 110,5988 | 198,3931 |         |          |                |            |

STAR DELAY: 2,7277 SEC 698,3008 PULSES DECIMAL = 10, COARSE + 50, FINE  
 76,8500 DEG 12 72 PULSES OCTAL CKAM SUB C = 6,0766 EPSILON= 6,6911 SCN=10

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PN 10 PASS 2139 PR23 #00/00 S/W SH,3 DSS43A RCVR AGC =122.23 FILE 10-907A MID  
SPACECRAFT ATTITUDE ON DAY 4 JAN 4,1978 0900 GMT

03/13/78

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.8696 RCSPHAK = 274.2600

REPLACES FILE NO. 907

SPACECRAFT-EARTH DIRECTION: CLAT = -3.2000 CLON = 226.9964

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.1185 CLON = 227.8635

REVISED

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PN 10 PASS 2139 PR23 #00/00 S/W SH,3 DSS43A RCVR AGC =122.23 FILE 10-907 MID  
SPACECRAFT ATTITUDE ON DAY 4 JAN 4,1978 0900 GMT  
SPIN PERIOD = 12.779170 SEC RTLT = .3 HR 56 MIN 37.83 SEC

03/13/78

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.1185 | 227.8635 |                |            |
| SUN             | 2.3435   | 0.8851   | -3.0797 | 230.2101 | 0,22110410D 10 | 14,7796858 |
| EARTH           | 0.8696   | 185.3985 | -3.2000 | 226.9964 | 0,21282009D 10 | 14,2259418 |
| JUPITER         | 15.0146  | 184.0269 | -4.0548 | 212.8484 | 0,17151659D 10 | 11,4650127 |
| SIRIUS(B)       | 113.3978 | 225.9829 |         |          |                |            |
| BETELGEUSE(R)   | 135.5965 | 206.8005 |         |          |                |            |
| CANOPUS(B)      | 94.6657  | 258.1464 |         |          |                |            |
| ARCTURUS(R)     | 40.8752  | 122.2742 |         |          |                |            |
| RIGIL KENTAURUS | 40.7334  | 282.7601 |         |          |                |            |
| ANTARES(R)      | 21.5347  | 355.4598 |         |          |                |            |
| CAPELLA(R)      | 141.9252 | 145.8450 |         |          |                |            |
| VEGA(B)         | 77.9351  | 66.0127  |         |          |                |            |
| ALDEBARAN(R)    | 156.8137 | 201.6934 |         |          |                |            |
| RIGEL(B)        | 136.2470 | 233.6590 |         |          |                |            |
| GAMMA CRUCIS(R) | 45.7921  | 259.2510 |         |          |                |            |
| SPICA(B)        | 24.3830  | 178.0909 |         |          |                |            |
| ACHERNAR(B)     | 100.6445 | 297.4837 |         |          |                |            |
| DENEK(B)        | 101.2062 | 60.7560  |         |          |                |            |
| PROCYON(B)      | 110.5668 | 198.3937 |         |          |                |            |

STAR DELAY: 2.7281 SEC 698,3998 PULSES DECIMAL = 10. COARSE + 58. FINE  
76.8536 DEG 12 72 PULSES OCTAL CKAH SUB C = -5.4547 EPSILON = 6.3396 SCN=10

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PN 10 PASS 2148 PR23 #00/00 S/W SH,3 DSS43A RCVR AGC =122.23 FILE 10-908A MID  
SPACECRAFT ATTITUDE ON DAY 13 JAN 13,1978 1100 GMT

03/13/78

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPGRRS = 0 RCSTPOS = 180  
AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.0259 RCSPHAK = 272.5600  
SPACECRAFT-EARTH DIRECTION: CLAT = -3.1705 CLON = 226.8706  
SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.0991 CLON = 227.8956

REVISED

REPLACES FILE NO. 908

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PN 10 PASS 2148 PR23 #00/00 S/W SH,3 DSS43A RCVR AGC =122.23 FILE 10-908 MID  
SPACECRAFT ATTITUDE ON DAY 13 JAN 13,1978 1100 GMT  
SPIN PERIOD = 12,780880 SEC RTLT = 4 HR 0 MIN 7.44 SEC

03/13/78

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.0991 | 227.8956 |                |            |
| SUN             | 2.4630   | 0.3470   | -3.0814 | 230.3621 | 0.222191150 10 | 14.8523496 |
| EARTH           | 1.0259   | 184.0197 | -3.1705 | 226.8706 | 0.215962110 10 | 14.4359699 |
| JUPITER         | 14.9422  | 184.0148 | -4.0290 | 212.9531 | 0.173241590 10 | 11.5803202 |
| SIRIUS(B)       | 113.4340 | 225.9888 |         |          |                |            |
| BETELGEUSE(R)   | 135.6338 | 206.7992 |         |          |                |            |
| CANOPUS(B)      | 94.6912  | 258.1504 |         |          |                |            |
| ARCTURUS(R)     | 40.8759  | 122.3191 |         |          |                |            |
| RIGIL KENTAURUS | 40.7452  | 282.7207 |         |          |                |            |
| ANTARES(R)      | 21.5044  | 355.4061 |         |          |                |            |
| CAPELLA(R)      | 141.9407 | 145.8033 |         |          |                |            |
| VEGA(B)         | 77.9044  | 66.0191  |         |          |                |            |
| ALDEBARAN(R)    | 156.8506 | 201.6807 |         |          |                |            |
| RIGEL(B)        | 136.2816 | 233.6757 |         |          |                |            |
| GAMMA CRUCIS(R) | 45.8171  | 259.2257 |         |          |                |            |
| SPICA(B)        | 24.4143  | 178.1378 |         |          |                |            |
| ACHERNAR(B)     | 100.6469 | 297.4924 |         |          |                |            |
| DENE(B)         | 101.1737 | 60.7541  |         |          |                |            |
| PROCYON(B)      | 110.6033 | 198.3924 |         |          |                |            |

STAR DELAY: 2.7283 SEC 698.4572 PULSES DECIMAL = 10, COARSE + 58, FINE  
76.8496 DEG 12 72 PULSES OCTAL CKAH SUB C = -5.7767 EPSILON= 6.1237 SCNS10

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PN 10 PASS 2153 PR23 #00/00 S/W SH,3 DSS43A RCVR AGC =123,46 FILE 10-909A MID  
SPACECRAFT ATTITUDE ON DAY 18 JAN 18,1978 1100 GMT

03/13/78

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180  
AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1,0527 RCSPHAK = 271,2750  
SPACECRAFT-EARTH DIRECTION: CLAT = -3,1537 CLON = 226,8416  
SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3,1100 CLON = 227,8950

REVISED

REPLACES FILE NO. 909

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PN 10 PASS 2153 PR23 #00/00 S/W SH,3 DSS43A RCVR AGC =123,46 FILE 10-909 MID  
SPACECRAFT ATTITUDE ON DAY 18 JAN 18,1978 1100 GMT  
SPIN PERIOD = 12,781730 SEC RTLT = .4 HR 2 MIN 7,26 SEC

03/13/78

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | =3,1100 | 227,8950 | -              | -          |
| SUN             | 2,5376   | 0,5589   | =3,0822 | 230,4362 | 0,22278949D 10 | 14,8923456 |
| EARTH           | 1,0527   | 182,4076 | =3,1537 | 226,8416 | 0,21775815D 10 | 14,5560261 |
| JUPITER         | 14,8820  | 183,9259 | =4,0135 | 213,0114 | 0,17419370D 10 | 11,6439639 |
| SIRIUS(B)       | 113,4257 | 225,9918 |         |          |                |            |
| BETFLGEUSE(R)   | 135,6283 | 206,8089 |         |          |                |            |
| CANOPUS(B)      | 94,6804  | 258,1505 |         |          |                |            |
| ARCTURUS(R)     | 40,8848  | 122,3118 |         |          |                |            |
| RIGIL KENTAURUS | 40,7347  | 282,7241 |         |          |                |            |
| ANTARES(R)      | 21,5041  | 355,4337 |         |          |                |            |
| CAPELLA(R)      | 141,9463 | 145,8152 |         |          |                |            |
| VEGA(B)         | 77,9146  | 66,0198  |         |          |                |            |
| ALDEBARAN(R)    | 156,8460 | 201,7038 |         |          |                |            |
| RIGEL(B)        | 136,2725 | 233,6819 |         |          |                |            |
| GAMMA CRUCIS(R) | 45,8063  | 259,2243 |         |          |                |            |
| SPICA(B)        | 24,4141  | 178,1137 |         |          |                |            |
| ACHERNAR(B)     | 100,6376 | 297,4914 |         |          |                |            |
| DENE(B)         | 101,1835 | 60,7532  |         |          |                |            |
| PROCYON(B)      | 110,5993 | 198,3961 |         |          |                |            |

STAR DELAY: 2,7285 SEC 698,5027 PULSES DECIMAL = 10, COARSE + 59, FINE  
76,8495 DEG 12 73 PULSES OCTAL CKAN SUB C = -5,4362 EPSILON = 5,9950 SCN=10

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PN 10 PASS 2160 PR23 #00/00 S/W SH,3 DSS14B RCVR AGC =122.20 FILE 10-910A MID  
 SPACECRAFT ATTITUDE ON DAY 25 JAN 24,1977 0400 GMT

03/13/78

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1,0300 RCSPHAK = 268,0140  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3,1308 CLON = 226,8478  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3,1542 CLON = 227,8791

REVISED

REPLACES FILE NO. 910

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PN 10 PASS 2160 PR23 #00/00 S/W SH,3 DSS14B RCVR AGC =122.20 FILE 10-910 MID  
 SPACECRAFT ATTITUDE ON DAY 25 JAN 24,1977 0400 GMT  
 SPIN PERIOD = 12.782950 SEC RTLT = 4 HR 4 MIN 51.54 SEC

03/13/78

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.1542 | 227.8791 | -              | -          |
| SUN             | 2.6736   | 1.4438   | -3.0834 | 230.5557 | 0,22359220D 10 | 14,9460027 |
| EARTH           | 1.0300   | 178,7301 | -3,1308 | 226,8478 | 0,22022062D 10 | 14,7206297 |
| JUPITER         | 15.1157  | 183,6412 | -3,9942 | 212,7570 | 0,17547394D 10 | 11,7295414 |
| SIRIUS(B)       | 113,3830 | 225,9993 |         |          |                |            |
| BETFLGEUSE(R)   | 135,5942 | 206,8409 |         |          |                |            |
| CANOPUS(B)      | 94,6340  | 258,1491 |         |          |                |            |
| ARCTURUS(R)     | 40,9136  | 122,2682 |         |          |                |            |
| RIGIL KENTAURUS | 40,6952  | 282,7525 |         |          |                |            |
| ANTARES(R)      | 21,5165  | 355,5477 |         |          |                |            |
| CAPELLA(R)      | 141,9580 | 145,8724 |         |          |                |            |
| VEGA(B)         | 77,9614  | 66,0197  |         |          |                |            |
| ALDEBARAN(R)    | 156,8149 | 201,7850 |         |          |                |            |
| RIGEL(B)        | 136,2275 | 233,6949 |         |          |                |            |
| GAMMA CRUCIS(R) | 45,7600  | 259,2306 |         |          |                |            |
| SPICA(B)        | 24,3997  | 178,0144 |         |          |                |            |
| ACHERNAR(B)     | 100,6057 | 297,4840 |         |          |                |            |
| DENEK(B)        | 101,2298 | 60,7508  |         |          |                |            |
| PROCYON(B)      | 110,5703 | 198,4091 |         |          |                |            |

STAR DELAY: 2,7288 SEC 698,5820 PULSES DECIMAL = 10, COARSE + 59, FINE  
 76,8509 DEG 12 73 PULSES OCTAL CKAM SUB C = 4,3288 EPSILON= 5,7726 SCN=10

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PN 10 PASS 2168 PR23 #00/00 S/W SH,3 DSS14A RCVR AGC =124.6 FILE 10-911A MID  
 SPACECRAFT ATTITUDE ON DAY 33 FEB 2,1978 0100 GMT

03/13/78

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.9571 RCSPHAK = 265.6950  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.1073 CLON = 226.9075  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.1743 CLON = 227.8637

REVISED

REPLACES FILE NO. 911

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PN 10 PASS 2168 PR23 #00/00 S/W SH,3 DSS14A RCVR AGC =124.6 FILE 10-911 MID  
 SPACECRAFT ATTITUDE ON DAY 33 FEB 2,1978 0100 GMT  
 SPIN PERIOD = 12.784420 SEC RTLT = 4 HR 7 MIN 42.65 SEC

03/13/78

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.1743 | 227.8637 |                |            |
| SUN             | 2.8019   | 1.7585   | -3.0846 | 230.6683 | 0.22441477D 10 | 15.0009873 |
| EARTH           | 0.9571   | 176.0131 | -3.1073 | 226.9075 | 0.22278551D 10 | 14.8920795 |
| JUPITER         | 14.6844  | 183.5672 | -3.9745 | 213.1723 | 0.17678929D 10 | 11.8174659 |
| SIRIUS(B)       | 113.3578 | 225.9997 |         |          |                |            |
| BEYFLGEUSE(R)   | 135.5715 | 206.8513 |         |          |                |            |
| CANOPUS(B)      | 94.6111  | 258.1474 |         |          |                |            |
| ARCTURUS(R)     | 40.9224  | 122.2400 |         |          |                |            |
| RIGIL KENTAURUS | 40.6789  | 282.7743 |         |          |                |            |
| ANTARES(R)      | 21.5302  | 355.6007 |         |          |                |            |
| CAPELLA(R)      | 141.9566 | 145.9038 |         |          |                |            |
| VEGA(B)         | 77.9860  | 66.0176  |         |          |                |            |
| ALDEBARAN(R)    | 156.7932 | 201.8145 |         |          |                |            |
| RIGEL(B)        | 136.2022 | 233.6936 |         |          |                |            |
| GAMMA CRUCIS(R) | 45.7373  | 259.2407 |         |          |                |            |
| SPICA(B)        | 24.3851  | 177.9680 |         |          |                |            |
| ACHERNAR(B)     | 100.5949 | 297.4789 |         |          |                |            |
| DENEK(B)        | 101.2548 | 60.7506  |         |          |                |            |
| PROCYON(B)      | 110.5494 | 198.4136 |         |          |                |            |

STAR DELAY: 2.7292 SEC 698.6781 PULSES DECIMAL = 10. COARSE + 59. FINE  
 76.8526 DEG 12 73 PULSES OCTAL CKAH SUB C = -3.8178 EPSILON= 5.5763 SCN=10

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PN 10 PASS 2174 PR23 #00/00 S/W SH,3 DSS63A RCVR AGC =125,63 FILE 10-912A MID  
 SPACECRAFT ATTITUDE ON DAY 38 FEB 7,1978 1900 GMT

03/13/78

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,8958 RCSPHAK = 298,9580  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3,0845 CLON = 227,0181  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2,7358 CLON = 227,8443

REVISED

REPLACES FILE NO. 912

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 PN 10 PASS 2174 PR23 #00/00 S/W SH,3 DSS63A RCVR AGC =125,63 FILE 10-912 MID  
 SPACECRAFT ATTITUDE ON DAY 38 FEB 7,1978 1900 GMT  
 SPIN PERIOD = 12,785150 SEC RTLT = 4 HR 10 MIN 31,79 SEC

03/13/78

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -2,7358 | 227,8443 |                |            |
| SUN             | 2,9508   | 353,1167 | -3,0857 | 230,7781 | 0,22522231D 10 | 15,0549672 |
| EARTH           | 0,8958   | 202,9300 | -3,0845 | 227,0181 | 0,22532088D 10 | 15,0615561 |
| JUPITER         | 14,6165  | 185,1886 | -3,9554 | 213,2536 | 0,17808397D 10 | 11,9040087 |
| SIRIUS(B)       | 113,6595 | 225,8600 |         |          |                |            |
| BETELGEUSE(R)   | 135,7508 | 206,4404 |         |          |                |            |
| CANOPUS(B)      | 95,0363  | 258,1372 |         |          |                |            |
| ARCTURUS(R)     | 40,5417  | 122,4927 |         |          |                |            |
| RIGIL KENTAURUS | 41,1109  | 282,6835 |         |          |                |            |
| ANTARES(R)      | 21,5873  | 354,4981 |         |          |                |            |
| CAPELLA(R)      | 141,6934 | 145,4560 |         |          |                |            |
| VEGA(B)         | 77,5933  | 65,9742  |         |          |                |            |
| ALDEBARAN(R)    | 156,9347 | 200,8410 |         |          |                |            |
| RIGEL(B)        | 136,5435 | 233,4030 |         |          |                |            |
| GAMMA CRUCIS(R) | 46,1646  | 259,3370 |         |          |                |            |
| SPICA(B)        | 24,3539  | 178,9336 |         |          |                |            |
| ACHERNAR(B)     | 100,9929 | 297,5132 |         |          |                |            |
| DENEK(B)        | 100,8816 | 60,7948  |         |          |                |            |
| PROCYON(B)      | 110,6689 | 198,2538 |         |          |                |            |

STAR DELAY: 2,7297 SEC 698,8107 PULSES DECIMAL = 10, COARSE + 59, FINE  
 76,8628 DEG 12 73 PULSES OCTAL CKAH SUB C = 347,7528 EPSILON= 5,3639 SCN=10

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PN 10 PASS 2182 PR23 #00/00 S/W H.3 DSS 63A RCVR AGC =122.23 FILE 10-913A NJW  
 SPACECRAFT ATTITUDE ON DAY 46 FEB 15, 1978 1600 GMT

03/13/78

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.7076 RCSPHAK = 260.4400  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.0586 CLON = 227.2099  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.1702 CLON = 227.9097

REVISED

REPLACES FILE NO. 913

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PN 10 PASS 2182 PR23 #00/00 S/W H.3 DSS 63A RCVR AGC =122.23 FILE 10-913 NJW  
 SPACECRAFT ATTITUDE ON DAY 46 FEB 15, 1978 1600 GMT  
 SPIN PERIOD = 12.786860. SEC RTLT = 4 HR 13 MIN 48.33 SEC

03/13/78

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.1702 | 227.9097 | -              | -          |
| SUN             | 2.9840   | 1.5185   | -3.0869 | 230.8970 | 0.226164330 10 | 15.1179365 |
| EARTH           | 0.7076   | 170.9437 | -3.0586 | 227.2099 | 0.228267000 10 | 15.2584893 |
| JUPITER         | 14.5520  | 183.4433 | -3.9334 | 213.3495 | 0.197580030 10 | 13.2072213 |
| SIRIUS(B)       | 113.3927 | 226.0153 |         |          |                |            |
| BETELGEUSE(R)   | 135.6143 | 206.8714 |         |          |                |            |
| CANCPUS(B)      | 94.6245  | 258.1535 |         |          |                |            |
| ARCTURUS(R)     | 40.9435  | 122.2898 |         |          |                |            |
| RIGIL KENTAURUS | 40.6728  | 282.7236 |         |          |                |            |
| ANTARES(R)      | 21.4847  | 355.5840 |         |          |                |            |
| CAPELLA(R)      | 141.9923 | 145.8691 |         |          |                |            |
| VEGA(B)         | 77.9636  | 66.0288  |         |          |                |            |
| ALDEBARAN(R)    | 156.8373 | 201.8481 |         |          |                |            |
| RIGEL(B)        | 136.2327 | 233.7323 |         |          |                |            |
| GAMMA CRUCIS(R) | 45.7499  | 259.2001 |         |          |                |            |
| SPICA(B)        | 24.4309  | 177.9831 |         |          |                |            |
| ACHERNAR(B)     | 100.5773 | 297.4894 |         |          |                |            |
| DENEK(B)        | 101.2288 | 60.7456  |         |          |                |            |
| PROCYON(B)      | 110.5942 | 198.4202 |         |          |                |            |

STAR DELAY: 2.7295 SEC 698,7559 PULSES DECIMAL = 10, COARSE + 59, FINE  
 76.8465 DEG 12 73 PULSES OCTAL CKAH SUB C = -3.8001 EPSILON= 5.3186 SCN=10

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PN 10 PASS 2190 PR23 #00/00 S/W 1.2 DSS 14A RCVR AGC -123.09 FILE 10-914A NJW  
SPACECRAFT ATTITUDE ON DAY 55 FEB 24, 1978 0000 GMT

03/13/78

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

REVISED

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180  
AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.4420 RCSPHAK = 251.2600  
SPACECRAFT-EARTH DIRECTION: CLAT = -3.0326 CLON = 227.4819  
SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.1746 CLON = 227.9011

REPLACES FILE NO. 914

PN 10 PASS 2190 PR23 #00/00 S/W 1.2 DSS 14A RCVR AGC -123.09 FILE 10-914 NJW  
SPACECRAFT ATTITUDE ON DAY 55 FEB 24, 1978 0000 GMT  
SPIN PERIOD = 12.788320-SEC RTLT = 4 HR 17 MIN 12.84 SEC

03/13/78

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.1746 | 227.9011 | -              | -          |
| SUN             | 3.1338   | 1.4923   | -3.0883 | 231.0385 | 0,22716106D 10 | 15,1845628 |
| EARTH           | 0.4420   | 161,2747 | -3.0326 | 227,4819 | 0,23133242D 10 | 15,4633971 |
| JUPITER         | 14,4397  | 183,3536 | -3,9103 | 213,4523 | 0,18120555D 10 | 12,1126705 |
| SIRIUS(B)       | 113,3835 | 226,0135 |         |          |                |            |
| BETELGEUSE(R)   | 135,6046 | 206,8709 |         |          |                |            |
| CANOPUS(B)      | 94,6185  | 258,1524 |         |          |                |            |
| ARCTURUS(R)     | 40,9427  | 122,2783 |         |          |                |            |
| RIGIL KENTAURUS | 40,6704  | 282,7340 |         |          |                |            |
| ANTARES(R)      | 21,4929  | 355,5964 |         |          |                |            |
| CAPELLA(R)      | 141,9877 | 145,8795 |         |          |                |            |
| VEGA(B)         | 77,9711  | 66,0270  |         |          |                |            |
| ALDEBARAN(R)    | 156,8277 | 201,8497 |         |          |                |            |
| RIGEL(B)        | 136,2241 | 233,7273 |         |          |                |            |
| GAMMA CRUCIS(R) | 45,7440  | 259,2070 |         |          |                |            |
| SPICA(B)        | 24,4225  | 177,9723 |         |          |                |            |
| ACHERNAR(B)     | 100,5774 | 297,4871 |         |          |                |            |
| DENEK(B)        | 101,2368 | 60,7462  |         |          |                |            |
| PROCYON(B)      | 110,5847 | 198,4202 |         |          |                |            |

STAR DELAY: 2,7299 SEC 698,8455 PULSES DECIMAL = 10, COARSE + 59, FINE  
76,8476 DEG 12 73 PULSES OCTAL CKAH SUB C = -3,6316 EPSILON= 5,1238 SCN#10

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PN 10 PASS 2196 PR23 #00/00 S/W SH,3 DSS63B RCVR AGC -122,20 FILE 10-915A MI  
SPACECRAFT ATTITUDE ON DAY 60 MAR 1,1978 2200 GMT

03/13/78

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPFAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180  
AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,2354 RCSPFAK = 221,9450  
SPACECRAFT-EARTH DIRECTION: CLAT = -3,0190 CLON = 227,6736  
SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3,1921 CLON = 227,8334

REVISED

REPLACES FILE NO. 915

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PN 10 PASS 2196 PR23 #00/00 S/W SH,3 DSS63B RCVR AGC -122,20 FILE 10-915 MI  
SPACECRAFT ATTITUDE ON DAY 60 MAR 1,1978 2200 GMT  
SPIN PERIOD = 12,789420, SEC RTLT = 4 HR 19 MIN 10,79 SEC

03/13/78

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -3,1921 | 227,8334 |                |            |
| SUN             | 3,2799   | 1,7100   | -3,0891 | 231,1166 | 0,22774907D 10 | 15,2238683 |
| EARTH           | 0,2354   | 132,6570 | -3,0190 | 227,6736 | 0,23310049C 10 | 15,5815836 |
| JUPITER         | 14,3095  | 183,2530 | -3,8968 | 213,5136 | 0,18215596D 10 | 12,1762005 |
| SIRIUS(R)       | 113,3240 | 225,9940 |         |          |                |            |
| BETELGEUSE(R)   | 135,5364 | 206,8519 |         |          |                |            |
| CANOPUS(B)      | 94,5874  | 258,1436 |         |          |                |            |
| ARCTURUS(R)     | 40,9214  | 122,1978 |         |          |                |            |
| RIGIL KENTAURUS | 40,6682  | 282,8116 |         |          |                |            |
| ANTARES(R)      | 21,5591  | 355,6500 |         |          |                |            |
| CAPELLA(R)      | 141,9415 | 145,9427 |         |          |                |            |
| VEGA(B)         | 78,0146  | 66,0116  |         |          |                |            |
| ALDEBARAN(R)    | 156,7584 | 201,8251 |         |          |                |            |
| RIGEL(B)        | 136,1699 | 233,6775 |         |          |                |            |
| GAMMA CRUCIS(R) | 45,7142  | 259,2648 |         |          |                |            |
| SPICA(B)        | 24,3555  | 177,9246 |         |          |                |            |
| ACHERNAR(B)     | 100,5931 | 297,4707 |         |          |                |            |
| DENEK(B)        | 101,2852 | 60,7525  |         |          |                |            |
| PROCYON(B)      | 110,5150 | 198,4147 |         |          |                |            |

STAR DELAY: 2,7304 SEC 698,9856 PULSES DECIMAL = 10, COARSE + 59, FINE  
76,8564 DEG 12 73 PULSES OCTAL CKAH SUB C = -3,2379 EPSILON= 4,9479 SCN#10

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PN 10 PASS 2202 PR23 #00/00 S/W SH,3 DSS14B RCVR AGC =122,20 FILE 10=916A SWG  
 SPACECRAFT ATTITUDE ON DAY 67 MAR 7,1978 0000 GMT

03/13/78

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

REVISED

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,2665 RCSPHAK = 135,6183  
 SPACECRAFT-EARTH DIRECTION: CLAT = -2,9986 CLON = 227,9875  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3,1901 CLON = 227,8020

REPLACES FILE NO. 916

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PN 10 PASS 2202 PR23 #00/00 S/W SH,3 DSS14B RCVR AGC =122,20 FILE 10=916 SWG  
 SPACECRAFT ATTITUDE ON DAY 67 MAR 7,1978 0000 GMT  
 SPIN PERIOD = 12,790520 SEC RTLT =.4 HR 21 MIN 55,98 SEC

03/13/78

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -3,1901 | 227,8020 |                |            |
| SUN             | 3,4227   | 1,5782   | -3,0902 | 231,2284 | 0,22859613D 10 | 15,2804900 |
| EARTH           | 0,2665   | 45,9375  | -2,9986 | 227,9875 | 0,23557671D 10 | 15,7471063 |
| JUPITER         | 14,1888  | 183,2029 | -3,8776 | 213,6026 | 0,18352799D 10 | 12,2679138 |
| SIRIUS(R)       | 113,3036 | 225,9819 |         |          |                |            |
| BETELGEUSE(R)   | 135,5093 | 206,8339 |         |          |                |            |
| CANOPUS(B)      | 94,5830  | 258,1394 |         |          |                |            |
| ARCTURUS(R)     | 40,9030  | 122,1667 |         |          |                |            |
| RIGIL KENTAURUS | 40,6772  | 282,8449 |         |          |                |            |
| ANTARES(R)      | 21,5905  | 355,6491 |         |          |                |            |
| CAPELLA(R)      | 141,9144 | 145,9612 |         |          |                |            |
| VEGA(B)         | 78,0255  | 66,0036  |         |          |                |            |
| ALDEBARAN(R)    | 156,7301 | 201,7919 |         |          |                |            |
| RIGEL(B)        | 136,1530 | 233,6482 |         |          |                |            |
| GAMMA CRUCIS(R) | 45,7103  | 259,2935 |         |          |                |            |
| SPICA(B)        | 24,3241  | 177,9248 |         |          |                |            |
| ACHERNAR(B)     | 100,6094 | 297,4639 |         |          |                |            |
| DENEK(B)        | 101,2987 | 60,7564  |         |          |                |            |
| PROCYON(B)      | 110,4859 | 198,4085 |         |          |                |            |

STAR DELAY: 2,7308 SEC 699,0844 PULSES DECIMAL = 10, COARSE + 59, FINE  
 76,8606 DEG 12 73 PULSES OCTAL CKAH SUB C = -3,2101 EPSILON= 4,7883 SCN#10

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PN 10 PASS 2210 PR23 #00/00 S/W ST.2 DSS63A RCVR AGC -122.2 FILE 10-917  
 SPACECRAFT ATTITUDE ON DAY 74 MAR 15, 1978 1600 GMT

SWG

03/15/78

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.6084 RCSPHAK = 106.8600  
 SPACECRAFT-EARTH DIRECTION: CLAT = -2.9793 CLON = 228.3734  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.1532 CLON = 227.7895

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PN 10 PASS 2210 PR23 #00/00 S/W ST.2 DSS63A RCVR AGC -122.2 FILE 10-917  
 SPACECRAFT ATTITUDE ON DAY 74 MAR 15, 1978 1600 GMT  
 SPIN PERIOD = 12.791860 SEC RTLT = 4 HR 24 MIN 46.86 SEC

SWG

03/15/78

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| -S/C +Z AXIS    | 0.0000   | 0.0000   | -3.1532 | 227.7895 |                |            |
| SUN             | 3.5542   | 0.8996   | -3.0914 | 231.3485 | 0.229512840 10 | 15.3417674 |
| EARTH           | 0.6084   | 16.5941  | -2.9793 | 228.3734 | 0.238138020 10 | 15.9183168 |
| JUPITER         | 14.0806  | 183.2835 | -3.8570 | 213.7000 | 0.185016710 10 | 12.3674271 |
| SIRIUS(B)       | 113.3216 | 225.9663 |         |          |                |            |
| BETELGEUSE(R)   | 135.5149 | 206.7940 |         |          |                |            |
| CANOPUS(B)      | 94.6166  | 258.1371 |         |          |                |            |
| ARCTURUS(R)     | 40.8651  | 122.1766 |         |          |                |            |
| RIGIL KENTAURUS | 40.7159  | 282.8487 |         |          |                |            |
| ANTARES(R)      | 21.6057  | 355.5578 |         |          |                |            |
| CAPELLA(R)      | 141.8834 | 145.9304 |         |          |                |            |
| VEGA(B)         | 77.9968  | 65.9973  |         |          |                |            |
| ALDEBARAN(R)    | 156.7322 | 201.7008 |         |          |                |            |
| RIGEL(B)        | 136.1753 | 233.6143 |         |          |                |            |
| GAMMA CRUCIS(R) | 45.7443  | 259.3114 |         |          |                |            |
| SPICA(B)        | 24.3104  | 178.0048 |         |          |                |            |
| ACHERNAR(B)     | 100.6478 | 297.4643 |         |          |                |            |
| DENEK(B)        | 101.2726 | 60.7614  |         |          |                |            |
| PROCYON(B)      | 110.4858 | 198.3933 |         |          |                |            |

STAR DELAY: 2.7312 SEC 699.1783 PULSES DECIMAL = 10. COARSE + 59. FINE  
 76.8629 DEG 12 73 PULSES OCTAL CKAH SUB C = -3.7519 EPSILON= 4.6515 SCN=10

PN 10 PASS 2216 PR23 #0/0 S/W 51.2 ESS63A RCVR AGC -123.90 FILE 10-518  
 SPACECRAFT ATTITUDE ON DAY 00 MAR 21, 1978 1500 GMT

JAF

03/21/78

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH GALACTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.9525 RCSPHAK = 101.2990

SPACECRAFT-EARTH DIRECTION: CLAT = -2.9658 CLON = 228.7024

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.1401 CLON = 227.7647

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PN 10 PASS 2216 PR23 #0/0 S/W 51.2 ESS63A RCVR AGC -123.90 FILE 10-518  
 SPACECRAFT ATTITUDE ON DAY 00 MAR 21, 1978 1500 GMT  
 SPIN PERIOD = 12.792900 SEC RTLI = 4 HR 26 MIN 52.94 SEC

JAF

03/21/78

|                  | URA      | URA      | CLAT    | CLON     | R (KM)         | R (AU)     |
|------------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS      | 0.0000   | 0.0000   | -3.1401 | 227.7647 | -              | -          |
| SUN              | 3.6713   | 0.6483   | -3.3722 | 221.4411 | 0.230198310 10 | 15.3870876 |
| EARTH            | 0.9525   | 10.5171  | -2.9658 | 228.7024 | 0.240028010 10 | 16.0446531 |
| JUPITER          | 13.9750  | 185.2881 | -3.8411 | 233.7104 | 0.186176290 10 | 12.0444952 |
| SIRIUS (B)       | 223.3238 | 225.9534 |         |          |                |            |
| BETELGEUSE (R)   | 135.4987 | 206.7094 |         |          |                |            |
| CANOPUS (B)      | 74.6243  | 250.1300 |         |          |                |            |
| ARCTURUS (K)     | 70.8403  | 122.1590 |         |          |                |            |
| RIGIL KENTAUKUS  | 40.7342  | 282.8720 |         |          |                |            |
| ANTARES (R)      | 21.5324  | 355.5284 |         |          |                |            |
| CAPELLA (K)      | 44.8556  | 145.9329 |         |          |                |            |
| VEGA (B)         | 77.9949  | 65.9900  |         |          |                |            |
| ALCEERAN (K)     | 156.7140 | 201.0498 |         |          |                |            |
| RIGEL (B)        | 137.1712 | 233.5841 |         |          |                |            |
| GAMMA CRUCIS (K) | 75.7526  | 259.3361 |         |          |                |            |
| SPICA (B)        | 24.2852  | 178.0565 |         |          |                |            |
| ACHERNAR (B)     | 100.0709 | 297.4000 |         |          |                |            |
| DENEK (B)        | 101.2732 | 60.7657  |         |          |                |            |
| PROCYON (B)      | 110.9664 | 158.5844 |         |          |                |            |

STAR DELAY: 2.7315 SEC 699.2706 PULSES DECIMAL = 10. COARSE + 59. FINE  
 70.8664 SEC 12 73 PULSES OCTAL URAN SUB C = -3.0911 EPSILON = 4.5374 SUN = 10

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H09AN)

IN 10 PASS 2218 PR23 #00/00 S/W I,2 DSS 63A RCVR AGC -125,6 FILE 10-919 NJW 03/23/78  
SPACECRAFT ATTITUDE ON DAY 82 MAR 23,1978 1600 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

Precession

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180  
AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1,0859 RCSPHAK = 100,1600  
SPACECRAFT-EARTH DIRECTION: CLAT = -2,9615 CLON = 228,8205  
SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3,1540 CLON = 227,7503

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IN 10 PASS 2218 PR23 #00/00 S/W I,2 DSS 63A RCVR AGC -125,6 FILE 10-919 NJW 03/23/78  
SPACECRAFT ATTITUDE ON DAY 82 MAR 23,1978 1600 GMT  
SPIN PERIOD = 12,793330 SEC RTLT = 4 HR 27 MIN 34,66 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -3,1540 | 227,7503 | -              | -          |
| SUN             | 3,7175   | 0,8460   | -3,0926 | 231,4727 | 0,230469280 10 | 15,4057005 |
| EARTH           | 1,0859   | 10,1827  | -2,9615 | 228,8205 | 0,240653400 10 | 16,0864572 |
| JUPITER         | 13,9381  | 183,2168 | -3,8357 | 213,8027 | 0,186574150 10 | 12,4715341 |
| SIRIUS(R)       | 113,2937 | 225,9523 |         |          |                |            |
| BETELGEUSE(R)   | 135,4795 | 206,7746 |         |          |                |            |
| CANOPUS(B)      | 94,6077  | 258,1319 |         |          |                |            |
| ARCTURUS(R)     | 40,8450  | 122,1355 |         |          |                |            |
| RIGIL KENTAURUS | 40,7238  | 282,8912 |         |          |                |            |
| ANTARES(R)      | 21,6447  | 355,5655 |         |          |                |            |
| CAPELLA(R)      | 141,8514 | 145,9571 |         |          |                |            |
| VEGA(B)         | 78,0136  | 65,9876  |         |          |                |            |
| ALDEBARAN(R)    | 156,6955 | 201,6668 |         |          |                |            |
| RIGEL(B)        | 136,1514 | 233,5798 |         |          |                |            |
| GAMMA CRUCIS(R) | 45,7362  | 259,3466 |         |          |                |            |
| SPICA(B)        | 24,2712  | 177,9977 |         |          |                |            |
| ACHERNAR(B)     | 100,6651 | 297,4555 |         |          |                |            |
| DENEK(B)        | 101,2925 | 60,7660  |         |          |                |            |
| PROCYON(B)      | 110,4483 | 198,3868 |         |          |                |            |

STAR DELAY: 2,7317 SEC 699,3063 PULSES DECIMAL = 10, COARSE + 59, FINE  
76,8681 DEG 12 73 PULSES OCTAL CKAM SUB C = -3,6484 EPSILON= 4,4943 SCN=10

Hog

PN 10 PASS 2218 PR23 #11/13 S/W 1.2 DSS 14A RCVR AGC -122.2 FILE 10-920 NJW  
SPACECRAFT ATTITUDE ON DAY 82 MAR 23, 1978 2000 GMT

03/23/78

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.1087 RCSPHAK = 274.4200  
 SPACECRAFT-EARTH DIRECTION: CLAT = -2.9611 CLON = 228.8302  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.9696 CLON = 229.9404

NEW ATTITUDE  
POST-PRECESSION

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PN 10 PASS 2218 PR23 #11/13 S/W 1.2 DSS 14A RCVR AGC -122.2 FILE 10-920 NJW  
SPACECRAFT ATTITUDE ON DAY 82 MAR 23, 1978 2000 GMT  
SPIN PERIOD = 12.793330 SEC RTLT = 4 HR 27 MIN 38.04 SEC

03/23/78

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -2.9696 | 229.9404 | -              | -          |
| SUN             | 1.5377   | 355.3738 | -3.0926 | 231.4753 | 0.230489200 10 | 15.4070321 |
| EARTH           | 1.1087   | 179.5897 | -2.9611 | 228.8302 | 0.240704020 10 | 16.0898409 |
| JUPITER         | 16.1300  | 183.5381 | -3.8353 | 213.8049 | 0.186606630 10 | 12.4737052 |
| SIRIUS(B)       | 114.9371 | 226.7206 |         |          |                |            |
| BETELGEUSE(R)   | 137.5079 | 207.7749 |         |          |                |            |
| CANOPUS(B)      | 95.2325  | 258.4300 |         |          |                |            |
| ARCTURUS(R)     | 41.8915  | 124.4437 |         |          |                |            |
| RIGIL KENTAURUS | 40.4617  | 280.4647 |         |          |                |            |
| ANTARES(R)      | 19.4812  | 354.6978 |         |          |                |            |
| CAPELLA(R)      | 143.5398 | 144.2329 |         |          |                |            |
| VEGA(B)         | 76.9642  | 66.5324  |         |          |                |            |
| ALDEBARAN(R)    | 158.7863 | 203.4163 |         |          |                |            |
| RIGEL(B)        | 137.5708 | 235.4837 |         |          |                |            |
| GAMMA CRUCIS(R) | 46.3571  | 257.4337 |         |          |                |            |
| SPICA(B)        | 26.4518  | 178.6390 |         |          |                |            |
| ACHERNAR(B)     | 99.8118  | 297.9378 |         |          |                |            |
| DENEVB(B)       | 100.0598 | 60.5406  |         |          |                |            |
| PROCYON(B)      | 112.5803 | 198.7092 |         |          |                |            |

STAR DELAY: 2.7211 SEC 696.5941 PULSES DECIMAL = 10, COARSE + 57, FINE  
 76.5700 DEG 12 71 PULSES OCTAL CKAH SUB C = 347.2005 EPSILON= 8.1733 SCN=10

PN 10 PASS 2225 PR23 #070 S/W I.2 OSS 148 RCVR AGC -122.2 FILE 10-921 NJW  
 SPACECRAFT ATTITUDE ON DAY 89 MAR 30, 1978 2200 GMT

03/30/78

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.6215 RCSPHAK = 268.0200  
 SPACECRAFT-EARTH DIRECTION: CLAT = -2.9477 CLON = 229.2593  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.0085 CLON = 229.8787

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PN 10 PASS 2225 PR23 #070 S/W I.2 OSS 148 RCVR AGC -122.2 FILE 10-921 NJW  
 SPACECRAFT ATTITUDE ON DAY 89 MAR 30, 1978 2200 GMT  
 SPIN PERIOD = 12.792600 SEC RTLT = 4 HR 29 MIN 56.23 SEC

03/30/78

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.0085 | 229.8787 | -              | -          |
| SUN             | 1.7055   | 357.0924 | -3.0936 | 231.5845 | 0.231335930 10 | 15.4630317 |
| EARTH           | 0.6215   | 174.4030 | -2.9477 | 229.2593 | 0.242775450 10 | 16.2283055 |
| JUPITER         | 15.9738  | 183.3602 | -3.8167 | 213.8968 | 0.187989060 10 | 12.5661136 |
| SIRIUS(B)       | 114.8667 | 226.7069 |         |          |                |            |
| BETELGEUSE(R)   | 137.4354 | 207.7779 |         |          |                |            |
| CANOPUS(B)      | 95.1821  | 258.4220 |         |          |                |            |
| ARCTURUS(R)     | 41.8888  | 124.3594 |         |          |                |            |
| RTGTL KENTAURUS | 40.4347  | 280.5408 |         |          |                |            |
| ANTARES(R)      | 19.5389  | 354.8196 |         |          |                |            |
| CAPPELLA(R)     | 143.5125 | 144.3209 |         |          |                |            |
| VEGA(B)         | 77.0244  | 66.5197  |         |          |                |            |
| ALDEBARAN(R)    | 158.7144 | 203.4418 |         |          |                |            |
| RIGEL(B)        | 137.5039 | 235.4492 |         |          |                |            |
| GAMMA CRUCIS(R) | 46.3058  | 257.4798 |         |          |                |            |
| SPICA(B)        | 26.3913  | 178.5546 |         |          |                |            |
| ACHERNAR(B)     | 99.8064  | 297.9221 |         |          |                |            |
| DENFB(B)        | 100.1239 | 60.5436  |         |          |                |            |
| PROCYON(B)      | 112.5096 | 198.7130 |         |          |                |            |

STAR DELAY: 2.7212 SEC 696.6271 PULSES DECIMAL = 10. COARSE + 57. FINE  
 76.5780 DEG 12 71 PULSES OCTAL CKAH SUB C = 349.3607 EPSILON= 7.7317 SCN=10

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42 381 50 SHEETS 5 SQUARE  
42 382 100 SHEETS 5 SQUARE  
42 389 200 SHEETS 5 SQUARE

ATTITUDE SHEETS 10-926, 927, 928 & 929  
SHOULD NOT BE USED FOR ATTITUDE DETER-  
MINATION DUE TO LOW SUN ANGLE CONDITIONS.

ATTITUDE SHEET 10-930 IS NOT DISTRIBUTED.

*RPX.*

N 10 PASS 2255 PR23 #4/6 S/W SI,2 DSS14A RCVR AGC -122.2 FILE 10-928B CLM  
SPACECRAFT ATTITUDE ON DAY 119 APR 29,1978 0200 GMT

05/13/78

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C,

REFERENCE FOR RCS PHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180  
AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.7083 RCS PHAK = 23.2870  
SPACECRAFT-EARTH DIRECTION: CLAT = -2.9147 CLON = 231.3155  
SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.4386 CLON = 231.8406

REVISED

REPLACES FILE NO. 10-928A

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N 10 PASS 2255 PR23 #4/6 S/W SI,2 DSS14A RCVR AGC -122.2 FILE 10-928B CLM  
SPACECRAFT ATTITUDE ON DAY 119 APR 29,1978 0200 GMT  
SPIN PERIOD = 12.794790 SEC RTLT = 4 HR 37 MIN 36.82 SEC

05/13/78

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AL)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -2.4386 | 231.8406 | -              | -          |
| SUN             | 0.6913   | 287.5098 | -3.0978 | 232.0489 | 0.23494083D 10 | 15.7046009 |
| EARTH           | 0.7083   | 222.2382 | -2.9147 | 231.3155 | 0.24967948D 10 | 16.6898048 |
| JUPITER         | 17.5653  | 184.6907 | -3.7396 | 214.2975 | 0.19391070D 10 | 12.9619452 |
| SIRIUS(B)       | 116.6198 | 227.3060 |         |          |                |            |
| BETELGEUSE(R)   | 139.4328 | 208.3437 |         |          |                |            |
| CANOPUS(B)      | 96.1294  | 258.6943 |         |          |                |            |
| ARCTURUS(R)     | 42.5620  | 126.5759 |         |          |                |            |
| RIGIL KENTAURUS | 40.6767  | 278.2655 |         |          |                |            |
| ANTARES(R)      | 17.6531  | 352.5905 |         |          |                |            |
| CAPELLA(R)      | 144.7418 | 142.1607 |         |          |                |            |
| VEGA(B)         | 75.7274  | 66.9949  |         |          |                |            |
| ALDEBARAN(R)    | 160.7371 | 204.2700 |         |          |                |            |
| RIGEL(B)        | 139.0671 | 237.0148 |         |          |                |            |
| GAMMA CRUCIS(R) | 47.3116  | 255.9056 |         |          |                |            |
| SPICA(B)        | 28.3427  | 179.8029 |         |          |                |            |
| ACHERNAR(B)     | 99.3846  | 298.3529 |         |          |                |            |
| DENEK(B)        | 98.6622  | 60.4011  |         |          |                |            |
| PROCYON(B)      | 114.5484 | 198.8461 |         |          |                |            |

STAR DELAY: 2.7120 SEC 694,2690 PULSES DECIMAL = 10. COARSE + 54. FINE  
76.3057 DEG 12 66 PULSES OCTAL. CKAH SUB C = 276,5080 EPSILON=11,0018 SCN=10

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PN 10 PASS 2262 PR23 #00/00 S/W SI.2 DSS63A RCVR AGC -123.96 FILE 10-929 A CLM  
SPACECRAFT ATTITUDE ON DAY 126 MAY 6,1978 1200 GMT

05/13/78

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180  
AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.4621 RCSPHAK = 62.1420  
SPACECRAFT-EARTH DIRECTION: CLAT = -2.9130 CLON = 231.7772  
SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.4524 CLON = 231.7394

REVISED

REPLACES FILE NO. 10-929

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PN 10 PASS 2262 PR23 #00/00 S/W SI.2 DSS63A RCVR AGC -123.96 FILE 10-929 A CLM  
SPACECRAFT ATTITUDE ON DAY 126 MAY 6,1978 1200 GMT  
SPIN PERIOD = 12.796010. SEC RTLT = 4 HR 38 MIN 45.34 SEC

05/13/78

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -2.4524 | 231.7394 | -              | -          |
| SUN             | 0.7579   | 301.4821 | -3.0987 | 232.1358 | 0.235707360 10 | 15.7558396 |
| EARTH           | 0.4621   | 274.6810 | -2.9130 | 231.7772 | 0.250706610 10 | 16.7584632 |
| JUPITER         | 17.3756  | 184.6345 | -3.7237 | 214.3846 | 0.195177180 10 | 13.0466029 |
| SIRIUS(R)       | 116.5411 | 227.2692 |         |          |                |            |
| BETELGEUSE(R)   | 139.3372 | 208.2977 |         |          |                |            |
| CANOPUS(B)      | 96.0960  | 258.6796 |         |          |                |            |
| ARCTURUS(R)     | 42.5129  | 126.4741 |         |          |                |            |
| RIGIL KENTAUROS | 40.6777  | 278.3800 |         |          |                |            |
| ANTARES(R)      | 17.7516  | 352.6698 |         |          |                |            |
| CAPELLA(R)      | 144.6704 | 142.2594 |         |          |                |            |
| VEGA(B)         | 75.7796  | 66.9684  |         |          |                |            |
| ALDEBARAN(R)    | 160.6393 | 204.1832 |         |          |                |            |
| RIGEL(B)        | 139.0004 | 236.9215 |         |          |                |            |
| GAMMA CRUCIS(R) | 47.2736  | 255.9887 |         |          |                |            |
| SPICA(B)        | 28.2417  | 179.7723 |         |          |                |            |
| ACHERNAR(B)     | 99.4204  | 298.3328 |         |          |                |            |
| DENEK(B)        | 98.7241  | 60.4092  |         |          |                |            |
| PROCYON(B)      | 114.4482 | 198.8328 |         |          |                |            |

STAR DELAY: 2.7128 SEC 694.4685 PULSES DECIMAL = 10. COARSE + 54, FINE  
76.3204 DEG 12 66 PULSES OCTAL. CKAH SUB C = 290.7438 EPSILON=10.7383 SCN=10

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PN 10 PASS 2274 PR23 #08/14 S/W I.2 DSS 63A RCVR AGC -125.6 FILE 10-931A NJW  
 SPACECRAFT ATTITUDE ON DAY 139 MAY 19, 1978 1300 GMT

05/19/78

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.9644 RCSPHAK = 274.8300  
 SPACECRAFT-EARTH DIRECTION: CLAT = -2.9149 CLON = 232.6420  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.2782 CLON = 233.3671

REVISED

REPLACES FILE NO. 10-931

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PN 10 PASS 2274 PR23 #08/14 S/W I.2 DSS 63A RCVR AGC -125.6 FILE 10-931A NJW  
 SPACECRAFT ATTITUDE ON DAY 139 MAY 19, 1978 1300 GMT  
 SPIN PERIOD = 12.797360 SEC RTLT = 4 HR 40 MIN 24.63 SEC

05/19/78

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -2.2782 | 233.3671 | -              | -          |
| SUN             | 1.3360   | 217.9996 | -3.1003 | 232.3128 | 0.23714559D 10 | 15.8519779 |
| EARTH           | 0.9644   | 221.3328 | -2.9149 | 232.6420 | 0.25219495D 10 | 16.8579512 |
| JUPITER         | 18.8443  | 184.7650 | -3.6941 | 214.5499 | 0.19756012D 10 | 13.2058904 |
| SIRTUS(B)       | 117.7668 | 227.8920 |         |          |                |            |
| BETELGEUSE(R)   | 140.8474 | 209.1162 |         |          |                |            |
| CANOPUS(B)      | 96.5829  | 258.9203 |         |          |                |            |
| ARCTURUS(R)     | 43.3590  | 128.0460 |         |          |                |            |
| RIGIL KENTAURUS | 40.6393  | 276.5431 |         |          |                |            |
| ANTARES(R)      | 16.1649  | 351.4334 |         |          |                |            |
| CAPELLA(R)      | 145.8341 | 140.6692 |         |          |                |            |
| VEGA(B)         | 74.9884  | 67.4089  |         |          |                |            |
| ALDEBARAN(R)    | 162.1870 | 205.8251 |         |          |                |            |
| RIGFL(B)        | 140.0167 | 238.4899 |         |          |                |            |
| GAMMA CRUCIS(R) | 47.8543  | 254.6577 |         |          |                |            |
| SPICA(B)        | 29.8679  | 180.1550 |         |          |                |            |
| ACHERNAR(B)     | 98.7979  | 298.6425 |         |          |                |            |
| DENEK(B)        | 97.7680  | 60.2841  |         |          |                |            |
| PROCYON(B)      | 116.0430 | 199.0714 |         |          |                |            |

STAR DELAY: 2.7045 SEC 692.3516 PULSES DECIMAL = 10. COARSE + 52. FINE  
 76.0797 DEG 12 64 PULSES OCTAL CKAH SUB C = 209.2474 EPSILON = 8.7521 SCN=10

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HOGAN

PN 10 PASS 2281 PR23 #00/00 S/W 1.2 DSS 63A RCVR AGC -123.9 FILE 10-932 TKG 05/25/78  
SPACECRAFT ATTITUDE ON DAY 145 MAY 25, 1978 1030 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.5202 RCSPHAK = 262.1900  
SPACECRAFT-EARTH DIRECTION: CLAT = -2.9182 CLON = 233.0585  
SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.8842 CLON = 233.5783

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PN 10 PASS 2281 PR23 #00/00 S/W 1.2 DSS 63A RCVR AGC -123.9 FILE 10-932 TKG 05/25/78  
SPACECRAFT ATTITUDE ON DAY 145 MAY 25, 1978 1030 GMT  
SPIN PERIOD = 12.797480-SEC RTLT = 4 HR 40 MIN 59.36 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(HP)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -2.8842 | 233.5783 | -              | -          |
| SUN             | 1.1979   | 190.4568 | -3.1010 | 232.3986 | 0.237848840 10 | 15.8989866 |
| JUPITER         | 18.9320  | 182.9340 | -3.6799 | 214.6315 | 0.198728150 10 | 13.2839672 |
| SIRIUS(R)       | 117.4571 | 228.1954 |         |          |                |            |
| BETELGEUSE(R)   | 140.7324 | 209.8995 |         |          |                |            |
| CANOPUS(R)      | 96.0285  | 258.9655 |         |          |                |            |
| ARCTURUS(R)     | 43.9660  | 127.8393 |         |          |                |            |
| RIGIL KENTAURUS | 40.0133  | 276.3861 |         |          |                |            |
| ANTARES(R)      | 15.8760  | 353.4387 |         |          |                |            |
| CAPELLA(R)      | 146.3799 | 141.1812 |         |          |                |            |
| VEGA(B)         | 75.4674  | 67.5310  |         |          |                |            |
| ALDEBARAN(R)    | 162.1017 | 207.8092 |         |          |                |            |
| RIGEL(B)        | 139.6076 | 239.0848 |         |          |                |            |
| GAMMA CRUCIS(R) | 47.3267  | 254.3336 |         |          |                |            |
| SPICA(B)        | 30.0826  | 179.1160 |         |          |                |            |
| ACHERNAR(B)     | 98.1648  | 298.6363 |         |          |                |            |
| DENEK(B)        | 98.1896  | 60.2258  |         |          |                |            |
| PROCYON(B)      | 116.0425 | 199.3945 |         |          |                |            |

STAR DELAY: 2.7029 SEC 691.9465 PULSES DECIMAL = 10, COARSE + 52, FINE  
76.0345 DFG 12.64 PULSES OCTAL CKAH SUB C = 181.2759 EPSILON = 9.1808 SCN=10

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R. HOGAN

PN 10 PASS 2286 PR23 #00/00 S/W I.2 DSS 63A RCVR AGC -123.9 FILE 10-933 NJW  
SPACECRAFT ATTITUDE ON DAY 150 MAY 30, 1978 1100 GMT

05/30/78

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.1880 RCSPHAK = 220.6400  
SPACECRAFT-EARTH DIRECTION: CLAT = -2.9223 CLON = 233.4084  
SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.0586 CLON = 233.5379

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PN 10 PASS 2286 PR23 #00/00 S/W I.2 DSS 63A RCVR AGC -123.9 FILE 10-933 NJW  
SPACECRAFT ATTITUDE ON DAY 150 MAY 30, 1978 1100 GMT  
SPIN PERIOD = 12.798330 SEC RTLT = 4 HR 41 MIN 21.95 SEC

05/30/78

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.0586 | 233.5379 | -              | -          |
| SUN             | 1.0661   | 182.3408 | -3.1016 | 232.4711 | 0,238443140 10 | 15,9387126 |
| EARTH           | 0.1879   | 133.4867 | -2.9223 | 233.4084 | 0,253054060 10 | 16,9153783 |
| JUPITER         | 18.8134  | 182.3963 | -3.6678 | 214.7016 | 0,199727350 10 | 13,3507587 |
| SIRIUS(B)       | 117.3002 | 228.2380 |         |          |                |            |
| BETELGEUSE(R)   | 140.6104 | 210.0572 |         |          |                |            |
| CANOPUS(B)      | 95.8496  | 258.9628 |         |          |                |            |
| ARCTURUS(R)     | 44.0798  | 127.6937 |         |          |                |            |
| RIGIL KENTAURUS | 39.8445  | 276.4552 |         |          |                |            |
| ANTARES(R)      | 15.8971  | 354.0612 |         |          |                |            |
| CAPFLA(R)       | 146.4575 | 141.4221 |         |          |                |            |
| VEGA(B)         | 75.6440  | 67.5365  |         |          |                |            |
| ALDEHARAN(R)    | 161.9842 | 208.2237 |         |          |                |            |
| RIGEL(B)        | 139.4373 | 239.1471 |         |          |                |            |
| GAMMA CRUCIS(R) | 47.1479  | 254.3238 |         |          |                |            |
| SPICA(B)        | 30.0455  | 178.8114 |         |          |                |            |
| ACHERNAR(B)     | 98.0311  | 298.6172 |         |          |                |            |
| DENEK(B)        | 98.3610  | 60.2162  |         |          |                |            |
| PROCYON(B)      | 115.9464 | 199.4660 |         |          |                |            |

STAR DELAY: 2.7032 SEC 692.0174 PULSES DECIMAL = 10. COARSE + 52, FINE  
76.0372 DEG 12 64 PULSES OCTAL CKAH SUB C = 172.7254 EPSILON= 9.6154 SCN=10

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HOGAN

PA 10 PASS 2297 PR23 400/00 S/A 1.2 DSS 63A RCVR AGC -125.6 FILE 10-934 TKG 06/12/78  
SPACECRAFT ATTITUDE ON DAY 161 JUN 10, 1978 1000 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.7432 RCSPHAK = 102.5000  
SPACECRAFT-EARTH DIRECTION: CLAT = -2.9349 CLON = 234.1443  
SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.1005 CLON = 233.4187

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PA 10 PASS 2297 PR23 400/00 S/A 1.2 DSS 63A RCVR AGC -125.6 FILE 10-934 TKG 06/12/78  
SPACECRAFT ATTITUDE ON DAY 161 JUN 10, 1978 1000 GMT  
SPIN PERIOD = 12.800290 SEC RTLT = 4 HR 41 MIN 49.04 SEC

|                 | CKA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.1005 | 233.4187 | -              | -          |
| SUN             | 0.7886   | 180.2211 | -3.1032 | 232.6289 | 0.239757400 10 | 16.0265642 |
| EARTH           | 0.7432   | 12.8559  | -2.9349 | 234.1443 | 0.253460150 10 | 16.9425234 |
| SIRIUS          | 18.5385  | 182.2093 | -3.6418 | 214.8556 | 0.201909270 10 | 13.4966090 |
| SIRIUS(R)       | 117.1897 | 228.2002 |         |          |                |            |
| BETELGEUSE(R)   | 140.4864 | 210.0224 |         |          |                |            |
| CANOPUS(B)      | 95.7857  | 258.9453 |         |          |                |            |
| ARCTURUS(R)     | 49.0403  | 127.5635 |         |          |                |            |
| RIGIL KENTARUS  | 39.8165  | 276.5962 |         |          |                |            |
| ANTARES(R)      | 16.0112  | 354.2428 |         |          |                |            |
| CAPPELLA(R)     | 146.3904 | 141.5766 |         |          |                |            |
| VEGA(B)         | 75.7282  | 67.5061  |         |          |                |            |
| ALDEBARAN(R)    | 161.8596 | 208.1580 |         |          |                |            |
| RIGEL(R)        | 139.3403 | 239.0467 |         |          |                |            |
| GAMMA CRUCIS(R) | 47.0755  | 254.4134 |         |          |                |            |
| SPICA(B)        | 29.9274  | 178.7281 |         |          |                |            |
| ACHERNAR(R)     | 98.0513  | 298.5933 |         |          |                |            |
| DENEB(B)        | 98.4564  | 60.2220  |         |          |                |            |
| PROCYON(B)      | 115.8203 | 199.4595 |         |          |                |            |

STAR DELAY: 2.7042 SEC 692.2825 PULSES DECIMAL = 10, COARSE + 52, FINE  
76.0547 DFG 12 64 PULSES OCTAL CKAH SUB C = 169.6018 EPSILON=10.6193 SCN=10

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HOBAN

RN 10 PASS 2300 PR23 #00/00 S/W 1.2 DSS 63A RCVR AGC -123.9 FILE 10-935 RWF  
SPACECRAFT ATTITUDE ON DAY 164 JUN 13, 1978 1000 GMT

06/14/78

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C,  
REFERENCE FOR RCS PHAK IS TOWARD SOUTH ECLIPTIC POLE.

PRE-PRECESSION

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.9538 RCSPHAK = 100.9300  
SPACECRAFT-EARTH DIRECTION: CLAT = -2.9377 CLON = 234.2736  
SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.1165 CLON = 233.3354

REVISED

REPLACES FILE NO. 10-936

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RN 10 PASS 2300 PR23 #00/00 S/W 1.2 DSS 63A RCVR AGC -123.9 FILE 10-935 RWF  
SPACECRAFT ATTITUDE ON DAY 164 JUN 13, 1978 1000 GMT  
SPIN PERIOD = 12.800900 SEC RTLT = 4 HR 41 MIN 50.81 SEC

06/14/78

|                 | CNA      | CKA      | CLAT    | CLON     | R (KM)         | R (AU)     |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.1165 | 233.3354 | -              | -          |
| SUN             | 0.6770   | 178.8985 | -3.1032 | 232.6575 | 0.239996130 10 | 16.0425221 |
| EARTH           | 0.9538   | 10.7769  | -2.9377 | 234.2736 | 0.253446700 10 | 16.9442981 |
| JUPITER         | 18.4264  | 182.1533 | -3.6371 | 214.8839 | 0.262308160 10 | 13.5232727 |
| STARICUS(R)     | 117.1223 | 228.1694 |         |          |                |            |
| BETELGEUSE(R)   | 140.4063 | 209.9843 |         |          |                |            |
| CANOPUS(B)      | 95.7541  | 258.9328 |         |          |                |            |
| ARCTURUS(R)     | 44.0023  | 127.4806 |         |          |                |            |
| RIGIL KENTAURUS | 39.8102  | 276.6931 |         |          |                |            |
| ANTARES(R)      | 16.0924  | 354.3224 |         |          |                |            |
| CAPPELLA(R)     | 146.3351 | 141.6686 |         |          |                |            |
| VEGA(B)         | 75.7748  | 67.4836  |         |          |                |            |
| ALDEBARAN(R)    | 161.7786 | 208.0771 |         |          |                |            |
| RIGEL(B)        | 139.2837 | 238.9687 |         |          |                |            |
| GAMMA CRUCIS(F) | 47.0378  | 254.4795 |         |          |                |            |
| SPICA(B)        | 29.8446  | 178.6925 |         |          |                |            |
| ACHERNAR(B)     | 98.0771  | 298.5773 |         |          |                |            |
| DENEB(B)        | 98.5116  | 60.2270  |         |          |                |            |
| PROCYON(B)      | 115.7365 | 199.4489 |         |          |                |            |

STAR DELAY: 2.7048 SEC 692.4289 PULSES DECIMAL = 10, COARSE + 52, FINE  
76.0672 DEG 12 64 PULSES OCTAL CKAH SUB C = 167,6393 EPSILON=11,0593 SCN=10

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HOGAN

PN 10 PASS 2300 PR23 #9/10 S/W SI,2 DSS63A RCVR AGC -123,9 FILE 10-936 CM  
SPACECRAFT ATTITUDE ON DAY 164 JUN 13,1978 1600 GMT

06/14/78

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C,  
REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

NEW ATTITUDE  
POST-PRECESSION

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,6961 RCSPHAK = 277,0400  
SPACECRAFT-EARTH DIRECTION: CLAT = -2,9383 CLON = 234,2897  
SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2,7708 CLON = 234,9662

REPLACES FILE NO. 10-937

REVISED

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PN 10 PASS 2300 PR23 #9/10 S/W SI,2 DSS63A RCVR AGC -123,9 FILE 10-936 CM  
SPACECRAFT ATTITUDE ON DAY 164 JUN 13,1978 1600 GMT  
SPIN PERIOD = 12,800900 SEC RTLT = 4 HR 41 MIN 50,97 SEC

06/14/78

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AL)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -2,7708 | 234,9662 | -              | -          |
| SUN             | 2,3260   | 188,2748 | -3,1033 | 232,6611 | 0,24002598D 10 | 16,0445174 |
| EARTH           | 0,6961   | 193,9393 | -2,9383 | 234,2897 | 0,25308907D 10 | 16,9444566 |
| JUPITER         | 20,0721  | 183,0167 | -3,6376 | 214,8809 | 0,2226538D 10  | 13,5204131 |
| SIRIUS(B)       | 118,4608 | 228,7750 |         |          |                |            |
| BETELGEUSE(B)   | 141,9864 | 210,7207 |         |          |                |            |
| CANOPUS(B)      | 96,4026  | 259,1799 |         |          |                |            |
| ARCTURUS(R)     | 44,7402  | 129,0902 |         |          |                |            |
| RIGIL KENTAURUS | 39,9911  | 274,7972 |         |          |                |            |
| ANTARES(R)      | 14,5141  | 352,4666 |         |          |                |            |
| CAPELLA(R)      | 147,3770 | 139,7632 |         |          |                |            |
| VEGA(B)         | 74,8371  | 67,9282  |         |          |                |            |
| ALDEBARAN(R)    | 163,3717 | 209,7039 |         |          |                |            |
| RIGEL(B)        | 140,4030 | 240,5135 |         |          |                |            |
| GAMMA CRUCIS(R) | 47,8230  | 253,2145 |         |          |                |            |
| SPICA(B)        | 31,4673  | 179,4049 |         |          |                |            |
| ACHERNAR(B)     | 97,5973  | 298,8805 |         |          |                |            |
| DENEK(B)        | 97,4019  | 60,1373  |         |          |                |            |
| PROCYON(B)      | 117,3869 | 199,6422 |         |          |                |            |

STAR DELAY: 2,6960 SEC 690,1800 PULSES DECIMAL = 10, COARSE + 50, FINE  
75,8201 DEG 12 62 PULSES OCTAL CKAH SUB C = 181,9023 EPSILON= 6,3725 SCN=10

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HOGAN

06/16/78

PN 10 PASS 2303 PR23 #00/00 S/W 1.2 DSS 63A RCVR AGC -123.9 FILE 10-937 NJW  
SPACECRAFT ATTITUDE ON DAY 167 JUN 16,1978 0930 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPFAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRHS = 180 RCSTPOS = 180  
AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.4467 RCSPFAK = 265.7200  
SPACECRAFT-EARTH DIRECTION: CLAT = -2.9438 CLON = 234.5251  
SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.9373 CLON = 234.9724

REVISED

REPLACES FILE NO. 938

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PN 10 PASS 2303 PR23 #00/00 S/W 1.2 DSS 63A RCVR AGC -123.9 FILE 10-937 NJW 06/16/78  
SPACECRAFT ATTITUDE ON DAY 167 JUN 16,1978 0930 GMT  
SPIN PERIOD = 12.799800 SEC RTLT = 4 HR 41 MIN 51.55 SEC

|                 | CKA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -2.9373 | 234.9724 |                |            |
| SUN             | 2.2614   | 184.2810 | -3.1037 | 232.7140 | 0.24047010D 10 | 16.0742045 |
| JUPITER         | 20.0107  | 182.5369 | -3.6278 | 214.9403 | 0.20310075D 10 | 13.5762533 |
| SIRIUS(B)       | 118.3397 | 228.8371 |         |          |                |            |
| BETFLGEUSE(R)   | 141.9065 | 210.9076 |         |          |                |            |
| CANCPLS(B)      | 96.2403  | 259.1843 |         |          |                |            |
| ARCTURUS(R)     | 44.8733  | 128.9898 |         |          |                |            |
| RIGIL KENTAURUS | 39.8247  | 274.8068 |         |          |                |            |
| ANTARES(R)      | 14.4870  | 353.1023 |         |          |                |            |
| CAPELLA(R)      | 147.4891 | 139.9565 |         |          |                |            |
| VEGA(B)         | 74.9890  | 67.9469  |         |          |                |            |
| ALDEBARAN(R)    | 163.2940 | 210.1963 |         |          |                |            |
| MIGFL(B)        | 140.2611 | 240.6189 |         |          |                |            |
| GAMMA CRUCIS(R) | 47.6655  | 253.1657 |         |          |                |            |
| SPICA(B)        | 31.4756  | 179.1335 |         |          |                |            |
| ACHERNAR(B)     | 97.4486  | 298.8709 |         |          |                |            |
| DENE(B)         | 97.5431  | 60.1260  |         |          |                |            |
| PROCYON(B)      | 117.3367 | 199.7247 |         |          |                |            |

STAR DELAY: 2.6956 SEC 690.0802 PULSES DECIMAL = 10. COARSE + 50. FINE  
75.8157 DEG 12 62 PULSES OCTAL CKAH SUB C = 177.7853 EPSILON = 6.4958 SCN=10

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R. HOGAN

N 10 PASS 2307 PR23 #00/00 S/W I.2 DSS 63A RCVR AGC -123.9 FILE 10-938  
SPACECRAFT ATTITUDE ON DAY 171 JUN 20,1978 0900 GMT

06/20/78

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,2580 RCSPHAK = 261,1000  
SPACECRAFT-EARTH DIRECTION: CLAT = -2,9506 CLON = 234,7700  
SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2,9751 CLON = 235,0272

REVISED

REPLACES FILE NO. 939

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N 10 PASS 2307 PR23 #00/00 S/W I.2 DSS 63A RCVR AGC -123.9 FILE 10-938  
SPACECRAFT ATTITUDE ON DAY 171 JUN 20,1978 0900 GMT  
SPIN PERIOD = 12,800530 SEC RTLT = 4 HR 41 MIN 48,69 SEC

06/20/78

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -2,9751 | 235,0272 | -              | -          |
| SUN             | 2,2572   | 183,3378 | -3,1042 | 232,7706 | 0,24094601D 10 | 16,1060167 |
| EARTH           | 0,2580   | 174,5642 | -2,9506 | 234,7700 | 0,25345487D 10 | 16,9421705 |
| JUPITER         | 20,0069  | 182,4061 | -3,6186 | 214,9971 | 0,20389747D 10 | 13,6295100 |
| SIRIUS(B)       | 118,3473 | 228,8756 |         |          |                |            |
| BETELGEUSE(R)   | 141,9340 | 210,9878 |         |          |                |            |
| CANOPUS(B)      | 96,2134  | 259,1938 |         |          |                |            |
| ARCTURUS(R)     | 44,9372  | 129,0114 |         |          |                |            |
| RIGIL KENTAURUS | 39,7825  | 274,7479 |         |          |                |            |
| ANTARES(R)      | 14,4281  | 353,2255 |         |          |                |            |
| CAPELLA(R)      | 147,5554 | 139,9494 |         |          |                |            |
| VEGA(B)         | 75,0035  | 67,9671  |         |          |                |            |
| ALDEBARAN(R)    | 163,3222 | 210,4002 |         |          |                |            |
| RIGEL(B)        | 140,2550 | 240,7015 |         |          |                |            |
| GAMMA CRUCIS(R) | 47,6451  | 253,1107 |         |          |                |            |
| SPICA(B)        | 31,5310  | 179,0760 |         |          |                |            |
| ACHERNAR(B)     | 97,3890  | 298,8776 |         |          |                |            |
| DENEK(B)        | 97,5487  | 60,1201  |         |          |                |            |
| PROCYON(B)      | 117,3755 | 199,7555 |         |          |                |            |

STAR DELAY: 2,6954 SEC 690,0334 PULSES DECIMAL = 10, COARSE + 50, FINE  
75,8062 DEG 12 62 PULSES OCTAL CKAH SUB C = 176,8339 EPSILON= 6,5039 SCN=10

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PN 10 PASS 2316 PR23 #00/00 S/W 1.2 DSS 63A RCVR AGC -123.9 FILE 10-939 NJW  
 SPACECRAFT ATTITUDE ON DAY 180 JUN 29, 1978 0800 GMT

06/29/78

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.3958 RCSPHAK = 91.2270  
 SPACECRAFT-EARTH DIRECTION: CLAT = -2.9680 CLON = 235.2888  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.9995 CLON = 234.8937

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 PN 10 PASS 2316 PR23 #00/00 S/W 1.2 DSS 63A RCVR AGC -123.9 FILE 10-939 NJW  
 SPACECRAFT ATTITUDE ON DAY 180 JUN 29, 1978 0800 GMT  
 SPIN PERIOD = 12.802120 SEC RTLT = 4 HR 41 MIN 29.74 SEC

06/29/78

|                  | CNA      | CKA      | CLAT    | CLON     | R (KM)         | R (AU)     |
|------------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS      | 0.0000   | 0.0000   | -2.9995 | 234.8937 | -              | -          |
| SUN              | 1.9968   | 183.0870 | -3.1052 | 232.8968 | 0.242015050 10 | 16.1774760 |
| EARTH            | 0.3958   | 4.5520   | -2.9680 | 235.2888 | 0.253170920 10 | 16.9231690 |
| JUPITER          | 10.7440  | 182.2940 | -3.5900 | 215.1256 | 0.205090310 10 | 13.7493520 |
| STARULS (R)      | 118.2411 | 220.0230 |         |          |                |            |
| BETELGEUSE (R)   | 141.8071 | 210.9200 |         |          |                |            |
| ANTARES (R)      | 96.1644  | 259.1731 |         |          |                |            |
| ARCTURUS (R)     | 40.8724  | 128.8850 |         |          |                |            |
| RIGIL KENTHAUS   | 39.7693  | 274.9030 |         |          |                |            |
| ANTARES (R)      | 14.5578  | 353.3727 |         |          |                |            |
| CAPELLA (R)      | 147.4688 | 140.1005 |         |          |                |            |
| VEGA (R)         | 75.0763  | 67.9296  |         |          |                |            |
| ALDEBARAN (R)    | 163.1947 | 210.2395 |         |          |                |            |
| RIGEL (R)        | 140.1683 | 240.5693 |         |          |                |            |
| GAMMA CRUCIS (R) | 47.5831  | 253.2138 |         |          |                |            |
| SPICA (R)        | 31.3980  | 179.0255 |         |          |                |            |
| ACHERNAR (R)     | 97.4320  | 298.8539 |         |          |                |            |
| DENEK (R)        | 97.6363  | 60.1269  |         |          |                |            |
| PROCYON (R)      | 117.2417 | 199.7372 |         |          |                |            |

STAR DELAY: 2.6965 SEC 690,3073 PULSES DECIMAL = 10, COARSE + 50, FINE  
 75.8269 DEC 12.62 PULSES OCTAL CKAH SUB C = 176,044 EPSILONE 7.0429 SCN#10

10 PASS 2322 PR23 #00/00 S/W 1.2 DSS 63A RCVR AGC =125.6 FILE 10-940 NJW  
 SPACECRAFT ATTITUDE ON DAY 186 JUL 5,1978 0800 GMT

07/05/78

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.7218 RCSPHAK = 89.9660  
 SPACECRAFT-EARTH DIRECTION: CLAT = -2.9813 CLON = 235.0088  
 SPACERAFT +Z AXIS ATTITUDE: CLAT = -3.0156 CLON = 234.8869

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10 PASS 2322 PR23 #00/00 S/W 1.2 DSS 63A RCVR AGC =125.6 FILE 10-940 NJW  
 SPACECRAFT ATTITUDE ON DAY 186 JUL 5,1978 0800 GMT  
 SPIN PERIOD = 12.803220 SEC RTLT = 4 HR 41 MIN 7.98 SEC

07/05/78

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.0156 | 234.8869 | -              | -          |
| SUN             | 1.9056   | 182.7678 | -3.1059 | 232.9807 | 0.242730940 10 | 16.2253302 |
| EARTH           | 0.7218   | 2.7001   | -2.9813 | 235.6088 | 0.252844680 10 | 16.9013824 |
| JUPITER         | 19.6499  | 182.2141 | -3.5843 | 215.2122 | 0.206893320 10 | 13.8297674 |
| SIRIUS(B)       | 118.2245 | 228.8258 |         |          |                |            |
| BETELGEUSE(R)   | 141.7930 | 210.9329 |         |          |                |            |
| CANOPUS(B)      | 96.1474  | 259.1724 |         |          |                |            |
| ARCTURUS(R)     | 44.8806  | 128.8692 |         |          |                |            |
| RIGIL KENTAURUS | 39.7539  | 274.9125 |         |          |                |            |
| ANTARES(R)      | 14.5627  | 353.4367 |         |          |                |            |
| CAPELLA(R)      | 147.4739 | 140.1322 |         |          |                |            |
| VEGA(B)         | 75.0937  | 67.9292  |         |          |                |            |
| ALDEBARAN(R)    | 163.1808 | 210.2737 |         |          |                |            |
| RIGEL(B)        | 140.1510 | 240.5713 |         |          |                |            |
| GAMMA CRUCIS(R) | 47.5658  | 253.2152 |         |          |                |            |
| SPICA(B)        | 31.3915  | 178.9987 |         |          |                |            |
| ACHERNAR(B)     | 97.4212  | 298.8518 |         |          |                |            |
| DENEK(B)        | 97.6536  | 60.1262  |         |          |                |            |
| PROCYON(B)      | 117.2299 | 199.7434 |         |          |                |            |

STAR DELAY: 2.6968 SEC 690.3734 PULSES DECIMAL = 10. COARSE + 50. FINE  
 75.8276 DEG 12 62 PULSES OCTAL CKAH SUB C = 175.5194 EPSILON = 7.2484 SCN = 10

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PN 10 PASS 2324 PR23 #00/00 S/W I.2 DSS 63A RCVR AGC -123.9 FILE 10-941 NJW  
SPACECRAFT ATTITUDE ON DAY 188 JUL 7,1978 0800 GMT

07/07/78

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

*PRE PRECESSION*

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.8224 RCSPHAK = 89.8440  
SPACECRAFT-EARTH DIRECTION: CLAT = -2.9860 CLON = 235.7102  
SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.0208 CLON = 234.8873

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PN 10 PASS 2324 PR23 #00/00 S/W I.2 DSS 63A RCVR AGC -123.9 FILE 10-941 NJW  
SPACECRAFT ATTITUDE ON DAY 188 JUL 7,1978 0800 GMT  
SPIN PERIOD = 12.803580 SEC RTLT = 4 HR 40 MIN 59.22 SEC

07/07/78

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.0208 | 234.8873 | -              | -          |
| SUN             | 1.8780   | 182.6534 | -3.1061 | 233.0086 | 0.24296955D 10 | 16.2412801 |
| EARTH           | 0.8224   | 2.4030   | -2.9860 | 235.7102 | 0.25271346D 10 | 16.8926110 |
| JUPITER         | 19.6211  | 182.1874 | -3.5798 | 215.2412 | 0.20729470D 10 | 13.8565976 |
| SIRIUS(B)       | 118.2209 | 228.8279 |         |          |                |            |
| BETELGEUSE(R)   | 141.7907 | 210.9389 |         |          |                |            |
| CANOPUS(B)      | 96.1423  | 259.1726 |         |          |                |            |
| ARCTURUS(R)     | 44.8850  | 128.8663 |         |          |                |            |
| RIGIL KENTAURUS | 39.7486  | 274.9125 |         |          |                |            |
| ANTARES(R)      | 14.5616  | 353.4566 |         |          |                |            |
| CAPELLA(R)      | 147.4776 | 140.1381 |         |          |                |            |
| VEGA(R)         | 75.0984  | 67.9298  |         |          |                |            |
| ALDEBARAN(R)    | 163.1785 | 210.2895 |         |          |                |            |
| RIGEL(B)        | 140.1466 | 240.5749 |         |          |                |            |
| GAMMA CRUCIS(R) | 47.5609  | 253.2134 |         |          |                |            |
| SPICA(B)        | 31.3921  | 178.9901 |         |          |                |            |
| ACHERNAR(B)     | 97.4164  | 298.8515 |         |          |                |            |
| DENEK(B)        | 97.6579  | 60.1259  |         |          |                |            |
| PROCYON(B)      | 117.2285 | 199.7461 |         |          |                |            |

STAR DELAY: 2.6968 SEC 690,3912 PULSES DECIMAL = 10. COARSE + 50. FINE  
75.8274 DEG 12 62 PULSES OCTAL CKAH SUB C = 175,3410 EPSILON= 7.3123 SCN=10

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HOGAN

PK 10 PASS 2325 PR23 #00/00 S/W 1.2 DSS 63A RCVR AGC -123.9 FILE 10-942  
SPACECRAFT ATTITUDE ON DAY 189 JUL 8, 1978 0800 GMT

JJA

07/08/78

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

*Post-Precession*

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.7765 RCSPHAK = 243.3000  
 SPACECRAFT-EARTH DIRECTION: CLAT = -2.9884 CLON = 235.7597  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3902 CLON = 236.4253

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 PK 10 PASS 2325 PR23 #00/00 S/W 1.2 DSS 63A RCVR AGC -123.9 FILE 10-942 JJA 07/08/78  
 SPACECRAFT ATTITUDE ON DAY 189 JUL 8, 1978 0800 GMT  
 SPIN PERIOD = 12.802360 SEC RTLT = 4 HR 40 MIN 54.58 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3902 | 236.4253 | -              | -          |
| SUN             | 3.4092   | 175.3209 | -3.1063 | 233.0225 | 0.24308885D 10 | 16.2492547 |
| EARTH           | 0.7765   | 148.8646 | -2.9884 | 235.7597 | 0.25264385D 10 | 16.8879579 |
| JUPITER         | 21.1308  | 181.1528 | -3.5775 | 215.2557 | 0.20749548D 10 | 13.8700187 |
| STRILS(R)       | 118.9434 | 229.6791 |         |          |                |            |
| BETELGEUSE(R)   | 142.9030 | 212.4782 |         |          |                |            |
| CANCFUS(B)      | 96.0645  | 259.4272 |         |          |                |            |
| ARCTURUS(R)     | 46.1447  | 129.8880 |         |          |                |            |
| RIGIL KENTAURUS | 39.2719  | 273.1724 |         |          |                |            |
| ANTARES(R)      | 12.9956  | 354.3766 |         |          |                |            |
| CAPELLA(R)      | 148.8865 | 139.0736 |         |          |                |            |
| VEGA(B)         | 74.8705  | 68.4351  |         |          |                |            |
| ALDEBARAN(R)    | 164.2803 | 214.2555 |         |          |                |            |
| RIGEL(B)        | 140.5538 | 242.5024 |         |          |                |            |
| GAMMA CRUCIS(R) | 47.6694  | 251.8613 |         |          |                |            |
| SPICA(B)        | 32.9352  | 178.5415 |         |          |                |            |
| ACHERNAR(B)     | 96.3496  | 299.0781 |         |          |                |            |
| DENERB(B)       | 97.2118  | 60.0142  |         |          |                |            |
| PROCYON(B)      | 118.5449 | 200.2939 |         |          |                |            |

STAR DELAY: 2.6875 SEC 688.0068 PULSES DECIMAL = 10, COARSE + 48, FINE  
 75.5728 DEG 12 60 PULSES OCTAL CKAH SUB C = 170.5180 EPSILON = 4.8029 SCN=10

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PN 10 PASS 2328 PR23 #00/00 S/W 1.2 DSS 63A RCVR AGC -122.2 FILE 10-943 NJW  
 SPACECRAFT ATTITUDE ON DAY 192 JUL 11, 1978 0800 GMT

07/11/78

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPFAK IS TOWARD SOUTH ECLIPTIC POLE,

*Hog AN*

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.6198 RCSPHAK = 237.0100  
 SPACECRAFT-EARTH DIRECTION: CLAT = -2.9958 CLON = 235.9042  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3661 CLON = 236.4020

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PN 10 PASS 2328 PR23 #00/00 S/W 1.2 DSS 63A RCVR AGC -122.2 FILE 10-943 NJW  
 SPACECRAFT ATTITUDE ON DAY 192 JUL 11, 1978 0800 GMT  
 SPIN PERIOD = 12.802970 SEC RTLT = 4 HR 40 MIN 39.62 SEC

07/11/78

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3661 | 236.4020 | -              | -          |
| SUN             | 3.3426   | 175.6419 | -3.1066 | 233.0641 | 0.24344675D 10 | 16.2731785 |
| EARTH           | 0.6198   | 143.3257 | -2.9958 | 235.9042 | 0.25241961D 10 | 16.8729686 |
| JUPITER         | 21.0645  | 181.1959 | -3.5708 | 215.2994 | 0.20809806D 10 | 13.9102981 |
| SIRIUS(R)       | 118.9466 | 229.6593 |         |          |                |            |
| BETELGEUSE(R)   | 142.8963 | 212.4336 |         |          |                |            |
| CANOPUS(B)      | 96.0838  | 259.4230 |         |          |                |            |
| ARCTURUS(R)     | 46.1113  | 129.8843 |         |          |                |            |
| RIGIL KENTAURUS | 39.2972  | 273.1978 |         |          |                |            |
| ANTARES(R)      | 13.0211  | 354.2817 |         |          |                |            |
| CAPELLA(R)      | 148.8532 | 139.0674 |         |          |                |            |
| VEGA(B)         | 74.8568  | 68.4254  |         |          |                |            |
| ALDEBARAN(R)    | 164.2746 | 214.1371 |         |          |                |            |
| RIGEL(B)        | 140.5644 | 242.4625 |         |          |                |            |
| GAMMA CRUCIS(R) | 47.6850  | 251.8869 |         |          |                |            |
| SPICA(B)        | 32.9113  | 178.5763 |         |          |                |            |
| ACHERNAR(B)     | 96.3819  | 299.0758 |         |          |                |            |
| DENEK(B)        | 97.2026  | 60.0168  |         |          |                |            |
| PROCYON(B)      | 118.5314 | 200.2759 |         |          |                |            |

STAR DELAY: 2.6878 SEC 688.0785 PULSES DECIMAL = 10. COARSE + 48. FINE  
 75.5770 DEG 12 60 PULSES OCTAL CKAH SUB C = 170.7655 EPSILON = 4.8764 SCN=10

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10 PASS 2337 PR23 #00/00 S/W 1.2 DSS 63B RCVR AGC -125.6 FILE 10-944 TKG  
 SPACECRAFT ATTITUDE ON DAY 201 JUL 20, 1978 1030 GMT

07/20/78

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.3912 RCSPHAK = 190.7700  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.0199 CLON = 236.3002  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.4093 CLON = 236.3374

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 10 PASS 2337 PR23 #00/00 S/W 1.2 DSS 63B RCVR AGC -125.6 FILE 10-944 TKG  
 SPACECRAFT ATTITUDE ON DAY 201 JUL 20, 1978 1030 GMT  
 SPIN PERIOD = 12.804560 SEC RTLT = 4 HR 39 MIN 45.68 SEC

07/20/78

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.4093 | 236.3374 | -              | -          |
| SUN             | 3.1571   | 174.6065 | -3.1076 | 233.1897 | 0.24453171D 10 | 16.3457025 |
| EARTH           | 0.3912   | 95.4556  | -3.0199 | 236.3002 | 0.25161099D 10 | 16.8189164 |
| JUPITER         | 56.3680  | 105.9900 | *****   | 215.4324 | 0.20992771D 10 | 14.0326009 |
| SIRIUS(B)       | 118.8720 | 229.6438 |         |          |                |            |
| BETELGEUSE(P)   | 142.8187 | 212.4322 |         |          |                |            |
| CANOPUS(B)      | 96.0295  | 259.4133 |         |          |                |            |
| ARCTURUS(R)     | 46.1032  | 129.8063 |         |          |                |            |
| RIGIL KENTAURUS | 39.2577  | 273.2757 |         |          |                |            |
| ANTARES(R)      | 13.0810  | 354.4905 |         |          |                |            |
| CAPELLA(R)      | 148.8327 | 139.1873 |         |          |                |            |
| VEGA(B)         | 74.9206  | 68.4097  |         |          |                |            |
| ALDEBARAN(R)    | 164.1970 | 214.1319 |         |          |                |            |
| RIGEL(B)        | 140.4963 | 242.4135 |         |          |                |            |
| GAMMA CRUCIS(R) | 47.6239  | 251.9267 |         |          |                |            |
| SPICA(B)        | 32.8480  | 178.5032 |         |          |                |            |
| ACHERNAR(B)     | 96.3755  | 299.0633 |         |          |                |            |
| DFNEB(B)        | 97.2722  | 60.0174  |         |          |                |            |
| PROCYON(B)      | 118.4560 | 200.2819 |         |          |                |            |

STAR DELAY: 2.6885 SEC 688.2523 PULSES DECIMAL = 10, COARSE + 48, FINE  
 75.5867 DEG 12 60 PULSES OCTAL CKAH SUB C = 169.5116 EPSILON= 5.0949 SCN=10

Hogan

PN 10 PASS 2347 PR23 #0/0 S/W SI,2 DSS63A RCVR AGC -122.23 FILE 10-945A  
SPACECRAFT ATTITUDE ON DAY 211 JUL 30,1978 0800 GMT

CM

07/31/78

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERFNCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,5297 RCSPHAK = 136,4000  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3,0485 CLON = 236,6544  
 SPACERAFT +Z AXIS ATTITUDE: CLAT = -3,3998 CLON = 236,2573

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PN 10 PASS 2347 PR23 #0/0 S/W SI,2 DSS63A RCVR AGC -122.23 FILE 10-945A  
SPACECRAFT ATTITUDE ON DAY 211 JUL 30,1978 0800 GMT  
SPIN PERIOD = 12,806270 SEC RTLT = 4 HR 38 MIN 34,60 SEC

CM

07/31/78

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -3,3998 | 236,2573 | -              | -          |
| SUN             | 2,9419   | 174,4046 | -3,1087 | 233,3251 | 0,245712850 10 | 16,4246557 |
| EARTH           | 0,5297   | 41,5397  | -3,0485 | 236,6544 | 0,250545530 10 | 16,7476959 |
| JUPITER         | 20,6411  | 180,9855 | -3,5287 | 215,5784 | 0,211924280 10 | 14,1660615 |
| STRIUS(B)       | 118,8275 | 229,6021 |         |          |                |            |
| BETELGEUSE(R)   | 142,7563 | 212,3605 |         |          |                |            |
| CANOPUS(B)      | 96,0242  | 259,4000 |         |          |                |            |
| ARCTURUS(R)     | 46,0448  | 129,7482 |         |          |                |            |
| RIGIL KENTAURUS | 39,2718  | 273,3679 |         |          |                |            |
| ANTARES(R)      | 13,1615  | 354,4781 |         |          |                |            |
| CAPELLA(R)      | 148,7660 | 139,2569 |         |          |                |            |
| VEGA(R)         | 74,9412  | 68,3840  |         |          |                |            |
| ALDEBARAN(R)    | 160,1361 | 213,9415 |         |          |                |            |
| RIGEL(B)        | 140,4676 | 242,3176 |         |          |                |            |
| GAMMA CRUCIS(R) | 47,6082  | 251,9940 |         |          |                |            |
| SPICA(B)        | 32,7678  | 178,5099 |         |          |                |            |
| ACHERNAR(B)     | 96,4226  | 299,0513 |         |          |                |            |
| DENEK(B)        | 97,3040  | 60,0221  |         |          |                |            |
| PROCYON(B)      | 118,3843 | 200,2574 |         |          |                |            |

STAR DELAY: 2,6893 SEC 688,4647 PULSES DECIMAL = 10, COARSE + 48, FINE  
 75,6000 DEG 12 60 PULSES OCTAL CKAH SUB C = 169,0286 EPSILON = 5,3761 SCN=10

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N 10 PASS 2350 PR23 #00/00 S/W SI,2 DSS63A RCVR AGC -122.2 FILE 10-946  
SPACECRAFT ATTITUDE ON DAY 214 AUG 2,1978 0900 GMT

TLS

08/02/78

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
- AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.5998 RCSPHAK = 129.4900  
SPACECRAFT-EARTH DIRECTION: CLAT = -3.0577 CLON = 236.7459  
SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3971 CLON = 236.2506

*Hogan*

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N 10 PASS 2350 PR23 #00/00 S/W SI,2 DSS63A RCVR AGC -122.2 FILE 10-946  
SPACECRAFT ATTITUDE ON DAY 214 AUG 2,1978 0900 GMT  
SPIN PERIOD = 12.806880 SEC RTLT = 4 HR 38 MIN 10.69 SEC

TLS

08/02/78

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3971 | 236.2506 | -              | -          |
| SUN             | 2.8939   | 174.3685 | -3.1090 | 233.3664 | 0.24607553D 10 | 16.4488991 |
| EARTH           | 0.5998   | 34.4565  | -3.0577 | 236.7459 | 0.25018725D 10 | 16.7237467 |
| JUPITER         | 20.5895  | 180.9732 | -3.5221 | 215.6235 | 0.21253835D 10 | 14.2071090 |
| SIRIUS(B)       | 118.8252 | 229.5979 |         |          |                |            |
| BETELGEUSE(R)   | 142.7521 | 212.3524 |         |          |                |            |
| CANCPUS(B)      | 96.0256  | 259.3989 |         |          |                |            |
| ARCTURUS(R)     | 46.0384  | 129.7445 |         |          |                |            |
| RIGIL KENTAURUS | 39.2749  | 273.3754 |         |          |                |            |
| ANTARFS(R)      | 13.1684  | 354.4691 |         |          |                |            |
| CAPELLA(R)      | 148.7592 | 139.2603 |         |          |                |            |
| VEGA(B)         | 74.9412  | 68.3817  |         |          |                |            |
| ALDEBARAN(R)    | 164.1320 | 213.9202 |         |          |                |            |
| RIGEL(B)        | 140.4669 | 242.3085 |         |          |                |            |
| GAMMA CRUCIS(R) | 47.6087  | 252.0001 |         |          |                |            |
| SPICA(B)        | 32.7611  | 178.5134 |         |          |                |            |
| ACHERNAR(B)     | 96.4282  | 299.0503 |         |          |                |            |
| DENEK(B)        | 97.3050  | 60.0226  |         |          |                |            |
| PROCYCN(B)      | 118.3789 | 200.2544 |         |          |                |            |

STAR DELAY: 2.6895 SEC 688.5079 PULSES DECIMAL = 10. COARSE + 49. FINE  
75.6011 DEG 12 61 PULSES OCTAL CKAH SUB C = 168.9254 EPSILON = 5.4431 SCN = 10

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HOGAN

PN 10 PASS 2359 FR23 #00/00 S/W SI,2 DSS63A RCVR AGC -122.2 FILE 10-947 TKG 08/11/78  
SPACECRAFT ATTITUDE ON DAY 223 AUG 11,1978 0600 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.8169 RCSPHAK = 118.9080  
SPACECRAFT-EARTH DIRECTION: CLAT = -3.0854 CLON = 236.9639  
SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.4099 CLON = 236.2130

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PN 10 PASS 2359 FR23 #00/00 S/W SI,2 DSS63A RCVR AGC -122.2 FILE 10-947 TKG 08/11/78  
SPACECRAFT ATTITUDE ON DAY 223 AUG 11,1978 0600 GMT  
SPIN PERIOD = 12.808460 SEC RTLT = 4 HR 36 MIN 57.01 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.4099 | 236.2130 | -              | -          |
| SUN             | 2.7387   | 173.7900 | -3.1099 | 233.4863 | 0.247133630 10 | 16.5196277 |
| EARTH           | 0.8169   | 23.3830  | -3.0854 | 236.9639 | 0.249082710 10 | 16.6499138 |
| JUPITER         | 20.4198  | 180.8816 | -3.5030 | 215.7558 | 0.214332400 10 | 14.3270321 |
| SIRIUS(B)       | 118.7911 | 229.5845 |         |          |                |            |
| BETELGEUSE(R)   | 142.7135 | 212.3380 |         |          |                |            |
| CANOPUS(B)      | 96.0061  | 259.3930 |         |          |                |            |
| ARCTURUS(R)     | 46.0242  | 129.7065 |         |          |                |            |
| RIGIL KENTAURUS | 39.2644  | 273.4200 |         |          |                |            |
| ANTARES(R)      | 13.2046  | 354.5365 |         |          |                |            |
| CAPELLA(R)      | 148.7390 | 139.3144 |         |          |                |            |
| VEGA(B)         | 74.9669  | 68.3713  |         |          |                |            |
| ALDEBARAN(R)    | 164.0937 | 213.8816 |         |          |                |            |
| RIGEL(B)        | 140.4381 | 242.2732 |         |          |                |            |
| GAMMA CRUCIS(R) | 47.5849  | 252.0269 |         |          |                |            |
| SPICA(B)        | 32.7239  | 178.4898 |         |          |                |            |
| ACHERNAR(B)     | 96.4353  | 299.0437 |         |          |                |            |
| DENEB(B)        | 97.3348  | 60.0237  |         |          |                |            |
| PROCYON(B)      | 118.3393 | 200.2516 |         |          |                |            |

STAR DELAY: 2.6900 SEC 688.6464 PULSES DECIMAL = 10. COARSE + 49. FINE  
75.6070 DEG 12 61 PULSES OCTAL CKAH SUB C = 168.1186 EPSILON = 5.6714 SCN = 10

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10 PASS 2367 PR23 #00/00 S/W SI,2 DSS14A RCVR AGC -122.2 FILE 10-948  
 SPACECRAFT ATTITUDE ON DAY 231 AUG 19,1978 1130 GMT

TKG

08/23/78

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRKS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1,0397 RCSPHAK = 115,3100  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3,1119 CLON = 237,0985  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3,4222 CLON = 236,1045

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10 PASS 2367 PR23 #00/00 S/W SI,2 DSS14A RCVR AGC -122.2 FILE 10-948  
 SPACECRAFT ATTITUDE ON DAY 231 AUG 19,1978 1130 GMT  
 SPIN PERIOD = 12,809810 SEC RLTT = 4 HR 35 MIN 45,65 SEC

TKG

08/23/78

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -3,4222 | 236,1045 |                |            |
| SUN             | 2,5232   | 172,9818 | -3,1108 | 233,5965 | 0,248113540 10 | 16,5851297 |
| EARTH           | 1,0397   | 17,3365  | -3,1119 | 237,0985 | 0,248013050 10 | 16,5784124 |
| JUPITER         | 20,1883  | 180,7933 | -3,4855 | 215,8792 | 0,215997260 10 | 14,4383195 |
| SIRIUS(B)       | 118,7115 | 229,5372 |         |          |                |            |
| BETELGEUSE(R)   | 142,6154 | 212,2693 |         |          |                |            |
| CANOPUS(B)      | 95,9741  | 259,3756 |         |          |                |            |
| ARCTURUS(R)     | 45,9646  | 129,6119 |         |          |                |            |
| RIGIL KENTAURUS | 39,2587  | 273,5467 |         |          |                |            |
| ANTARES(R)      | 13,3112  | 354,6254 |         |          |                |            |
| CAPELLA(R)      | 148,6648 | 139,4393 |         |          |                |            |
| VEGA(B)         | 75,0183  | 68,3391  |         |          |                |            |
| ALDEBARAN(R)    | 163,9969 | 213,7002 |         |          |                |            |
| RIGEL(B)        | 140,3767 | 242,1578 |         |          |                |            |
| GAMMA CRUCIS(R) | 47,5399  | 252,1112 |         |          |                |            |
| SPICA(B)        | 32,6159  | 178,4596 |         |          |                |            |
| ACHERNAR(B)     | 96,4771  | 299,0259 |         |          |                |            |
| DENEK(B)        | 97,3996  | 60,0286  |         |          |                |            |
| PROCYON(B)      | 118,2334 | 200,2312 |         |          |                |            |

STAR DELAY: 2,6909 SEC 688,8775 PULSES DECIMAL = 10, COARSE + 49, FINE  
 75,6244 DEG 12 61 PULSES OCTAL CKAH SUB C = 166,9624 EPSILON= 6,0195 SCN=10

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PN 10 PASS #375 PR23 #00/00 S/W SI,2 DSS14A RCVR AGC -127.3 FILE 10-949 JJA  
 SPACECRAFT ATTITUDE ON DAY 239 AUG 27,1978 1000 GMT

08/28/78

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.0034 RCSPHAK = 110.6100  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.1378 CLON = 237.1656  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.4017 CLON = 236.1959

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PN 10 PASS #375 PR23 #00/00 S/W SI,2 DSS14A RCVR AGC -127.3 FILE 10-949 JJA  
 SPACECRAFT ATTITUDE ON DAY 239 AUG 27,1978 1000 GMT  
 SPIN PERIOD = 12.811270 SEC RTLT = 4 HR 34 MIN 36.16 SEC

08/28/78

|                  | CKA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|------------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS      | 0.0000   | 0.0000   | -3.4017 | 236.1959 | -              | -          |
| SUN              | 2.5066   | 173.4257 | -3.1116 | 233.7021 | 0.24904053D 10 | 16.6470943 |
| EARTH            | 1.0034   | 15.2178  | -3.1378 | 237.1656 | 0.24697140D 10 | 16.5087834 |
| JUPITER          | 20.1601  | 180.8002 | -3.4688 | 215.9993 | 0.21760983D 10 | 14.5461116 |
| SIRIUS (S)       | 118.7863 | 229.5734 |         |          |                |            |
| BETELGEUSE (R)   | 142.7036 | 212.3158 |         |          |                |            |
| CANOPUS (B)      | 96.0111  | 259.3901 |         |          |                |            |
| ARCTURUS (R)     | 46.0070  | 129.6979 |         |          |                |            |
| RIGIL CENTAURUS  | 39.2736  | 273.4392 |         |          |                |            |
| ANTARES (R)      | 13.2223  | 354.5074 |         |          |                |            |
| CAPELLA (R)      | 148.7207 | 139.3214 |         |          |                |            |
| VEGA (B)         | 74.9655  | 68.3653  |         |          |                |            |
| ALDEBARAN (R)    | 164.0842 | 213.8232 |         |          |                |            |
| RIGEL (R)        | 142.4375 | 242.2493 |         |          |                |            |
| GAMMA CRUCIS (R) | 47.5875  | 252.0431 |         |          |                |            |
| SPICA (B)        | 37.7066  | 178.5009 |         |          |                |            |
| ACHERNAR (B)     | 96.4507  | 299.0415 |         |          |                |            |
| DENEK (B)        | 97.3362  | 60.0251  |         |          |                |            |
| PROCYON (B)      | 118.3262 | 200.2432 |         |          |                |            |

STAR DELAY: 2.6907 SFC 688.8242 PULSES DECIMAL = 10. COARSE + 49. FINE  
 75.6099 DFG 12 61 PULSES OCTAL CKAH SUB C = 167.3778 EPSILON = 6.0479 SCN = 10

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PN 10 PASS 2379 PR23 400/00 S/W 1,2 DSS 63A RCVR AGC =123.9 FILE 10-950 NJW

08/31/78

SPACECRAFT ATTITUDE ON DAY 243 AUG 31, 1978 0600 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR ROSEPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRHS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.9790 ROSEPHAK = 109.6400  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.1503 CLON = 237.1755  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3882 CLON = 236.2243

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PN 10 PASS 2379 PR23 400/00 S/W 1,2 DSS 63A RCVR AGC =123.9 FILE 10-950 NJW  
 SPACECRAFT ATTITUDE ON DAY 243 AUG 31, 1978 0600 GMT  
 SPIN PERIOD = 12,811680 SEC RTLT = 4 HR 34 MIN 3.18 SEC

08/31/78

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3882 | 236.2243 | -              | -          |
| SUN             | 2.4830   | 173.6826 | -3.1119 | 233.7528 | 0.249517300 10 | 16.6769639 |
| EARTH           | 0.9790   | 14.0391  | -3.1503 | 237.1755 | 0.246477130 10 | 16.4757440 |
| JUPITER         | 20.1307  | 180.8131 | -3.4608 | 216.0574 | 0.218387720 10 | 14.5981096 |
| SIRIUS(R)       | 118.8150 | 229.5822 |         |          |                |            |
| BETELGEUSE(R)   | 142.7347 | 212.3225 |         |          |                |            |
| CANOPUS(B)      | 96.0296  | 259.3944 |         |          |                |            |
| ARCTURUS(R)     | 46.0148  | 129.7290 |         |          |                |            |
| RIGIL KENTAUROS | 39.2854  | 273.4053 |         |          |                |            |
| ANTARES(R)      | 13.1954  | 354.4404 |         |          |                |            |
| CAPELLA(R)      | 148.7335 | 139.2758 |         |          |                |            |
| VEGA(B)         | 74.9426  | 68.3727  |         |          |                |            |
| ALDEBARAN(R)    | 164.1152 | 213.8411 |         |          |                |            |
| RIGEL(B)        | 140.4626 | 242.2738 |         |          |                |            |
| GAMMA CRUCIS(R) | 47.6091  | 252.0239 |         |          |                |            |
| SPICA(B)        | 32.7346  | 178.5247 |         |          |                |            |
| ACHERNAR(B)     | 96.4487  | 299.0467 |         |          |                |            |
| DENEK(B)        | 97.3103  | 60.0245  |         |          |                |            |
| PROCYON(B)      | 118.3574 | 200.2434 |         |          |                |            |

STAR DELAY: 2.6907 SEC 688.8173 PULSES DECIMAL = 10, COARSE + 49, FINE  
 75.6056 DEG 12 61 PULSES OCTAL CKAH SUB C = 167.5939 EPSILON= 6.0887 SCN=10

10 PASS 2385 PR23 #00/00 S/W I,2 DSS 148 RCVR AGC =123,9 FILE 10-951 NJW  
 SPACECRAFT ATTITUDE ON DAY 249 SEP 6,1978 0800 GMT

09/06/78

*Gagan*

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,9660 RCSPHAK = 109,0000  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3,1699 CLON = 237,1611  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3,3884 CLON = 236,2186

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10 PASS 2385 PR23 #00/00 S/W I,2 DSS 148 RCVR AGC =123,9 FILE 10-951 NJW  
 SPACECRAFT ATTITUDE ON DAY 249 SEP 6,1978 0800 GMT  
 SPIN PERIOD = 12,812980 SEC RTLT = 4 HR 33 MIN 12,39 SEC

09/06/78

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -3,3884 | 236,2186 |                |            |
| SUN             | 2,3979   | 173,4611 | -3,1125 | 233,8328 | 0,25024211D 10 | 16,7274138 |
| EARTH           | 0,9660   | 13,0504  | -3,1699 | 237,1611 | 0,24571576D 10 | 16,4248503 |
| JUPITER         | 20,0326  | 180,7737 | -3,4482 | 216,1501 | 0,21962447D 10 | 14,6807801 |
| SIRIUS(B)       | 118,8111 | 229,5795 |         |          |                |            |
| BETELGEUSE(R)   | 142,7298 | 212,3184 |         |          |                |            |
| CANOPUS(B)      | 96,0283  | 259,3935 |         |          |                |            |
| ARCTURUS(R)     | 46,0113  | 129,7242 |         |          |                |            |
| HIGIL KENTAURUS | 39,2855  | 273,4119 |         |          |                |            |
| ANTARES(R)      | 13,2010  | 354,4434 |         |          |                |            |
| CAPPELLA(R)     | 148,7293 | 139,2819 |         |          |                |            |
| VEGA(B)         | 74,9449  | 68,3709  |         |          |                |            |
| ALDEBARAN(R)    | 164,1104 | 213,8303 |         |          |                |            |
| RIGEL(B)        | 140,4597 | 242,2674 |         |          |                |            |
| GAMMA CRUCIS(R) | 47,6071  | 252,0285 |         |          |                |            |
| SPICA(B)        | 32,7289  | 178,5238 |         |          |                |            |
| ACHERNAR(B)     | 96,4513  | 299,0458 |         |          |                |            |
| DENEK(B)        | 97,3134  | 60,0248  |         |          |                |            |
| PROCYON(B)      | 118,3520 | 200,2421 |         |          |                |            |

STAR DELAY: 2,6910 SEC 688,8849 PULSES DECIMAL = 10, COARSE + 49, FINE  
 75,6065 DEG 12 61 PULSES OCTAL CKAM SUB C = 167,2213 EPSILON = 6,2398 SCNB10  
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N 10 PASS 4 PR23 #00/00 S/W SI,2 DSS63A RCVR AGC -123.96 FILE 10-952 CM 09/15/78  
 SPACECRAFT ATTITUDE ON DAY 0 SEPT 0, 0 0000 GMT  
 15, 1978 0330

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.8721 RCSPHAK = 108.8100  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.1974 CLON = 237.0758  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3837 CLON = 236.2224

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N 10 PASS 2394 PR23 #00/00 S/W SI,2 DSS63A RCVR AGC -123.96 FILE 10-952 CM 09/15/78  
 SPACECRAFT ATTITUDE ON DAY 0 SEPT 0, 0 0000 GMT  
 SPIN PERIOD = 12.814570 SEC RTLT = 4 HR 32 MIN 4.37 SEC

|                 | CKA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3837 | 236.2224 | -              | -          |
| SUN             | 2.2868   | 173.2769 | -3.1134 | 233.9479 | 0.25129190D 10 | 16.7975864 |
| EARTH           | 0.8721   | 12.3097  | -3.1974 | 237.0758 | 0.24469615D 10 | 16.3566945 |
| JUPITER         | 19.9018  | 180.7311 | -3.4302 | 216.2851 | 0.22141868D 10 | 14.8007139 |
| SIRIUS(B)       | 118.8172 | 229.5797 |         |          |                |            |
| BETELGEUSE(R)   | 142.7355 | 212.3160 |         |          |                |            |
| CANOPUS(B)      | 96.0337  | 259.3940 |         |          |                |            |
| ARCTURUS(R)     | 46.0101  | 129.7302 |         |          |                |            |
| RIGIL KENTAURUS | 39.2900  | 273.4072 |         |          |                |            |
| ANTARES(R)      | 13.1977  | 354.4218 |         |          |                |            |
| CAPELLA(R)      | 148.7290 | 139.2721 |         |          |                |            |
| VEGA(B)         | 74.9391  | 68.3716  |         |          |                |            |
| ALDEBARAN(R)    | 164.1162 | 213.8240 |         |          |                |            |
| RIGEL(B)        | 140.4657 | 242.2690 |         |          |                |            |
| GAMMA CRUCIS(R) | 47.6128  | 252.0267 |         |          |                |            |
| SPICA(B)        | 32.7326  | 178.5316 |         |          |                |            |
| ACHERNAR(B)     | 96.4536  | 299.0466 |         |          |                |            |
| DENEK(B)        | 97.3074  | 60.0249  |         |          |                |            |
| PROCYON(B)      | 118.3572 | 200.2406 |         |          |                |            |

STAR DELAY: 2.6913 SEC 688,9656 PULSES DECIMAL = 10, COARSE + 49, FINE  
 75.6060 DEG 12 61 PULSES OCTAL CKAH SUB C = 166,8302 EPSILON = 6.4467 SCN=10

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HOBAN

10 PASS 2400 PR23 #0/0 S/W SI,2 DSS 63 RCVR AGC =122.2 FILE 10-953 SLB  
SPACECRAFT ATTITUDE ON DAY 264 SEP 20,1978 0400 GMT

09/21/78

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.6449 RCSPHAK = 109.3800  
SPACECRAFT-EARTH DIRECTION: CLAT = -3.2152 CLON = 236.9753  
SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3765 CLON = 236.3499

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10 PASS 2400 PR23 #0/0 S/W SI,2 DSS 63 RCVR AGC =122.2 FILE 10-953 SLB  
SPACECRAFT ATTITUDE ON DAY 264 SEP 20,1978 0400 GMT  
SPIN PERIOD = 12.815670 SEC RTLT = 4 HR 31 MIN 23.00 SEC

09/21/78

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3765 | 236.3499 |                |            |
| SUN             | 2.3349   | 173.6093 | -3.1139 | 234.0260 | 0.252009010 10 | 16.8455221 |
| EARTH           | 0.6449   | 14.4650  | -3.2152 | 236.9753 | 0.244076000 10 | 16.3152406 |
| JUPITER         | 19.9367  | 180.7160 | -3.4181 | 216.3778 | 0.222646250 10 | 14.8827707 |
| SIRIUS(B)       | 118.9051 | 229.6380 |         |          |                |            |
| BETELGEUSE(R)   | 142.8468 | 212.4052 |         |          |                |            |
| CANOPUS(B)      | 96.0641  | 259.4147 |         |          |                |            |
| ARCTURUS(R)     | 46.0860  | 129.8364 |         |          |                |            |
| RIGIL KENTAURUS | 39.2898  | 273.2589 |         |          |                |            |
| ANTARES(R)      | 13.0718  | 354.3454 |         |          |                |            |
| CAPELLA(R)      | 148.8207 | 139.1336 |         |          |                |            |
| VEGA(B)         | 74.8855  | 68.4103  |         |          |                |            |
| ALDEBARAN(R)    | 164.2257 | 214.0611 |         |          |                |            |
| RIGEL(B)        | 140.5311 | 242.4092 |         |          |                |            |
| GAMMA CRUCIS(R) | 47.6590  | 251.9259 |         |          |                |            |
| SPICA(B)        | 32.8596  | 178.5552 |         |          |                |            |
| ACHERNAR(B)     | 96.3981  | 299.0671 |         |          |                |            |
| DENEK(B)        | 97.2376  | 60.0188  |         |          |                |            |
| PROCYON(B)      | 118.4790 | 200.2683 |         |          |                |            |

STAR DELAY: 2.6908 SEC 688.8367 PULSES DECIMAL = 10. COARSE + 49. FINE  
75.5853 DEG 12 61 PULSES OCTAL CKAM SUB C = 167.2535 EPSILON = 6.3558 SCN = 10

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PN 10 PASS 2410 PR23 #00/00 S/W SI,3 DSS 63A RCVR AGC =123.9 FILE 10-954 CM  
 SPACECRAFT ATTITUDE ON DAY 274 OCT 10, 1978 0200 GMT

10/02/78

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C,

*(Nogon)*

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,5133 RCSPHAK = 112,3200  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3,2425 CLON = 236,7392  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3,3802 CLON = 236,2439

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PN 10 PASS 2410 PR23 #00/00 S/W SI,3 DSS 63A RCVR AGC =123.9 FILE 10-954 CM  
 SPACECRAFT ATTITUDE ON DAY 274 OCT 10, 1978 0200 GMT  
 SPIN PERIOD = 12,817250 SEC RTLT = 4 HR 30 MIN 27,10 SEC

10/02/78

|                 | CMA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -3,3802 | 236,2439 |                |            |
| SUN             | 2,1036   | 172,8138 | -3,1148 | 234,1537 | 0,253189900 10 | 16,9244586 |
| EARTH           | 0,5133   | 15,5497  | -3,2425 | 236,7392 | 0,243238180 10 | 16,2592366 |
| JUPITER         | 19,6777  | 180,6407 | -3,3983 | 216,5314 | 0,224671080 10 | 15,0181203 |
| SIRIUS(B)       | 118,8337 | 229,5887 |         |          |                |            |
| BETELGEUSE(R)   | 142,7555 | 212,3284 |         |          |                |            |
| CANOPUS(B)      | 96,0410  | 259,3975 |         |          |                |            |
| ARCTURUS(R)     | 46,0211  | 129,7496 |         |          |                |            |
| RIGIL KENTAURUS | 39,2923  | 273,3820 |         |          |                |            |
| ANTARES(R)      | 13,1767  | 354,3993 |         |          |                |            |
| CAPELLA(R)      | 148,7430 | 139,2460 |         |          |                |            |
| VEGA(B)         | 74,9279  | 68,3779  |         |          |                |            |
| ALDEBARAN(R)    | 164,1359 | 213,8570 |         |          |                |            |
| RIGEL(B)        | 140,4788 | 242,2913 |         |          |                |            |
| GAMMA CRUCIS(R) | 47,6228  | 252,0104 |         |          |                |            |
| SPICA(B)        | 32,7539  | 178,5391 |         |          |                |            |
| ACHERNAR(B)     | 96,4463  | 299,0502 |         |          |                |            |
| DENEK(B)        | 97,2936  | 60,0240  |         |          |                |            |
| PROCYON(B)      | 118,3785 | 200,2441 |         |          |                |            |

STAR DELAY: 2,6917 SEC 669,0784 PULSES DECIMAL = 10, COARSE + 49, FINE  
 75,6025 DEG 12 61 PULSES OCTAL CKAH SUB C = 166,0002 EPSILON = 6,8136 SCN = 10

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PN 10 PASS 2415 PR23 #00/00 S/W I,3 DSS 63A RCVR AGC -122,2 FILE 10-955A NJW  
SPACECRAFT ATTITUDE ON DAY 279 OCT 6,1978 0230 GMT

10/10/78

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 KCSTPOS = 180  
AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,3591 RCSPHAK = 117,0800  
SPACECRAFT-EARTH DIRECTION: CLAT = -3,2549 CLON = 236,5887  
SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3,3764 CLON = 236,2503

REVISED

REPLACES FILE NO. 955

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PN 10 PASS 2415 PR23 #00/00 S/W I,3 DSS 63A RCVR AGC -122,2 FILE 10-955A NJW  
SPACECRAFT ATTITUDE ON DAY 279 OCT 6,1978 0230 GMT  
SPIN PERIOD = 12,817990 SEC RTLT = 4 HR 30 MIN 5,83 SEC

10/10/78

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -3,3764 | 236,2503 | -              | -          |
| SUN             | 2,0459   | 172,7267 | -3,1154 | 234,2178 | 0,25378669D 10 | 16,9643509 |
| EARTH           | 0,3591   | 19,7801  | -3,2549 | 236,5887 | 0,24291932D 10 | 16,2379225 |
| JUPITER         | 17,6063  | 180,6197 | -3,3884 | 216,6095 | 0,22569593D 10 | 15,0866263 |
| SIRIUS(B)       | 118,8407 | 229,5904 |         |          |                |            |
| BETELGEUSE(R)   | 142,7629 | 212,3291 |         |          |                |            |
| CANCPUS(B)      | 96,0459  | 259,3984 |         |          |                |            |
| ARCTURUS(R)     | 46,0223  | 129,7570 |         |          |                |            |
| RIGIL KENTAURUS | 39,2956  | 273,3744 |         |          |                |            |
| ANTARES(R)      | 13,1708  | 354,3812 |         |          |                |            |
| CAPELLA(R)      | 148,7454 | 139,2349 |         |          |                |            |
| VEGA(B)         | 74,9221  | 68,3795  |         |          |                |            |
| ALDEBARAN(R)    | 164,1433 | 213,8590 |         |          |                |            |
| RIGEL(B)        | 140,4850 | 242,2964 |         |          |                |            |
| GAMMA CRUCIS(R) | 47,6283  | 252,0063 |         |          |                |            |
| SPICA(B)        | 32,7602  | 178,5455 |         |          |                |            |
| ACHERNAR(B)     | 96,4465  | 299,0514 |         |          |                |            |
| DENEK(B)        | 97,2872  | 60,0239  |         |          |                |            |
| PROCYON(B)      | 118,3858 | 200,2438 |         |          |                |            |

STAR DELAY: 2,6918 SEC 689,1094 PULSES DECIMAL = 10, COARSE + 49, FINE  
75,6016 DEG 12 61 PULSES OCTAL CKAH SUB C = 165,7906 EPSILON = 6,9360 SCN=10

PN 10 PASS 2424 PR23 #00/00 S/W SH,3 DSS14A RCVR AGC +123.96 FILE 10-956A CLM  
 SPACECRAFT ATTITUDE ON DAY 288 OCT 15,1978 1000 GMT

10/25/78

1706AN

REVISED

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,1285 RCSPHAK = 230,6700

SPACECRAFT-EARTH DIRECTION: CLAT = -3,2730 CLON = 236,2984

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3,3653 CLON = 236,3880

REPLACES FILE NO. 10-956

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PN 10 PASS 2424 PR23 #00/00 S/W SH,3 DSS14A RCVR AGC +123.96 FILE 10-956 CLM  
 SPACECRAFT ATTITUDE ON DAY 288 OCT 15,1978 1000 GMT  
 SPIN PERIOD = 12.819940 SEC RTLT = 4 HR 29 MIN 42,73 SEC

10/25/78

|                 | CMA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -3,3653 | 236,3880 | -              | -          |
| SUN             | 2,0762   | 173,1638 | -3,1160 | 234,3235 | 0,254777200 10 | 17,0305615 |
| JUPITER         | 19,6141  | 180,6028 | -3,3721 | 216,7396 | 0,227399160 10 | 15,2004786 |
| SIRIUS(B)       | 118,9383 | 229,6523 |         |          |                |            |
| BETELGEUSE(R)   | 142,8850 | 212,4219 |         |          |                |            |
| CANOPUS(B)      | 96,0821  | 259,4207 |         |          |                |            |
| ARCTURUS(R)     | 46,1017  | 129,8737 |         |          |                |            |
| RIGIL KENTAUFUS | 39,2988  | 273,2139 |         |          |                |            |
| ANTARES(R)      | 13,0350  | 354,2832 |         |          |                |            |
| CAPELLA(R)      | 148,8421 | 139,0806 |         |          |                |            |
| VEGA(B)         | 74,8611  | 68,4210  |         |          |                |            |
| ALDEBARAN(R)    | 164,2635 | 214,1060 |         |          |                |            |
| RIGEL(B)        | 140,5587 | 242,4461 |         |          |                |            |
| GAMMA CRUCIS(R) | 47,6815  | 251,8984 |         |          |                |            |
| SPICA(B)        | 32,8974  | 178,5763 |         |          |                |            |
| ACHERNAR(B)     | 96,3894  | 299,0737 |         |          |                |            |
| DENEK(B)        | 97,2088  | 60,0176  |         |          |                |            |
| PROCYON(B)      | 118,5186 | 200,2720 |         |          |                |            |

STAR DELAY: 2,6915 SEC 689,0115 PULSES DECIMAL = 10, COARSE + 49, FINE  
 75,5793 DEG 12 61 PULSES OCTAL CKAH SUB C = 166,2925 EPSILON= 6,8713 SCN=10

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PH 10 PASS 2431 PR23 #00/00 S/W SIDB DSS14A RCVR AGC -12226 FILE 10-951B CLM  
 SPACECRAFT ATTITUDE ON DAY 295 OCT 22, 1978 1330 GMT

10/25/78

*HOGAN*

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.4205 RCSPHAK = 272.7500  
 SPACECRAFT-EARTH DIRECTION: CLAT. = -3.2875 CLON = 235.9728  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3132 CLON = 236.3932

REVISED

REPLACES FILE NO. 10-957A

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PH 10 PASS 2431 PR23 #00/00 S/W SIDB DSS14A RCVR AGC -12226 FILE 10-957 CLM  
 SPACECRAFT ATTITUDE ON DAY 295 OCT 22, 1978 1330 GMT  
 SPIN PERIOD = 12.821160 SEC RTLT = 4 HR 29 MIN 36.51 SEC

10/25/78

| S/C +Z AXIS     | CKA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| SUN             | 0.0000   | 0.0000   | -3.3132 | 236.3932 | -              | -          |
| JUPITER         | 1.9739   | 174.3430 | -3.1167 | 234.4261 | 0.255745690 10 | 17.0953001 |
| SIRIUS(B)       | 19.4923  | 180.6994 | -3.3565 | 216.8676 | 0.229067190 10 | 15.3119779 |
| BETELGEUSE(R)   | 118.9814 | 229.6361 |         |          |                |            |
| CANOPUS(B)      | 142.9173 | 212.3678 |         |          |                |            |
| ARCTURUS(R)     | 96.1343  | 259.4205 |         |          |                |            |
| RIGIL KENTAURUS | 46.0651  | 129.9101 |         |          |                |            |
| ANTARES(R)      | 39.3506  | 273.2043 |         |          |                |            |
| CAPELLA(R)      | 13.0351  | 354.0574 |         |          |                |            |
| VEGA(B)         | 148.8119 | 139.0102 |         |          |                |            |
| ALDEBARAN(R)    | 74.8107  | 68.4175  |         |          |                |            |
| RIGEL(B)        | 164.2970 | 213.9634 |         |          |                |            |
| GAMMA CRUCIS(R) | 140.6073 | 242.4228 |         |          |                |            |
| SPICA(B)        | 47.7326  | 251.9089 |         |          |                |            |
| ACHERNAR(B)     | 32.9014  | 178.6573 |         |          |                |            |
| DENEK(B)        | 96.4324  | 299.0773 |         |          |                |            |
| PROCYON(B)      | 97.1611  | 60.0206  |         |          |                |            |
|                 | 118.5416 | 200.2467 |         |          |                |            |

STAR DELAY: 2.6917 SEC 689.0786 PULSES DECIMAL = 10, COARSE + 49, FINE  
 75.5795 DEG 12 61 PULSES OCTAL CKAH SUB C = 167.2492 EPSILON = 7.0938 SCN = 10

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PN 10 PASS 2433 PR23 #0/0 S/W SIDB DSS 43A RCVR AGC -122.2 FILE 10-958A NJW  
 SPACECRAFT ATTITUDE ON DAY 297 OCT 24, 1978 1700 GMT

10/25/78

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

HOGAN

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

REVISED

ROLL REFERENCE PARAMETERS: ASPSGRKS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.5422 RCSPHAK = 276.2900  
 SPACECRAFT-EARTH DIPECTION: CLAT = -3.2908 CLON = 235.8809  
 SPACECRAFT +Z AXTS ATTITUDE: CLAT = -3.2869 CLON = 236.4239

REPLACES FILE NO. 10-958

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PN 10 PASS 2433 PR23 #0/0 S/W SIDB DSS 43A RCVR AGC -122.2 FILE 10-958 NJW  
 SPACECRAFT ATTITUDE ON DAY 297 OCT 24, 1978 1700 GMT  
 SPIN PERIOD = 12.821650 SEC RTLT = 4 HR 29 MIN 37.79 SEC

10/25/78

| S/C +Z AXIS     | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| SUN             | 0.0000   | 0.0000   | -3.2869 | 236.4239 | -              | -          |
| JUPITER         | 1.9750   | 175.1170 | -3.1169 | 234.4531 | 0.25600202D 10 | 17.1124345 |
| SIRIUS(B)       | 19.4894  | 180.7612 | -3.3523 | 216.9016 | 0.22950911D 10 | 15.3415180 |
| BETELGEUSE(R)   | 119.0212 | 229.6414 |         |          |                |            |
| CANOPUS(B)      | 142.9572 | 212.3618 |         |          |                |            |
| ARCTURUS(R)     | 96.1657  | 259.4250 |         |          |                |            |
| RIGIL KENTAURUS | 46.0646  | 129.9507 |         |          |                |            |
| ANTARES(R)      | 39.3751  | 273.1671 |         |          |                |            |
| CAPELLA(R)      | 13.0074  | 353.9323 |         |          |                |            |
| VEGA(B)         | 148.8177 | 138.9460 |         |          |                |            |
| ALDEBARAN(R)    | 74.7751  | 68.4243  |         |          |                |            |
| RIGEL(B)        | 164.3371 | 213.9484 |         |          |                |            |
| GAMMA CRUCIS(R) | 140.6447 | 242.4428 |         |          |                |            |
| SPICA(B)        | 47.7671  | 251.8916 |         |          |                |            |
| ACHERNAR(B)     | 32.9313  | 178.7007 |         |          |                |            |
| DENEK(B)        | 96.4405  | 299.0835 |         |          |                |            |
| PROCYON(B)      | 97.1231  | 60.0207  |         |          |                |            |
|                 | 118.5794 | 200.2408 |         |          |                |            |

STAR DELAY: 2.6917 SEC 689.0640 PULSES DECIMAL = 10. COARSE + 49. FINE  
 75.5750 DEG 12 61 PULSES OCTAL CKAH SUB C = 168.0257 EPSILON = 7.0912 SCN = 10

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PN 10 PASS 2438 PR23 #0/0 S/W SI,3 DSS 63A RCVR AGC =122.9 FILE 10= 959 CLM  
SPACECRAFT ATTITUDE ON DAY 302 OCT 29,1978 0230 GMT

10/31/78

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

PRE-PRECESSION

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.7222 RCSPHAK = 278.2600  
SPACECRAFT-EARTH DIRECTION: CLAT = -3.2966 CLON = 235.6872  
SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.2503 CLON = 236.4091

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PN 10 PASS 2438 PR23 #0/0 S/W SI,3 DSS 63A RCVR AGC =122.9 FILE 10= 959 CLM  
SPACECRAFT ATTITUDE ON DAY 302 OCT 29,1978 0230 GMT  
SPIN PERIOD = 12.822140 SEC RTLT = 4 HR 29 MIN 44.39 SEC

10/31/78

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)   |
|-----------------|----------|----------|---------|----------|----------------|---------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.2503 | 236.4091 |                |         |
| SUN             | 1.9028   | 176.0455 | -3.1173 | 234.5080 | 0.256524090 10 | 17.1473 |
| EARTH           | 0.7222   | 183.6962 | -3.2966 | 235.6872 | 0.242597930 10 | 16.2164 |
| JUPITER         | 19.4059  | 180.8385 | -3.3440 | 216.9709 | 0.230409700 10 | 15.4017 |
| SIRIUS(B)       | 119.0396 | 229.6211 |         |          |                |         |
| BETELGEUSE(R)   | 142.9643 | 212.3094 |         |          |                |         |
| CANOPUS(B)      | 96.1991  | 259.4218 |         |          |                |         |
| ARCTURUS(R)     | 46.0270  | 129.9616 |         |          |                |         |
| RIGIL KENTAURUS | 39.4125  | 273.1817 |         |          |                |         |
| ANTARES(R)      | 13.0261  | 353.7806 |         |          |                |         |
| CAPELLA(R)      | 148.7825 | 138.9156 |         |          |                |         |
| VEGA(B)         | 74.7464  | 68.4161  |         |          |                |         |
| ALDEBARAN(R)    | 164.3452 | 213.8095 |         |          |                |         |
| RIGEL(B)        | 140.6704 | 242.4052 |         |          |                |         |
| GAMMA CRUCIS(R) | 47.7973  | 251.9139 |         |          |                |         |
| SPICA(B)        | 32.9157  | 178.7560 |         |          |                |         |
| ACHERNAR(B)     | 96.4797  | 299.0832 |         |          |                |         |
| DENE(B)         | 97.0987  | 60.0238  |         |          |                |         |
| PROCYON(B)      | 118.5782 | 200.2185 |         |          |                |         |

STAR DELAY: 2.6919 SEC 689.1191 PULSES DECIMAL = 10. COARSE + 49. FINE  
75.5782 DFG 12 61 PULSES OCTAL CKAH SUB C = 168.7906 EPSILON = 7.2549 SC

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PN 10 PASS 2438 PR23 #03/10 S/W SI,3 DSS14A RCVR AGC =123,9 FILE 10=960 CLM  
SPACECRAFT ATTITUDE ON DAY 302 OCT 29,1978 1100 GMT

10/31/78

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

NEW ATTITUDE  
POST-PRECESSION

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,8201 RCSPHAK = 174,5900  
SPACECRAFT-EARTH DIRECTION: CLAT = -3,2970 CLON = 235,6708  
SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3,7411 CLON = 234,9801

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PN 10 PASS 2438 PR23 #03/10 S/W SI,3 DSS14A RCVR AGC =123,9 FILE 10=960 CLM  
SPACECRAFT ATTITUDE ON DAY 302 OCT 29,1978 1100 GMT  
SPIN PERIOD = 12,822140 SEC RTLT = 4 HR 29 MIN 45,21 SEC

10/31/78

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -3,7411 | 234,9801 | -              | -          |
| SUN             | 0,7791   | 126,8163 | -3,1173 | 234,5125 | 0,25656722D 10 | 17,1502152 |
| EARTH           | 0,8201   | 32,7708  | -3,2970 | 235,6708 | 0,24261017D 10 | 16,2172574 |
| JUPITER         | 17,9731  | 179,3029 | -3,3433 | 216,9767 | 0,23048414D 10 | 15,4066939 |
| SIRIUS(B)       | 117,7382 | 229,1216 |         |          |                |            |
| BETELGEUSE(R)   | 141,4949 | 211,7825 |         |          |                |            |
| CANOPUS(B)      | 95,4521  | 259,2010 |         |          |                |            |
| ARCTURUS(R)     | 45,5052  | 128,4964 |         |          |                |            |
| RIGIL KENTAURUS | 39,0231  | 274,8805 |         |          |                |            |
| ANTARES(R)      | 14,4045  | 356,2074 |         |          |                |            |
| CAPELLA(R)      | 148,0070 | 140,9314 |         |          |                |            |
| VEGA(B)         | 75,7314  | 68,0279  |         |          |                |            |
| ALDEBARAN(R)    | 162,8825 | 212,4684 |         |          |                |            |
| RIGEL(B)        | 139,5628 | 241,0925 |         |          |                |            |
| GAMMA CRUCIS(R) | 46,8987  | 252,9430 |         |          |                |            |
| SPICA(B)        | 31,5047  | 177,8224 |         |          |                |            |
| ACHERNAR(B)     | 96,7407  | 298,8239 |         |          |                |            |
| DENEK(B)        | 98,2362  | 60,0700  |         |          |                |            |
| PROCYON(B)      | 117,0701 | 200,1150 |         |          |                |            |

STAR DELAY: 2,6997 SEC 691,1328 PULSES DECIMAL = 10, COARSE + 51, FINE  
75,7990 DEG 12 63 PULSES OCTAL CKAH SUB C = 116,1603 EPSILON=10,6559 SCN=10

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PN 10 PASS 2442 PR23 #0/0 S/W SIDB DSS 43A RCVR AGC -125.6 FILE 10-961 MGF  
 SPACECRAFT ATTITUDE ON DAY 306 NOV 2, 1978 1600 GMT

11/06/78

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C,  
 REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.6248 RCSPHAK = 174.5400  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.3014 CLON = 235.4779  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.6323 CLON = 234.9469

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PN 10 PASS 2442 PR23 #0/0 S/W SIDB DSS 43A RCVR AGC -125.6 FILE 10-961 MGF  
 SPACECRAFT ATTITUDE ON DAY 306 NOV 2, 1978 1600 GMT  
 SPIN PERIOD = 12.821770 SEC RTLT = 4 HR 29 MIN 57.23 SEC

11/06/78

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)     |
|-----------------|----------|----------|---------|----------|----------------|-----------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.6323 | 234.9469 | -              | -         |
| SUN             | 0.6405   | 126.5503 | -3.1177 | 234.5649 | 0.257067920 10 | 17.211300 |
| EARTH           | 0.6248   | 31.9646  | -3.3014 | 235.4779 | 0.242790350 10 | 16.229301 |
| JUPITER         | 17.8724  | 179.6316 | -3.3437 | 217.0434 | 0.231348590 10 | 15.464471 |
| SIRIUS(B)       | 117.7989 | 229.0688 |         |          |                |           |
| BETELGEUSE(R)   | 141.5239 | 211.6420 |         |          |                |           |
| CANOPUS(B)      | 95.5529  | 259.1938 |         |          |                |           |
| ARCTURUS(R)     | 45.3994  | 128.5355 |         |          |                |           |
| RIGIL KENTAURUS | 39.1344  | 274.9075 |         |          |                |           |
| ANTARES(R)      | 14.4451  | 355.7920 |         |          |                |           |
| CAFELLA(R)      | 147.9126 | 140.8277 |         |          |                |           |
| VEGA(B)         | 75.6429  | 68.0075  |         |          |                |           |
| ALDEBARAN(R)    | 162.9127 | 212.1097 |         |          |                |           |
| RIGEL(B)        | 139.6420 | 240.9944 |         |          |                |           |
| GAMMA CRUCIS(R) | 46.9931  | 253.0002 |         |          |                |           |
| SPICA(B)        | 31.4676  | 177.9959 |         |          |                |           |
| ACHERNAR(B)     | 96.8521  | 298.8246 |         |          |                |           |
| DENEK(B)        | 98.1583  | 60.0798  |         |          |                |           |
| PROCYON(B)      | 117.0764 | 200.0548 |         |          |                |           |

STAR DELAY: 2.6999 SEC 691.1788 PULSES DECIMAL = 10. COARSE + 51. FINE  
 75.8062 DEG 12 63 PULSES OCTAL CKAH SUB C = 115.3424 EPSILON=11.2079 SEC

11/08/78

PN 10 PASS 2448 PR2/3400/00 S/MSIDB3 DSS43A RCVR AGC -122.2 FILE10-962  
SPACECRAFT ATTITUDE ON DAY 312 NOV 8, 1978 1600 GMT

ROLL REFERENCE BODY IS SUN

SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS:

ASPSGRS = 180

RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE:

RCSANGAK = 0.3663

RCSPHAK = 201.1500

SPACECRAFT-EARTH DIRECTION:

CLAT = -3.3057

CLON = 235.1948

SPACECRAFT +Z AXIS ATTITUDE:

CLAT = -3.6179

CLON = 235.0029

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11/08/78

PN 10 PASS 2448 PR2/3400/00 S/MSIDB3 DSS43A RCVR AGC -122.2 FILE10-962  
SPACECRAFT ATTITUDE ON DAY 312 NOV 8, 1978 1600 GMT  
SPIN PERIOD = 12.822870 SEC RTLT = 4 HR 30 MIN 23.55 SEC

S/C +Z AXIS

CNA

CKA

CLAT

CLON

R(KM)

R(AU)

SUN

0.0000

0.0000

-3.6179

235.0029

0.257781680 10

17.2313957

EARTH

0.6177

126.0041

-3.1181

234.6393

0.243184950 10

16.2550785

JUPITER

0.3663

58.4676

-3.3057

235.1948

0.232582050 10

15.5469285

SIRIUS(R)

17.8334

179.6089

-3.3241

217.1389

BETELGEUSE(R)

117.8463

229.0897

CANOPUS(R)

141.5791

211.6671

ARCTURUS(R)

95.5775

259.2024

REGIL KENTAURUS

45.4230

128.5910

ANTARES(R)

39.1439

274.8411

CAPELLA(R)

14.3904

355.7237

VEGA(R)

147.9408

140.7571

ALDEBARAN(R)

75.6086

68.0230

RIGEL(B)

162.9676

212.1705

GAMMA CRUCIS(R)

139.6817

241.0473

SPICA(B)

47.0232

252.9578

ACHERNAR(B)

31.5230

178.0260

DENER(B)

96.8377

298.8349

PRICYON(B)

92.1180

60.0775

117.1338

200.0612

STAR DELAY: 2.6998 SEC  
11.7978 DEG

691.1594 PULSES DECIMAL = 10. COARSE + 51. FINE  
12 63 PULSES OCTAL CKAH SUB C = 114.7020 EPSILON=11.3020 SCNF  
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NOTE -  
ATTITUDE SHEETS 10-963, 964, 965 & 967  
WERE NOT PROCESSED DUE TO LOW SUN  
ANGLE ANGLES.

APP.

HOGAN

11/21/78

PR 10 PASS 2466 FR23 404711 S/W51.3 USS 63A RCVR AGC 122.2 FILE 10-966 INIT  
SPACECRAFT ATTITUDE ON DAY 330 NOV 26, 1978 0000 GMT

NEW ATTITUDE  
POST-PRECESSION

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.  
REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRHS = 0 RCSTPOS = 180  
AMPLITUDE AND PHASE ANGLE: RC5ANGAF = 0.0173 RCSPHAK = 80.9870  
SPACECRAFT-EARTH DIRECTION: CLAT = -3.3055 CLON = 234.3639  
SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.5556 CLON = 233.4799

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PR 10 PASS 2466 FR23 404711 S/W51.3 USS 63A RCVR AGC 122.2 FILE 10-966 INIT  
SPACECRAFT ATTITUDE ON DAY 330 NOV 26, 1978 0000 GMT  
SPIN PERIOD = 12.923360 SEC WILT = 4 to 32 MIN 41.04 SEC

11/21/78

|                  | CR1      | CR4      | CLAT    | CLON     | R (KM)         | R (AU)    |
|------------------|----------|----------|---------|----------|----------------|-----------|
| S/C +Z AXIS      | 0.0000   | 0.0000   | -3.5556 | 233.4799 | -              | -         |
| SUN              | 1.4374   | 17.8291  | -3.1195 | 234.8519 | 0.259843030 10 | 17.369106 |
| EARTH            | 0.9173   | 12.8130  | -3.3055 | 234.3639 | 0.245257890 10 | 16.394240 |
| SPHAK            | 16.0360  | 179.5472 | -3.2922 | 217.4106 | 0.230151560 10 | 15.783550 |
| SIRIUS (S)       | 116.8904 | 228.3817 |         |          |                |           |
| DETELGEUSE (R)   | 140.3895 | 210.5385 |         |          |                |           |
| CAYCELS (R)      | 95.3505  | 250.9632 |         |          |                |           |
| ARCTURUS (R)     | 44.4389  | 127.3325 |         |          |                |           |
| RIGIL KENTAURUS  | 30.3571  | 270.5896 |         |          |                |           |
| ANTARES (R)      | 15.9109  | 355.8140 |         |          |                |           |
| CAPELLA (R)      | 106.7199 | 142.0650 |         |          |                |           |
| MEGAS (S)        | 76.1256  | 67.5674  |         |          |                |           |
| ALDEBARAN (R)    | 161.6936 | 209.4630 |         |          |                |           |
| RIGEL (R)        | 130.9803 | 239.3800 |         |          |                |           |
| GAMMA CRUCIS (R) | 46.6536  | 254.2400 |         |          |                |           |
| SPICA (R)        | 30.0017  | 177.9452 |         |          |                |           |
| ACHERNAR (R)     | 97.6222  | 298.5742 |         |          |                |           |
| CELEBE (R)       | 98.8212  | 60.1831  |         |          |                |           |
| PROCYON (R)      | 115.7253 | 199.6801 |         |          |                |           |

STAR DELAY: 2.7095 SEC 693.3670 PULSES DECIMAL = 10, COARSE + 53, FINE  
76.0368 DEG 12 65 PULSES OCTAL CRAM SUB C = 9.1747 EPSILON = 8.4504 SEC



PN 10 PASS 2476 PR23 0 0/0 S/W51.3 DSS 14 RCVR AGC -122.2 FILE 10-968 SLB 12/06/78  
 SPACECRAFT ATTITUDE ON DAY 340 DEC 6, 1978 0530 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASFSGRRS = 0 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSENGAK = 0.6351 RCSPHAK = 22.9630  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.2965 CLON = 233.8972  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.6616 CLON = 233.8839

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PN 10 PASS 2476 PR23 0 0/0 S/W51.3 DSS 14 RCVR AGC -122.2 FILE 10-968 SLB 12/06/78  
 SPACECRAFT ATTITUDE ON DAY 340 DEC 6, 1978 0530 GMT  
 SPIN PERIOD = 12.826290 SEC HTLT = 4 HR 39 MIN 47.11 SEC

|                  | ORA      | ORA      | CLAT    | CLON     | R (R)          | R (AC)     |
|------------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS      | 0.0000   | 0.0000   | -2.6616 | 233.8839 | -              | -          |
| SUN              | 1.1830   | 337.1578 | -3.1203 | 234.9757 | 0.261059090 10 | 17.4504739 |
| EARTH            | 0.6351   | 271.2008 | -3.2965 | 233.8972 | 0.247135630 10 | 16.5197614 |
| JUPITER          | 16.2916  | 182.5640 | -3.2738 | 217.5618 | 0.230262210 10 | 15.9266183 |
| SIRIUS (R)       | 117.8265 | 228.2518 |         |          |                |            |
| BETELGEUSE (R)   | 141.1080 | 209.8639 |         |          |                |            |
| CANOPUS (R)      | 96.3054  | 259.0081 |         |          |                |            |
| ARCTURUS (R)     | 43.9794  | 128.2455 |         |          |                |            |
| RIGIL KENTAURUS  | 40.2017  | 276.0120 |         |          |                |            |
| ANTARES (R)      | 15.6002  | 352.5371 |         |          |                |            |
| CAPPELLA (R)     | 146.4765 | 140.8456 |         |          |                |            |
| VEGA (R)         | 75.1451  | 67.5975  |         |          |                |            |
| ALDEBARAN (R)    | 162.4756 | 207.6517 |         |          |                |            |
| RIGEL (R)        | 139.9552 | 239.2747 |         |          |                |            |
| GAMMA CRUCIS (R) | 47.6239  | 254.1344 |         |          |                |            |
| SPICA (R)        | 30.3853  | 179.5190 |         |          |                |            |
| ACHERNAR (R)     | 98.2137  | 298.7050 |         |          |                |            |
| DENEK (R)        | 97.8448  | 60.2188  |         |          |                |            |
| PROCYON (R)      | 116.4043 | 199.3557 |         |          |                |            |

STAR DELAY: 2.7075 SEC 693,1160 PULSES DECIMAL = 10. COARSE + 53. FINE  
 75.9919 URG 12 65 PULSES OCTAL CRAN SUB E = 322 9992 EMISSIONS 0 0000 0000

HOGAN

PN 10 PASS 2485 PR23 #00/00 S/W SIDB DSS43A RCVR AGC -122.2 FILE 10-969 1KG 12/19/78

SPACECRAFT ATTITUDE ON DAY 349 DEC 15, 1978 1400 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.7375 RCSPHAK = 353.3400  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.2831 CLON = 233.5091  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.6309 CLON = 233.8540

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PN 10 PASS 2485 PR23 #00/00 S/W SIDB DSS43A RCVR AGC -122.2 FILE 10-969 1KG 12/19/78

SPACECRAFT ATTITUDE ON DAY 349 DEC 15, 1978 1400 GMT  
 SPIN PERIOD = 12.827870 SEC RTLT = 4 HR 37 MIN 8.64 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -2.6309 | 233.8540 |                |            |
| SUN             | 1.3309   | 338.3636 | -3.1210 | 235.0930 | 0.262170830 10 | 17.5247881 |
| EARTH           | 0.7375   | 242.1668 | -3.2831 | 233.5091 | 0.249257050 10 | 16.6615675 |
| JUPITER         | 16.1110  | 182.6299 | -3.2572 | 217.7337 | 0.240194830 10 | 16.0558041 |
| SIRIUS(B)       | 117.8295 | 228.2279 |         |          |                |            |
| BETELGEUSE(R)   | 141.0974 | 209.8111 |         |          |                |            |
| CANOPUS(B)      | 96.3297  | 259.0028 |         |          |                |            |
| ARCTURUS(R)     | 43.9368  | 128.2395 |         |          |                |            |
| RIGIL KENTAURUS | 40.2353  | 276.0419 |         |          |                |            |
| ANTARES(R)      | 15.6338  | 352.4410 |         |          |                |            |
| CAPELLA(R)      | 146.4339 | 140.6370 |         |          |                |            |
| VEGA(B)         | 75.1282  | 67.5857  |         |          |                |            |
| ALDEBARAN(R)    | 162.4633 | 207.5205 |         |          |                |            |
| RIGEL(B)        | 139.9663 | 239.2242 |         |          |                |            |
| GAMMA CRUCIS(R) | 47.6452  | 254.1668 |         |          |                |            |
| SPICA(B)        | 30.3552  | 179.5695 |         |          |                |            |
| ACHERNAR(B)     | 98.2549  | 296.7019 |         |          |                |            |
| DENEK(B)        | 97.8330  | 60.2231  |         |          |                |            |
| PROCYON(B)      | 116.3863 | 199.3350 |         |          |                |            |

STAR DELAY: 2.7080 SEC 693.2494 PULSES DECIMAL # 10 COARSE + 53 FINE  
 75.9972 DEG 12 65 PULSES OCTAL CKAH SUB C # 329.5959 EPSILON# 8.7676 SCNE#10

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PN 10 PASS 2489 PR23 #0/0 S/WSI,3 DSS 63A RCVR AGC -122,2 FILE 10-10-970NLN

12/19/78

SPACECRAFT ATTITUDE ON DAY 352 DEC 18, 1978 2100 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGHRS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,8278 RCSPHAK = 344,1800

SPACECRAFT-EARTH DIRECTION: CLAT = -3,2773 CLON = 233,3837

SPACECRAFT +Z AXIS ATTITUDE: CLAI = -2,6138 CLON = 233,8793

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PN 10 PASS 2489 PR23 #0/0 S/WSI,3 DSS 63A RCVR AGC -122,2 FILE 10-10-970NLN

12/19/78

SPACECRAFT ATTITUDE ON DAY 352 DEC 18, 1978 2100 GMT

SPIN PERIOD = 12.828480 SEC RTLI = 4 HR 38 MIN 4,17 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -2,6138 | 233,8793 |                |            |
| SUN             | 1,3458   | 337,8152 | -3,1212 | 235,1273 | 0,26256200D 10 | 17,5509358 |
| EARTH           | 0,8278   | 233,2959 | -3,2773 | 233,3837 | 0,25008941D 10 | 16,71/2066 |
| JUPITER         | 16,0833  | 182,6718 | -3,2515 | 217,7873 | 0,24087546D 10 | 16,1013008 |
| SIRIUS(B)       | 117,8591 | 228,2329 |         |          |                |            |
| BETELGEUSE(R)   | 141,1278 | 209,8094 |         |          |                |            |
| CANOPUS(B)      | 96,3514  | 259,0064 |         |          |                |            |
| ARCTURUS(R)     | 43,9390  | 128,2722 |         |          |                |            |
| RIGIL KENTAURUS | 40,2497  | 276,0113 |         |          |                |            |
| ANTARES(R)      | 15,6110  | 352,3693 |         |          |                |            |
| CAPELLA(R)      | 146,4426 | 140,5940 |         |          |                |            |
| VEGA(B)         | 75,1027  | 67,5913  |         |          |                |            |
| ALDEBARAN(R)    | 162,4936 | 207,5104 |         |          |                |            |
| RIGEL(B)        | 139,9940 | 239,2407 |         |          |                |            |
| GAMMA CRUCIS(R) | 47,6687  | 254,1501 |         |          |                |            |
| SPICA(B)        | 30,3803  | 179,6003 |         |          |                |            |
| ACHERNAR(B)     | 98,2579  | 298,7075 |         |          |                |            |
| DENEK(B)        | 97,8055  | 60,2224  |         |          |                |            |
| PROCYON(B)      | 116,4158 | 194,3323 |         |          |                |            |

STAR DELAY: 2,7080 SEC 693,2501 PULSES DECIMAL = 10, COARSE + 53, FINE  
75,9936 DEG 12 65 PULSES OCTAL CKAH SUB C # 329,0922 EPSILON= 8,7230 SCN=10

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PN 10 PASS2497 PR23 #0/0 S/WSIDB DSS63A RCVR AGC -123.9 FILE 10-971 KS  
 SPACECRAFT ATTITUDE ON DAY 361 DEC 27, 1978 0015 GMT

12/26/78

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.0274 RCSPHAK = 327.7340  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.2608 CLON = 233.1063  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.6354 CLON = 233.9224

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PN 10 PASS2497 PR23 #0/0 S/WSIDB DSS63A RCVR AGC -123.9 FILE 10-971 KS  
 SPACECRAFT ATTITUDE ON DAY 361 DEC 27, 1978 0015 GMT  
 SPIN PERIOD = 12.829950 SEC RTLT = 4 HR 40 MIN 33.17 SEC

12/26/78

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -2.6354 | 233.9224 |                |            |
| SUN             | 1.3877   | 339.4500 | -3.1218 | 235.2237 | 0.26352735D 10 | 17.6154646 |
| EARTH           | 1.0273   | 217.5189 | -3.2608 | 233.1063 | 0.25232285D 10 | 16.8665007 |
| JUPITER         | 15.9924  | 182.5554 | -3.2373 | 217.9201 | 0.24255669D 10 | 16.2136825 |
| SIRIUS(B)       | 117.8716 | 228.2595 |         |          |                |            |
| BETELGEUSE(R)   | 141.1544 | 209.8613 |         |          |                |            |
| CANOPUS(B)      | 96.3383  | 259.0135 |         |          |                |            |
| ARCTURUS(R)     | 43.9827  | 128.2953 |         |          |                |            |
| RIGIL KENTAURUS | 40.2237  | 275.9653 |         |          |                |            |
| ANTARES(R)      | 15.5655  | 352.4279 |         |          |                |            |
| CAPELLA(R)      | 146.4896 | 140.5800 |         |          |                |            |
| VEGA(B)         | 75.1063  | 67.6061  |         |          |                |            |
| ALDEBARAN(R)    | 162.5218 | 207.6366 |         |          |                |            |
| RIGEL(B)        | 139.9974 | 239.3000 |         |          |                |            |
| GAMMA CRUCIS(R) | 47.6596  | 254.1090 |         |          |                |            |
| SPICA(B)        | 30.4235  | 179.5659 |         |          |                |            |
| ACHERNAR(B)     | 98.2182  | 298.7134 |         |          |                |            |
| DENEK(B)        | 97.8030  | 60.2178  |         |          |                |            |
| PROCYON(B)      | 116.4493 | 199.3515 |         |          |                |            |

STAR DELAY: 2.7081 SEC 693.2644 PULSES DECIMAL = 10. COARSE + 53. FINE  
 75.9865 DEG 12 65 PULSES OCTAL CKAH SUB C = 330.8512 EPSILON = 8.5988 SCN = 10

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PN 10 PASS2507 PR23 #0/0 S/WSI.3 DSS43A RCVR AGC =123.9 FILE 10-972 TG  
SPACECRAFT ATTITUDE ON DAY 6 JAN 6, 1979 1230 GMT

01/08/79

*(Handwritten signature)*

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180  
AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.2272 RCSPHAK = 320.6620  
SPACECRAFT-EARTH DIRECTION: CLAT = -3.2356 CLON = 232.8222  
SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.5991 CLON = 233.8728

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PN 10 PASS2507 PR23 #0/0 S/WSI.3 DSS43A RCVR AGC =123.9 FILE 10-972 TG  
SPACECRAFT ATTITUDE ON DAY 6 JAN 6, 1979 1230 GMT  
SPIN PERIOD = 12.831780 SEC RTLT = 4 HR 44 MIN 8.54 SEC

01/08/79

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -2.5991 | 233.8728 | -              | -          |
| SUN             | 1.5973   | 340.3247 | -3.1225 | 235.3414 | 0.264/15140 10 | 17.6948623 |
| EARTH           | 1.2272   | 211.2677 | -3.2356 | 232.8222 | 0.255551200 10 | 17.0822995 |
| JUPITER         | 53.9158  | 178.1041 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 117.8657 | 228.2249 |         |          |                |            |
| BETELGEUSE(R)   | 141.1295 | 209.7893 |         |          |                |            |
| CANOPUS(B)      | 96.3640  | 259.0050 |         |          |                |            |
| ARCTURUS(R)     | 43.9235  | 128.2761 |         |          |                |            |
| RIGIL KENTAURUS | 40.2650  | 276.0168 |         |          |                |            |
| ANTARES(R)      | 15.6194  | 352.3202 |         |          |                |            |
| CAPELLA(R)      | 106.4283 | 140.5829 |         |          |                |            |
| VEGA(B)         | 75.0916  | 67.5879  |         |          |                |            |
| ALDEBARAN(R)    | 162.4946 | 207.4595 |         |          |                |            |
| RIGEL(B)        | 140.0033 | 239.2249 |         |          |                |            |
| GAMMA CRUCIS(R) | 47.6810  | 254.1591 |         |          |                |            |
| SPICA(B)        | 30.3737  | 179.6249 |         |          |                |            |
| ACHERNAR(B)     | 98.2738  | 298.7074 |         |          |                |            |
| DENEK(B)        | 97.7960  | 60.2239  |         |          |                |            |
| PROCYON(B)      | 116.4146 | 199.3241 |         |          |                |            |

STAR DELAY: 2.7088 SEC 693.4403 PULSES DECIMAL = 10. COARSE + 53. FINE  
75.9950 DEG 12 65 PULSES OCTAL CNAH SUB C = 332.2048 EPSILON = 8.1200 SCN=10

PN 10 PASS 2512 PR23 #00/00 S/W SI,3 DSS43A RCVR AGC =123.9 FILE 10=973 GAN  
 SPACECRAFT ATTITUDE ON DAY 11 JAN 11,1979 1230 GMT

01/11/79

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.3587 RCSPHAK = 316.3400  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.2224 CLON = 232.7203  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.5956 CLON = 233.9273

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PN 10 PASS 2512 PR23 #00/00 S/W SI,3 DSS43A RCVR AGC =123.9 FILE 10=973 GAN  
 SPACECRAFT ATTITUDE ON DAY 11 JAN 11,1979 1230 GMT  
 SPIN PERIOD = 12.832760 SEC RTLT = 4 HR 45 MIN 58.54 SEC

01/11/79

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | =2.5956 | 233.9273 | =              | =          |
| SUN             | 1.5681   | 340.3124 | =3.1229 | 235.4059 | 0.26536985D 10 | 17.7386263 |
| EARTH           | 1.3587   | 207.5038 | =3.2224 | 232.7203 | 0.25720010D 10 | 17.1925201 |
| JUPITER         | 53.9701  | 178.1105 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 117.9046 | 228.2476 |         |          |                |            |
| BETELGEUSE(R)   | 141.1735 | 209.8216 |         |          |                |            |
| CANOPUS(B)      | 96.3784  | 259.0134 |         |          |                |            |
| ARCTURUS(R)     | 43.9544  | 128.3252 |         |          |                |            |
| RIGIL KENTAURUS | 40.2628  | 275.9549 |         |          |                |            |
| ANTARES(R)      | 15.5659  | 352.2839 |         |          |                |            |
| CAPELLA(R)      | 146.4681 | 140.5291 |         |          |                |            |
| VEGA(B)         | 75.0676  | 67.6035  |         |          |                |            |
| ALDEBARAN(R)    | 162.5446 | 207.5317 |         |          |                |            |
| RIGEL(B)        | 140.0341 | 259.2810 |         |          |                |            |
| GAMMA CRUCIS(R) | 47.6993  | 254.1148 |         |          |                |            |
| SPICA(B)        | 30.4281  | 179.6340 |         |          |                |            |
| ACHERNAR(B)     | 98.2508  | 298.7170 |         |          |                |            |
| DENEK(B)        | 97.7659  | 60.2201  |         |          |                |            |
| PROCYON(B)      | 116.4671 | 199.3338 |         |          |                |            |

STAR DELAY: 2.7087 SEC 693.4170 PULSES DECIMAL = 10. COARSE + 53. FINE  
 75.9866 DEG 12 65 PULSES OCTAL CKAH SUB C = 332.2215 EPSILON= 8.0909 SCN=10

PN 10 PASS 2522 PR23 #00/00 S/W SI,3 DSS43A RCVR AGC -123,9 FILE 10-974 TKG  
 SPACECRAFT ATTITUDE ON DAY 21 JAN 21,1979 1145 GMT

01/22/79

NOGAN

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1,5510 RCSPHAK = 306,6770  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3,1945 CLON = 232,5853  
 SPACERAFT +Z AXIS ATTITUDE: CLAT = -2,6620 CLON = 234,0440

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PN 10 PASS 2522 PR23 #00/00 S/W SI,3 DSS43A RCVR AGC -123,9 FILE 10-974 TKG  
 SPACECRAFT ATTITUDE ON DAY 21 JAN 21,1979 1145 GMT  
 SPIN PERIOD = 12,834470 SEC RTLT = 4 HR 49 MIN 49,34 SEC

01/22/79

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -2,6620 | 234,0440 | -              | -          |
| SUN             | 1,5462   | 342,5951 | +3,1236 | 235,5216 | 0,26655300D 10 | 17,8177139 |
| EARTH           | 1,5510   | 200,1141 | -3,1945 | 232,5853 | 0,26065976D 10 | 17,4237807 |
| JUPITER         | 54,0888  | 178,0705 | 0,0000  | 180,0000 | 0,00000000     | 0,0000000  |
| SIRIUS(B)       | 117,9326 | 228,3225 |         |          |                |            |
| BETELGEUSE(R)   | 141,2464 | 209,9709 |         |          |                |            |
| CANOPUS(B)      | 96,3354  | 259,0329 |         |          |                |            |
| ARCTURUS(R)     | 44,0788  | 128,3824 |         |          |                |            |
| RIGIL KENTAURUS | 40,1848  | 275,8313 |         |          |                |            |
| ANTARES(R)      | 15,4416  | 352,4710 |         |          |                |            |
| CAPELLA(R)      | 146,6002 | 140,4999 |         |          |                |            |
| VEGA(B)         | 75,0847  | 67,6443  |         |          |                |            |
| ALDEBARAN(R)    | 162,6168 | 207,8973 |         |          |                |            |
| RIGEL(B)        | 140,0363 | 239,4463 |         |          |                |            |
| GAMMA CRUCIS(R) | 47,6674  | 254,0016 |         |          |                |            |
| SPICA(B)        | 30,5451  | 179,5280 |         |          |                |            |
| ACHERNAR(B)     | 98,1365  | 298,7325 |         |          |                |            |
| DENEK(B)        | 97,7657  | 60,2072  |         |          |                |            |
| PROCYON(B)      | 116,5550 | 199,3897 |         |          |                |            |

STAR DELAY: 2,7083 SEC 693,3314 PULSES DECIMAL = 10, COARSE + 53, FINE  
 75,9671 DEG 12 65 PULSES OCTAL CKAH SUB C = 334,4450 EPSILON= 8,1501 SCN=10

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PN 10 PASS2569 PR23 #0/0 S/WSI.3 DSS12A RCVR AGC =144.9 FILE 10-975 MG 03/08/79  
 SPACECRAFT ATTITUDE ON DAY 68 MAR 9,1979 0100 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1,1946 RCSPHAK = 309,4900

SPACECRAFT-EARTH DIRECTION: CLAT = -3,0617 CLON = 233,1923

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2,5912 CLON = 234,2917

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PN 10 PASS2569 PR23 #0/0 S/WSI.3 DSS12A RCVR AGC =144.9 FILE 10-975 MG 03/08/79  
 SPACECRAFT ATTITUDE ON DAY 68 MAR 9,1979 0100 GMT  
 SPIN PERIOD = 12,842770 SEC RTLT = 5 HR 8 MIN 55,22 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -2,5912 | 234,2917 | -              | -          |
| SUN             | 1,8347   | 342,9954 | -3,1265 | 236,0488 | 0,272077620 10 | 18,1870067 |
| EARTH           | 1,1946   | 203,2172 | -3,0617 | 233,1923 | 0,277835990 10 | 18,5719245 |
| JUPITER         | 54,3338  | 178,1387 | 0,0000  | 180,0000 | 0,000000000    | 0,0000000  |
| SIRIUS(B)       | 118,1499 | 228,4073 |         |          |                |            |
| BETELGEUSE(R)   | 141,4961 | 210,0604 |         |          |                |            |
| CANOPUS(B)      | 96,4519  | 259,0700 |         |          |                |            |
| ARCTURUS(R)     | 44,1776  | 128,6388 |         |          |                |            |
| RIGIL KENTAURUS | 40,2307  | 275,5430 |         |          |                |            |
| ANTARES(R)      | 15,2059  | 352,1051 |         |          |                |            |
| CAPELLA(R)      | 146,7456 | 140,1882 |         |          |                |            |
| VEGA(B)         | 74,9252  | 67,7097  |         |          |                |            |
| ALDEBARAN(R)    | 162,8686 | 208,0813 |         |          |                |            |
| RIGEL(B)        | 140,2228 | 239,6702 |         |          |                |            |
| GAMMA CRUCIS(R) | 47,8040  | 253,8147 |         |          |                |            |
| SPICA(B)        | 30,7921  | 179,6617 |         |          |                |            |
| ACHERNAR(B)     | 98,0795  | 298,7796 |         |          |                |            |
| DENEK(B)        | 97,5813  | 60,1943  |         |          |                |            |
| PROCYON(B)      | 116,8120 | 199,4088 |         |          |                |            |

STAR DELAY: 2,7088 SEC 693,4412 PULSES DECIMAL = 10, COARSE + 53, FINE  
 75,9300 DEG 12 65 PULSES OCTAL CKAH SUB C = 335,5811 EPSILON = 7,4143 SCN = 10

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PN 10 PA 0371 PR23 #0/0 S/WSIDB DSS63B RCVR A -144.9 FILE 10-976 KS 03/12/79  
 SPACECRAFT ATTITUDE ON DAY 70 MAR 11, 1979 1045 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.2771 RCSPHAK = 312.4800

SPACECRAFT-EARTH DIRECTION: CLAT = -3.0557 CLON = 233.2743

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.5560 CLON = 234.4510

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PN 10 PASS2571 PR23 #0/0 S/WSIDB DSS63B RCVR AGC -144.9 FILE 10-976 KS 03/12/79  
 SPACECRAFT ATTITUDE ON DAY 70 MAR 11, 1979 1045 GMT  
 SPIN PERIOD = 12.843250 SEC RTLT = 5 HR 9 MIN 51.27 SEC

| S/C +Z AXIS     | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| SUN             | 0.0000   | 0.0000   | -2.5560 | 234.4510 | -              | -          |
| EARTH           | 1.7197   | 340.5837 | -3.1266 | 236.0753 | 0.27236143D 10 | 18.2059779 |
| JUPITER         | 1.2771   | 203.0616 | -3.0557 | 233.2743 | 0.27867619D 10 | 18.6280876 |
| SIRIUS(B)       | 54.4917  | 178.1747 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| BETELGEUSE(R)   | 118.2818 | 228.4658 |         |          |                |            |
| CANOPUS(B)      | 141.6514 | 210.1298 |         |          |                |            |
| ARCTURUS(R)     | 96.5166  | 259.0941 |         |          |                |            |
| RIGIL KENTAURUS | 44.2496  | 128.7963 |         |          |                |            |
| ANTARES(R)      | 40.2506  | 275.3590 |         |          |                |            |
| CAPELLA(R)      | 15.0532  | 351.9015 |         |          |                |            |
| VEGA(B)         | 146.8451 | 139.9981 |         |          |                |            |
| ALDEBARAN(R)    | 74.8323  | 67.7531  |         |          |                |            |
| RIGEL(B)        | 163.0255 | 208.2321 |         |          |                |            |
| GAMMA CRUCIS(R) | 140.3333 | 239.8215 |         |          |                |            |
| SPICA(B)        | 47.8823  | 253.6924 |         |          |                |            |
| ACHERNAR(B)     | 30.9511  | 179.7291 |         |          |                |            |
| DENEK(B)        | 98.0337  | 298.8089 |         |          |                |            |
| PROCYON(B)      | 97.4717  | 60.1856  |         |          |                |            |
|                 | 116.9737 | 199.4260 |         |          |                |            |

STAR DELAY: 2.7080 SEC 693.2465 PULSES DECIMAL = 10. COARSE + 53. FINE  
 75.9059 DEG 12 65 PULSES OCTAL CKAH SUB C = 332.8881 EPSILON = 7.6957 SCN = 10

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1 10 PASS: PR23 #0/0 S/WSI,3 DSS12A RCVR AGC 50.2 FILE 10-977 SB 03/21/79  
SPACECRAFT ATTITUDE ON DAY 80 MAR 21,1979 0400 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPCS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,5072 RCSPHAK = 341,7100

SPACECRAFT-EARTH DIRECTION: CLAT = -3,0333 CLON = 233,6493

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2,6006 CLON = 233,9142

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10 PASS2581 PR23 #0/0 S/WSI,3 DSS12A RCVR AGC -130.2 FILE 10-977 SB 03/21/79  
SPACECRAFT ATTITUDE ON DAY 80 MAR 21,1979 0400 GMT  
SPIK PERIOD = 12,844960 SEC RTLT = 5 HR 13 MIN 31,13 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | -(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -2,6006 | 233,9142 |                |            |
| SUN             | 2,3259   | 346,8601 | -3,1272 | 236,1826 | 0,27351503D 10 | 18,2630902 |
| EARTH           | 0,5072   | 238,5565 | -3,0333 | 233,6493 | 0,28197179D 10 | 18,6483817 |
| JUPITER         | 53,9572  | 178,1059 | 0,0000  | 180,0000 | 0,00000000     | 0,0000000  |
| SIRIUS(R)       | 117,8922 | 228,2437 |         |          |                |            |
| BETELGEUSE(R)   | 141,1647 | 209,8184 |         |          |                |            |
| CANOPUS(B)      | 96,3710  | 259,0115 |         |          |                |            |
| ARCTURUS(R)     | 43,9503  | 128,3107 |         |          |                |            |
| RIGIL KENTAURUS | 40,2592  | 275,9703 |         |          |                |            |
| ANTARES(R)      | 15,5782  | 352,3076 |         |          |                |            |
| CAPELLA(R)      | 146,4612 | 140,5469 |         |          |                |            |
| VEGA(B)         | 75,0772  | 67,6002  |         |          |                |            |
| ALDEBARAN(R)    | 162,5307 | 207,5262 |         |          |                |            |
| RIGEL(B)        | 140,0231 | 239,2701 |         |          |                |            |
| GAMMA CRUCIS(R) | 47,6908  | 254,1244 |         |          |                |            |
| SPICA(B)        | 30,4151  | 179,6247 |         |          |                |            |
| ACHERNAR(B)     | 98,2526  | 298,7144 |         |          |                |            |
| DENEK(B)        | 97,7768  | 60,2207  |         |          |                |            |
| PROCYON(B)      | 116,4531 | 199,3335 |         |          |                |            |

STAR DELAY: 2,7113 SEC 694,0938 PULSES DECIMAL = 10, COARSE + 54, FINE  
75,9885 DEG 12 66 PULSES OCTAL CKAH SUB C = 340,4875 EPSILON = 6,3728 SCN=10

PN 10 PAS 0 PR23 #0/0 S/WSJ,X DSS12A RCVR AGC 130.2 FILE 10-978 MG 03/29 9  
 SPACECRAFT ATTITUDE ON DAY 88 MAR 30, 1979 0000 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.5142 RCSPHAK = 44.2690

SPACECRAFT-EARTH DIRECTION: CLAT = -3.0155 CLON = 234.0423

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.5808 CLON = 233.7674

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PN 10 PASS2590 PR23 #0/0 S/WSJ,X DSS12A RCVR AGC 130.2 FILE 10-978 MG 03/29/79  
 SPACECRAFT ATTITUDE ON DAY 88 MAR 30, 1979 0000 GMT  
 SPIN PERIOD = 12.846550 SEC RTLT = 5 HR 16 MIN 37.37 SEC

|                 | CVA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -2.5808 | 233.7674 |                |            |
| SUN             | 2.5676   | 347.6414 | -3.1277 | 236.2792 | 0.27456192D 10 | 18.3530695 |
| EARTH           | 0.5142   | 302.2775 | -3.0155 | 234.0423 | 0.28476345D 10 | 19.0349900 |
| JUPITER         | 53.8100  | 178.1102 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 117.8092 | 228.1723 |         |          |                |            |
| BETELGEUSE(R)   | 141.0471 | 209.7001 |         |          |                |            |
| CANOPUS(B)      | 96.3624  | 258.9884 |         |          |                |            |
| ARCTURUS(R)     | 43.8439  | 128.1971 |         |          |                |            |
| RIGIL KENTAURUS | 40.2943  | 276.1333 |         |          |                |            |
| ANTARES(R)      | 15.7262  | 352.3009 |         |          |                |            |
| CAPELLA(R)      | 146.3352 | 140.6573 |         |          |                |            |
| VEGA(B)         | 75.1149  | 67.5554  |         |          |                |            |
| ALDEBARAN(R)    | 162.4095 | 207.2502 |         |          |                |            |
| RIGEL(B)        | 139.9650 | 239.1012 |         |          |                |            |
| GAMMA CRUCIS(R) | 47.6699  | 254.2512 |         |          |                |            |
| SPICA(B)        | 30.2683  | 179.6504 |         |          |                |            |
| ACHERNAR(B)     | 98.3405  | 298.6904 |         |          |                |            |
| DENEK(B)        | 97.8324  | 60.2329  |         |          |                |            |
| PROCYON(B)      | 116.3212 | 199.2935 |         |          |                |            |

STAR DELAY: 2.7125 SEC 694.3910 PULSES DECIMAL = 10. COARSE + 54. FINE  
 76.0116 DEG 12.66 PULSES OCTAL CKAH SUB C = 341.6966 EPSILON = 5.9448 SCN=10

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PN 10 PAS 94 PR23 #0/0 S/WSJX DSS43A RCVR AGC -128.7 FILE 10-979 KS 04/03/79  
SPACECRAFT ATTITUDE ON DAY 94 APR 4, 1979 0400 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGERS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.7265 RCSPHAK = 70.6392

SPACECRAFT-EARTH DIRECTION: CLAT = -3.0063 CLON = 234.2924

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.6554 CLON = 233.6555

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PN 10 PASS2594 PR23 #0/0 S/WSJX DSS43A RCVR AGC -128.7 FILE 10-979 KS 04/03/79  
SPACECRAFT ATTITUDE ON DAY 94 APR 4, 1979 0400 GMT  
SPIN PERIOD = 12.847410 SEC RTLT = 5 HR 18 MIN 19.36 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AL)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -2.6554 | 233.6555 |                |            |
| SUN             | 2.7178   | 349.9197 | -3.1280 | 236.3353 | 0.275174130 10 | 18.3939926 |
| EARTH           | 0.7265   | 331.0985 | -3.0063 | 234.2924 | 0.286292180 10 | 19.1371778 |
| JUPITER         | 53.7008  | 178.0477 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 117.6791 | 228.1495 |         |          |                |            |
| BETELGEUSE(R)   | 140.9131 | 209.7066 |         |          |                |            |
| CANOPUS(B)      | 96.2679  | 258.9727 |         |          |                |            |
| ARCTURUS(R)     | 43.8336  | 128.0525 |         |          |                |            |
| RIGIL KENTAURUS | 40.2323  | 276.2689 |         |          |                |            |
| ANTARES(R)      | 15.8272  | 352.6093 |         |          |                |            |
| CAPELLA(R)      | 146.2959 | 140.8449 |         |          |                |            |
| VEGA(B)         | 75.2264  | 67.5305  |         |          |                |            |
| ALDEBARAN(R)    | 162.2760 | 207.2924 |         |          |                |            |
| RIGEL(B)        | 139.8436 | 239.0278 |         |          |                |            |
| GAMMA CRUCIS(R) | 47.5679  | 254.3259 |         |          |                |            |
| SPICA(B)        | 30.1571  | 179.5158 |         |          |                |            |
| ACHERNAB(B)     | 98.3287  | 296.6657 |         |          |                |            |
| DENEK(B)        | 97.9526  | 60.2361  |         |          |                |            |
| PROCYON(B)      | 116.1911 | 199.3048 |         |          |                |            |

STAR DELAY: 2.7132 SEC 694.5806 PULSES DECIMAL = 10. COARSE + 55. FINE  
76.0273 DEG 12.67 PULSES OCTAL CKAH SUB C = 344.2161 EPSILON = 5.7036 SCN = 10

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PN 10 PASS 2596 PR23 #0/0 S/WSJX DSS43A RCVR A -125.6 FILE 10-980 KS 04/05/79  
 SPACECRAFT ATTITUDE ON DAY 95 APR 5, 1979 0700 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

PRE-PRECESSION

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.6984 RCSPHAK = 73.1880  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.0044 CLON = 234.3486  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.7152 CLON = 233.7121

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PN 10 PASS2596 PR23 #0/0 S/WSJX DSS43A RCVR AGC -125.6 FILE 10-980 KS 04/05/79  
 SPACECRAFT ATTITUDE ON DAY 95 APR 5, 1979 0700 GMT  
 SPIN PERIOD = 12.847650 SEC RTLT = 5 HR 18 MIN 40.83 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -2.7152 | 233.7121 |                |            |
| SUN             | 2.6641   | 351.0204 | -3.1280 | 236.3475 | 0.275307420 10 | 18.4029024 |
| EARTH           | 0.6984   | 335.5202 | -3.0044 | 234.3486 | 0.286614010 10 | 19.1586905 |
| JUPITER         | 53.7593  | 178.0079 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)       | 117.6722 | 228.1952 |         |          |                |            |
| BETELGEUSE(R)   | 140.9325 | 209.8078 |         |          |                |            |
| CANOPUS(B)      | 96.2200  | 258.9827 |         |          |                |            |
| ARCTURUS(R)     | 43.9156  | 128.0631 |         |          |                |            |
| RIGIL KENTAURUS | 40.1666  | 276.2127 |         |          |                |            |
| ANTARES(R)      | 15.7635  | 352.7965 |         |          |                |            |
| CAPELLA(R)      | 146.3775 | 140.8637 |         |          |                |            |
| VEGA(B)         | 75.2602  | 67.5530  |         |          |                |            |
| ALDEBARAN(R)    | 162.2986 | 207.5429 |         |          |                |            |
| RIGEL(B)        | 139.8213 | 239.1243 |         |          |                |            |
| GAMMA CRUCIS(R) | 47.5256  | 254.2639 |         |          |                |            |
| SPICA(B)        | 30.2142  | 179.4165 |         |          |                |            |
| ACHERNAR(B)     | 98.2490  | 298.6714 |         |          |                |            |
| DENEK(B)        | 97.9765  | 60.2277  |         |          |                |            |
| PROCYON(B)      | 116.2247 | 199.3445 |         |          |                |            |

STAR DELAY: 2.7129 SEC 694.5025 PULSES DECIMAL = 10. COARSE + 55. FINE  
 76.0173 DEG 12.67 PULSES OCTAL CKAH SUB C = 345.2327 EPSILON = 5.7877 SCN = 10

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PN 10 P 2597 PR23 #3/3 S/WSJX DSS63A RCVR -125.6 FILE 10-981 KS 04/05/79  
 SPACECRAFT ATTITUDE ON DAY 95 APR 5, 1979 0930 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

*MID-PRECESSION*

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.3943 RCSPHAK = 31.3610

SPACECRAFT-EARTH DIRECTION: CLAT = -3.0043 CLON = 234.3534

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.6309 CLON = 234.2268

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PN 10 PASS2597 PR23 #3/3 S/WSJX DSS63A RCVR AGC -125.6 FILE 10-981 KS 04/05/79  
 SPACECRAFT ATTITUDE ON DAY 95 APR 5, 1979 0930 GMT  
 SPIN PERIOD = 12.847650 SEC RTLT = 5 HR 18 MIN 42.64 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -2.6309 | 234.2268 |                |            |
| SUN             | 2.1766   | 346.7450 | -3.1280 | 236.3486 | 0.275318770 10 | 18.4036611 |
| EARTH           | 0.3943   | 288.7142 | -3.0043 | 234.3534 | 0.286641200 10 | 19.1605080 |
| JUPITER         | 54.2703  | 178.1058 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)       | 118.0772 | 228.3925 |         |          |                |            |
| BETELGEUSE(R)   | 141.4201 | 210.0598 |         |          |                |            |
| CANOPUS(B)      | 96.4007  | 259.0607 |         |          |                |            |
| ARCTURUS(R)     | 44.1681  | 128.5583 |         |          |                |            |
| RIGIL KENTAURUS | 40.1975  | 275.6209 |         |          |                |            |
| ANTARES(R)      | 15.2647  | 352.2787 |         |          |                |            |
| CAPELLA(R)      | 146.7211 | 140.2949 |         |          |                |            |
| VEGA(B)         | 74.9865  | 67.6947  |         |          |                |            |
| ALDEBARAN(R)    | 162.7927 | 208.0927 |         |          |                |            |
| RIGEL(B)        | 140.1558 | 239.6242 |         |          |                |            |
| GAMMA CRUCIS(R) | 47.7479  | 253.8582 |         |          |                |            |
| SPICA(B)        | 30.7275  | 179.5914 |         |          |                |            |
| ACHERNAR(B)     | 98.0760  | 298.7659 |         |          |                |            |
| DENEK(B)        | 97.6479  | 60.1963  |         |          |                |            |
| PROCYON(B)      | 116.7376 | 199.4139 |         |          |                |            |

STAR DELAY: 2.7101 SEC 693.7895 PULSES DECIMAL = 10. COARSE + 54. FINE  
 75.9393 DEG 12.66 PULSES OCTAL CKAH SUB C = 340.0815 EPSILON = 6.6635 SCNR = 1

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PN 10 PA 97 PR23 #6/6 S/WSJX DSS63A RCVR -127.2 FILE 10-982 SLB 04/ 79  
SPACECRAFT ATTITUDE ON DAY 95 APR 5, 1979 1600 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

NEW ATTITUDE  
POST- PRECESSION

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1,0221 RCSPHAK = 289,4490

SPACECRAFT-EARTH DIRECTION: CLAT = -3,0038 CLON = 234,3675

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2,8992 CLON = 235,3856

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PN 10 PASS2597 PR23 #6/6 S/WSJX DSS63A RCVR AGC -127.2 FILE 10-982 SLB 04/05/79  
SPACECRAFT ATTITUDE ON DAY 95 APR 5, 1979 1600 GMT  
SPIN PERIOD = 12,847040 SEC RTLT = 5 HR 18 MIN 47,92 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -2,8992 | 235,3856 |                |            |
| SUN             | 0,9914   | 346,6263 | -3,1280 | 236,3516 | 0,275351850 10 | 18,4058723 |
| EARTH           | 1,0221   | 185,9042 | -3,0038 | 234,3675 | 0,286720400 10 | 19,1658021 |
| JUPITER         | 55,4362  | 178,0006 | 0,0000  | 189,0000 | 0,000000000    | 0,0000000  |
| SIRIUS(B)       | 118,6396 | 229,0134 |         |          |                |            |
| BETELGEUSE(R)   | 142,2797 | 211,1600 |         |          |                |            |
| CANOPUS(B)      | 96,3550  | 259,2493 |         |          |                |            |
| ARCTURUS(R)     | 45,1045  | 129,3550 |         |          |                |            |
| RIGIL KENTAURUS | 39,8298  | 274,3309 |         |          |                |            |
| ANTARES(R)      | 14,0822  | 352,7756 |         |          |                |            |
| CAPELLA(R)      | 147,7793 | 139,5108 |         |          |                |            |
| VEGA(B)         | 74,7992  | 68,0674  |         |          |                |            |
| ALDEBARAN(R)    | 163,6689 | 210,8129 |         |          |                |            |
| RIGEL(B)        | 140,4955 | 241,0528 |         |          |                |            |
| GAMMA CRUCIS(R) | 47,8225  | 252,8383 |         |          |                |            |
| SPICA(B)        | 31,8877  | 179,2258 |         |          |                |            |
| ACHERNAR(B)     | 97,2824  | 298,9410 |         |          |                |            |
| DENFB(B)        | 97,3045  | 60,1029  |         |          |                |            |
| PROCYON(B)      | 117,7380 | 199,7998 |         |          |                |            |

STAR DELAY: 2,7033 SEC 692,0334 PULSES DECIMAL = 10, COARSE + 52, FINE  
75,7507 DEG 12 64 PULSES OCTAL CKAH SUB C = 336,7529 EPSILON = 9,8735 SCN=10

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PN 10 PASS2604 PR23 #0/0 S/WSJ,X DSS12A RCVR AGC -129.49 FILE 10-983 MG 04/12/79  
 SPACECRAFT ATTITUDE ON DAY 102 APR 12,1979 2230 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTROS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.6903 RCSPHAK = 289.9700

SPACECRAFT-EARTH DIRECTION: CLAT = -2.9930 CLON = 234.7447

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.9044 CLON = 235.4302

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PN 10 PASS2604 PR23 #0/0 S/WSJ,X DSS12A RCVR AGC -129.49 FILE 10-983 MG 04/12/79  
 SPACECRAFT ATTITUDE ON DAY 102 APR 12,1979 2230 GMT  
 SPIN PERIOD = 12.847770 SEC RTLT = 5 HR 20 MIN 59.35 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -2.9044 | 235.4302 |                |            |
| SUN             | 1.0232   | 347.3247 | -3.1284 | 236.4300 | 0.276212210 10 | 18.4633830 |
| EARTH           | 0.6903   | 187.3949 | -2.9930 | 234.7447 | 0.288690460 10 | 19.2974906 |
| JUPITER         | 55.4809  | 178.0003 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(R)       | 118.6648 | 229.0359 |         |          |                |            |
| BETELGEUSE(R)   | 142.3152 | 211.1978 |         |          |                |            |
| CANCPUS(B)      | 96.3581  | 259.2566 |         |          |                |            |
| ARCTURUS(R)     | 45.1368  | 129.3882 |         |          |                |            |
| RIGIL KENTAURUS | 39.8213  | 274.2804 |         |          |                |            |
| ANTARES(R)      | 14.0373  | 352.7701 |         |          |                |            |
| CAPELLA(R)      | 147.8166 | 139.4734 |         |          |                |            |
| VEGA(B)         | 74.7874  | 68.0814  |         |          |                |            |
| ALDEBARAN(R)    | 163.7045 | 210.9086 |         |          |                |            |
| RIGEL(B)        | 140.5125 | 241.1054 |         |          |                |            |
| GAMMA CRUCIS(R) | 47.8307  | 252.8006 |         |          |                |            |
| SPICA(B)        | 31.9323  | 179.2207 |         |          |                |            |
| ACHERNAR(B)     | 97.2563  | 298.9479 |         |          |                |            |
| DENEK(B)        | 97.2868  | 60.0999  |         |          |                |            |
| PROCYON(B)      | 117.7781 | 199.8126 |         |          |                |            |

STAR DELAY: 2.7032 SEC 692.0066 PULSES DECIMAL = 10, COARSE + 52, FINE  
 75.7434 DEG 12.64 PULSES OCTAL CKAH SUB C = 337.5621 EPSILON = 9.7625 SCN = 10

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APR 21

PN 10 PASS 2613 PR23 #0/0 S/WSJ,X DSS43A RCVR AGC =136.60 FILE 10-984A RM 04/24/79  
SPACECRAFT ATTITUDE ON DAY 112 APR 22,1979 0630 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.1900 RCSPHAK = 348.0700

SPACECRAFT-EARTH DIRECTION: CLAT = -2.9820 CLON = 235.2581

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.8120 CLON = 235.3431

REVISED

REPLACES FILE NO. 10-984

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PN 10 PASS 2613 PR23 #0/0 S/WSJ,X DSS43A RCVR AGC =136.60 FILE 10-984A RM 04/24/79  
SPACECRAFT ATTITUDE ON DAY 112 APR 22,1979 0630 GMT  
SPIN PERIOD = 12.849420 SEC RTLT = 5 HR 23 MIN 30.33 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -2.8120 | 235.3431 |                |            |
| SUN             | 1.2270   | 345.0030 | -3.1289 | 236.5300 | 0.27731765D 10 | 18.5372761 |
| EARTH           | 0.1900   | 243.4673 | -2.9820 | 235.2581 | 0.29095355D 10 | 19.4487667 |
| JUPITER         | 55.3908  | 178.0575 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 118.6774 | 228.9625 |         |          |                |            |
| BETELGEUSE(R)   | 142.2884 | 211.0330 |         |          |                |            |
| CANOPUS(B)      | 96.4326  | 259.2407 |         |          |                |            |
| ARCTURUS(R)     | 45.0102  | 129.3752 |         |          |                |            |
| RIGIL KENTAURUS | 39.9199  | 274.3716 |         |          |                |            |
| ANTARES(R)      | 14.1355  | 352.4515 |         |          |                |            |
| CAPELLA(R)      | 147.6904 | 139.4475 |         |          |                |            |
| VEGA(B)         | 74.7342  | 68.0456  |         |          |                |            |
| ALDEBARAN(R)    | 163.6768 | 210.4811 |         |          |                |            |
| RIGEL(B)        | 140.5511 | 240.9543 |         |          |                |            |
| GAMMA CRUCIS(R) | 47.8933  | 252.8961 |         |          |                |            |
| SPICA(B)        | 31.8442  | 179.3630 |         |          |                |            |
| ACHERNAR(B)     | 97.3792  | 298.9396 |         |          |                |            |
| DENEK(B)        | 97.2501  | 60.1110  |         |          |                |            |
| PROCYON(B)      | 117.7275 | 199.7470 |         |          |                |            |

STAR DELAY: 2.7041 SEC 692.2404 PULSES DECIMAL = 10. COARSE + 52. FINE  
75.7593 DEG 12.64 PULSES OCTAL CKAH SUB C = 335.9148 EPSILON = 9.0882 SCN =

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PN 10 PASS 2620 PR23 #0/0 S/WSJ,X DSS43A RCVR AGC =123.10 FILE 10-985 MG 04/29/79  
 SPACECRAFT ATTITUDE ON DAY 119 APR 29,1979 0600 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.5260 RCSPHAK = 99.5950

SPACECRAFT-EARTH DIRECTION: CLAT = -2.9761 CLON = 235.6583

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.0158 CLON = 235.1330

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PN 10 PASS 2620 PR23 #0/0 S/WSJ,X DSS43A RCVR AGC =123.10 FILE 10-985 MG 04/29/79  
 SPACECRAFT ATTITUDE ON DAY 119 APR 29,1979 0600 GMT  
 SPIN PERIOD = 12.850700 SEC RTLT = 5 HR 25 MIN 9.29 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.0158 | 235.1330 | "              | "          |
| SUN             | 1.4736   | 355.5440 | -3.1293 | 236.6044 | 0.278145050 10 | 18.5925836 |
| EARTH           | 0.5260   | 4.3178   | -2.9761 | 235.6583 | 0.292436960 10 | 19.5479251 |
| JUPITER         | 55.1883  | 177.9006 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 118.3860 | 228.9386 |         |          |                |            |
| BETELGEUSE(R)   | 142.0035 | 211.1076 |         |          |                |            |
| CANOPUS(B)      | 96.1932  | 259.2114 |         |          |                |            |
| ARCTURUS(R)     | 45.0354  | 129.0734 |         |          |                |            |
| RIGIL KENTAURUS | 39.7333  | 274.6308 |         |          |                |            |
| ANTARES(R)      | 14.3185  | 353.3406 |         |          |                |            |
| CAPELLA(R)      | 147.6624 | 139.8968 |         |          |                |            |
| VEGA(B)         | 75.0017  | 68.0030  |         |          |                |            |
| ALDEBARAN(R)    | 163.3925 | 210.7026 |         |          |                |            |
| RIGEL(B)        | 140.2711 | 240.8418 |         |          |                |            |
| GAMMA CRUCIS(R) | 47.6370  | 253.0133 |         |          |                |            |
| SPICA(B)        | 31.6373  | 179.0182 |         |          |                |            |
| ACHERNAR(B)     | 97.3023  | 298.8925 |         |          |                |            |
| DENEK(B)        | 97.5313  | 60.1108  |         |          |                |            |
| PROCYON(B)      | 117.4611 | 199.7995 |         |          |                |            |

STAR DELAY: 2.7054 SEC 692.5767 PULSES DECIMAL = 10, COARSE + 53, FINE  
 75.7886 DEG 12.65 PULSES OCTAL CKAH SUB C = 347.1925 EPSILON = 8.3515 SCN = 10

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PN 10 PASS 2624 PR23 #0/0 S/WSI,3 DSS12A RCVR AGC -131,6 FILE 10-986 SLB 05/02/79  
 SPACECRAFT ATTITUDE ON DAY 122 MAY 2, 1979 2100 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

REVISED

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,8345 RCSPHAK = 104,1090 REPLACES FILE NO. *985 dated 5-2-79*

SPACECRAFT-EARTH DIRECTION: CLAT = -2,9737 CLON = 235,8696

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3,1988 CLON = 235,0649

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 PN 10 PASS 2624 PR23 #0/0 S/WSI,3 DSS12A RCVR AGC -131,6 FILE 10-985 SLB 05/02/79  
 SPACECRAFT ATTITUDE ON DAY 122 MAY 2, 1979 2100 GMT  
 SPIN PERIOD = 12,851310 SEC RTLT = 5 HR 25 MIN 55,69 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -3,1988 | 235,0649 |                |            |
| SUN             | 1,5770   | 2,4764   | -3,1295 | 236,6428 | 0,278574230 10 | 18,6212721 |
| EARTH           | 0,8345   | 15,6244  | -2,9737 | 235,8696 | 0,293132430 10 | 19,5944138 |
| JUPITER         | 55,1273  | 177,7679 | 0,0000  | 180,0000 | 0,000000000    | 0,0000000  |
| SIRIUS(B)       | 118,2033 | 228,9720 |         |          |                |            |
| BETELGEUSE(R)   | 141,8506 | 211,2588 |         |          |                |            |
| CANOPUS(B)      | 96,0007  | 259,2043 |         |          |                |            |
| ARCTURUS(R)     | 45,1348  | 128,9022 |         |          |                |            |
| RIGIL KENTAURUS | 39,5564  | 274,7270 |         |          |                |            |
| ANTARES(R)      | 14,3660  | 354,0775 |         |          |                |            |
| CAPELLA(R)      | 147,7278 | 140,1841 |         |          |                |            |
| VEGA(B)         | 75,1968  | 68,0008  |         |          |                |            |
| ALDEBARAN(R)    | 163,2402 | 211,1063 |         |          |                |            |
| RIGEL(B)        | 140,0781 | 240,8738 |         |          |                |            |
| GAMMA CRUCIS(R) | 47,4421  | 253,0202 |         |          |                |            |
| SPICA(B)        | 31,5729  | 178,7150 |         |          |                |            |
| ACHERNAR(B)     | 97,1749  | 298,8701 |         |          |                |            |
| DENEK(B)        | 97,7239  | 60,1028  |         |          |                |            |
| PROCYON(B)      | 117,3351 | 199,8731 |         |          |                |            |

STAR DELAY: 2,7058 SEC 692,6751 PULSES DECIMAL = 10, COARSE + 53, FINE  
 75,7957 DEG 12 65 PULSES OCTAL CKAH SUB C = -5,5904 EPSILON= 8,0668 SCN=10

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*Aspen*

N 10 PASS 2632 PR23 #0/0 S/WSJ,X DSS63A RCVR AGC -123.90 FILE 10-987A TG 05/15/79  
SPACECRAFT ATTITUDE ON DAY 130 MAY 10,1979 0800 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

REVISED

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180

REPLACES FILE NO. 987 dated  
5-11

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1,2599 RCSPHAK = 100,6100

SPACECRAFT-EARTH DIRECTION: CLAT = -2,9707 CLON = 236,3095

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3,3047 CLON = 235,0928

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N 10 PASS 2632 PR23 #0/0 S/WSJ,X DSS63A RCVR AGC -123.90 FILE 10-987A TG 05/15/79  
SPACECRAFT ATTITUDE ON DAY 130 MAY 10,1979 0800 GMT  
SPIN PERIOD = 12.851070 SEC RTLT = 5 HR 27 MIN 20.24 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3047 | 235.0928 |                |            |
| SUN             | 1.6354   | 6.0916   | -3.1298 | 236.7215 | 0.279457110 10 | 18.6802881 |
| EARTH           | 1.2599   | 15.3399  | -2.9707 | 236.3095 | 0.294399800 10 | 19.6791310 |
| JUPITER         | 55.1593  | 177.6965 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)       | 118.1417 | 229.0220 |         |          |                |            |
| BETELGEUSE(R)   | 141.8193 | 211.3939 |         |          |                |            |
| CANOPUS(B)      | 95.9019  | 259.2108 |         |          |                |            |
| ARCTURUS(R)     | 45.2347  | 128.8593 |         |          |                |            |
| RIGIL KENTAURUS | 39.4486  | 274.7054 |         |          |                |            |
| ANTARES(R)      | 14.3278  | 354.4801 |         |          |                |            |
| CAPELLA(R)      | 147.8169 | 140.2865 |         |          |                |            |
| VEGA(B)         | 75.2846  | 68.0196  |         |          |                |            |
| ALDEBARAN(R)    | 163.2090 | 211.4560 |         |          |                |            |
| RIGEL(B)        | 139.9991 | 240.9658 |         |          |                |            |
| GAMMA CRUCIS(R) | 47.3490  | 252.9688 |         |          |                |            |
| SPICA(B)        | 31.6033  | 178.5455 |         |          |                |            |
| ACHERNAR(B)     | 97.0687  | 298.8683 |         |          |                |            |
| DENEK(B)        | 97.8018  | 60.1939  |         |          |                |            |
| PROCYON(B)      | 117.3252 | 199.9310 |         |          |                |            |

STAR DELAY: 2.7055 SEC 692.6028 PULSES DECIMAL = 10. COARSE + 53. FINE  
75.7892 DEG 12.65 PULSES OCTAL CKAH SUB C = -1.8202 EPSILON= 7.9118 SCN=10

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HOGA

PN 10 PASS 2632 PR23 #10/12 S/WSJ,X DSS63A RCVR AGC -123.90 FILE 10-988 TG 05/11/79  
SPACECRAFT ATTITUDE ON DAY 130 MAY 10, 1979 1400 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.9696 RCSPHAK = 264.5700

SPACECRAFT-EARTH DIRECTION: CLAT = -2.9706 CLON = 236.3243

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.1921 CLON = 237.2696

NEW ATTITUDE  
POST-PRECESSION

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PN 10 PASS 2632 PR23 #10/12 S/WSJ,X DSS63A RCVR AGC -123.90 FILE 10-988 TG 05/11/79  
SPACECRAFT ATTITUDE ON DAY 130 MAY 10, 1979 1400 GMT  
SPIN PERIOD = 12.851070 SEC RILT = 5 HR 27 MIN 22.81 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.1921 | 237.2696 |                |            |
| SUN             | 0.5483   | 173.4931 | -3.1298 | 236.7241 | 0.279486710 10 | 18.6822667 |
| EARTH           | 0.9696   | 166.8211 | -2.9706 | 236.3243 | 0.294438430 10 | 19.6817132 |
| JUPITER         | 57.3268  | 177.9502 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 119.6383 | 230.0173 |         |          |                |            |
| BETELGEUSE(R)   | 143.7194 | 212.9142 |         |          |                |            |
| CANGRUS(B)      | 96.4129  | 259.5624 |         |          |                |            |
| ARCTURUS(R)     | 46.5386  | 130.6724 |         |          |                |            |
| RIGIL KENTAURUS | 39.4304  | 272.1827 |         |          |                |            |
| ANTARES(R)      | 12.1791  | 353.1327 |         |          |                |            |
| CAPELLA(R)      | 149.3867 | 137.9392 |         |          |                |            |
| VEGA(B)         | 74.3780  | 68.6794  |         |          |                |            |
| ALDEBARAN(R)    | 165.0853 | 215.4700 |         |          |                |            |
| RIGEL(B)        | 141.1138 | 243.3618 |         |          |                |            |
| GAMMA CRUCIS(R) | 48.1240  | 251.2438 |         |          |                |            |
| SPICA(B)        | 33.7736  | 178.9192 |         |          |                |            |
| ACHERNAR(B)     | 96.1120  | 299.2175 |         |          |                |            |
| DENEK(B)        | 96.6188  | 59.9861  |         |          |                |            |
| PROCYON(B)      | 119.4041 | 200.4019 |         |          |                |            |

STAR DELAY: 2.6929 SEC 689.3896 PULSES DECIMAL = 10, COARSE + 49, FINE  
75.4376 DEG 12.61 PULSES OCTAL CKAH SUB C = 161.8990 EPSILON=11.5942 SCNE=1

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42.381 50 SHEETS 5 SQUARE  
42.382 100 SHEETS 5 SQUARE  
42.389 200 SHEETS 5 SQUARE

NOTE -

ATTITUDE SHEET 10-985 WAS NOT RUN  
DUE TO LOW SUN CONE ANGLE.

*RP*

12. HOGAN

PN 10 PASS2650 PR23 #0/0 S/WSJX DSS12A RCVR AGC =128,7 FILE 10-990 GN 05/29/79  
SPACECRAFT ATTITUDE ON DAY 148 MAY 28, 1979 2000 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,3909 RCSPHAK = 186,1400

SPACECRAFT-EARTH DIRECTION: CLAT = -2,9727 CLON = 237,4022

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3,3300 CLON = 237,2436

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PN 10 PASS2650 PR23 #0/0 S/WSJX DSS12A RCVR AGC =128,7 FILE 10-990 GN 05/29/79  
SPACECRAFT ATTITUDE ON DAY 148 MAY 28, 1979 2000 GMT  
SPIN PERIOD = 12,853140 SEC RTLT = 5 HR 29 MIN 46,10 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -3,3300 | 237,2436 |                |            |
| SUN             | 0,3844   | 148,7670 | -3,1307 | 236,9144 | 0,281646270 10 | 18,8266223 |
| EARTH           | 0,3909   | 66,0928  | -2,9727 | 237,4022 | 0,296586210 10 | 19,8252814 |
| JUPITER         | 57,3058  | 177,6597 | 0,0000  | 180,0000 | 0,00000000     | 0,0000000  |
| SIRIUS(B)       | 119,5159 | 230,0548 |         |          |                |            |
| BETELGEUSE(R)   | 143,6225 | 213,0508 |         |          |                |            |
| CANOPUS(B)      | 96,2725  | 259,5608 |         |          |                |            |
| ARCTURUS(R)     | 46,6264  | 130,5672 |         |          |                |            |
| RIGIL KENTAURUS | 39,2936  | 272,2194 |         |          |                |            |
| ANTARES(R)      | 12,1892  | 353,7796 |         |          |                |            |
| CAPELLA(R)      | 149,4596 | 138,1408 |         |          |                |            |
| VEGA(B)         | 74,5160  | 68,6851  |         |          |                |            |
| ALDEBARAN(R)    | 164,9837 | 215,8311 |         |          |                |            |
| RIGEL(B)        | 140,9788 | 243,4079 |         |          |                |            |
| GAMMA CRUCIS(R) | 47,9850  | 251,2246 |         |          |                |            |
| SPICA(B)        | 33,7504  | 178,7106 |         |          |                |            |
| ACHERNAR(B)     | 96,0343  | 299,2065 |         |          |                |            |
| DENEK(B)        | 96,7513  | 59,9792  |         |          |                |            |
| PROCYON(B)      | 119,3316 | 200,4680 |         |          |                |            |

STAR DELAY: 2,6934 SEC 689,5148 PULSES DECIMAL = 10, COARSE + 50, FINE  
75,4392 DEG 12 62 PULSES OCTAL CKAH SUB C = 136,4469 EPSILON=12,3200 SCN=10

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PN 10 F 2660 PR23 #0/0 S/WSJX DSS63A RCVR -123.9 FILE 10-991 KS 0 /79  
 SPA CRAFT ATTITUDE ON DAY 159 JUNE 8, 1979 0845 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.0801 RCSPHAK = 306.3600

SPACECRAFT-EARTH DIRECTION: CLAT = -2.9799 CLON = 238.0032

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -1.9097 CLON = 238.1495

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PN 10 PASS2660 PR23 #0/0 S/WSJX DSS63A RCVR AGC -123.9 FILE 10-991 KS 06/08/79  
 SPACECRAFT ATTITUDE ON DAY 159 JUNE 8, 1979 0845 GMT  
 SPIN PERIOD = 12.853140 SEC RTLT = 5 HR 30 MIN 28.56 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -1.9097 | 238.1495 | -              | -          |
| SUN             | 1.6610   | 227.3628 | -3.1312 | 237.0228 | 0.262890470 10 | 18.9097908 |
| EARTH           | 1.0801   | 262.2246 | -2.9799 | 238.0032 | 0.297222610 10 | 19.8678215 |
| JUPITER         | 58.1692  | 178.8140 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)       | 121.1857 | 229.9678 |         |          |                |            |
| BETELGEUSE(R)   | 145.1499 | 212.1015 |         |          |                |            |
| CANOPUS(B)      | 97.8327  | 259.6807 |         |          |                |            |
| ARCTURUS(R)     | 46.1582  | 132.1498 |         |          |                |            |
| RIGIL KENTAURUS | 40.6869  | 271.1327 |         |          |                |            |
| ANTARES(R)      | 11.5406  | 346.4148 |         |          |                |            |
| CAPELLA(R)      | 149.1460 | 135.3946 |         |          |                |            |
| VEGA(R)         | 72.8643  | 68.8227  |         |          |                |            |
| ALDEBARAN(R)    | 166.5351 | 213.2859 |         |          |                |            |
| RIGEL(B)        | 142.6536 | 243.6749 |         |          |                |            |
| GAMMA CRUCIS(R) | 49.6221  | 250.9199 |         |          |                |            |
| SPICA(B)        | 34.6501  | 180.8473 |         |          |                |            |
| ACHERNAR(B)     | 96.7998  | 299.4145 |         |          |                |            |
| DFNEB(B)        | 95.0687  | 60.0130  |         |          |                |            |
| PROCYON(B)      | 120.6713 | 199.9201 |         |          |                |            |

STAR DELAY: 2.6891 SEC 688.4190 PULSES DECIMAL = 10, COARSE + 48, FINE  
 75.3193 DEG 12 60 PULSES OCTAL CKAH SUB C = 219.5173 EPSILON = 7.8454 SCN=10

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HQ-AN

PN 10 PASS2668 PR23 #4/4 S/WJSX USS63A RCVR AGC =144.9 FILE 10-992 MF  
SPACECRAFT ATTITUDE ON DAY 106 JUNE 15, 1974 0600 GMT

06/16/74

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRHS = 100 RCSTPOS = 180  
AMPLITUDE AND PHASE ANGLE: RCSPHAK = 1.7249 RCSPHAK = 300.4600  
SPACECRAFT-EARTH DIRECTION: CLAT = -2.9868 CLON = 230.3812  
SPACECRAFT +Z AXIS ATTITUDE: CLAT = -1.2746 CLON = 230.1722

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PN 10 PASS2668 PR23 #4/4 S/WJSX USS63A RCVR AGC =144.9 FILE 10-992 MF  
SPACECRAFT ATTITUDE ON DAY 106 JUNE 15, 1974 0600 GMT  
SPIN PERIOD = 12.856320 SEC RILT = 5 HR 30 MIN 41.18 SEC

06/16/74

|                 | C/A      | C/A      | CLAT    | CLON     | R(KR)          | R(AL)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -1.2746 | 230.1722 | -              | -          |
| SUN             | 2.1471   | 239.8798 | -3.1315 | 237.0933 | 0.263706100 10 | 10.9043100 |
| EARTH           | 1.7249   | 270.9517 | -2.9868 | 238.3812 | 0.297411890 10 | 19.0804739 |
| JUPITER         | 58.1410  | 179.2090 | 0.0000  | 180.0000 | 0.000000000    | 0.00000000 |
| SIRIUS(R)       | 121.6858 | 229.7287 |         |          |                |            |
| BETELGEUSE(R)   | 145.5031 | 211.3304 |         |          |                |            |
| CANOPUS(B)      | 98.4615  | 259.6603 |         |          |                |            |
| ARCTURUS(R)     | 45.7043  | 132.5809 |         |          |                |            |
| BIGEL KENTAUUS  | 41.3214  | 271.0930 |         |          |                |            |
| ANTARES(R)      | 11.6840  | 343.4024 |         |          |                |            |
| CAPELLA(R)      | 148.7131 | 134.0231 |         |          |                |            |
| VEGA(R)         | 72.2840  | 60.7579  |         |          |                |            |
| ALDEBARAN(R)    | 106.8920 | 211.0612 |         |          |                |            |
| BIGEL (R)       | 143.2321 | 243.3272 |         |          |                |            |
| GAMMA CRUCIS(R) | 50.2300  | 251.0764 |         |          |                |            |
| SPICA(B)        | 34.6873  | 181.7652 |         |          |                |            |
| ACHERNAR(B)     | 97.3417  | 299.4503 |         |          |                |            |
| DENEK(B)        | 94.5072  | 60.0385  |         |          |                |            |
| PROCYON(B)      | 120.9072 | 199.5691 |         |          |                |            |

STAR DELAY: 2.6902 SEC 688.7032 PULSES DECIMAL = 10. COARSE + 49. FINE  
75.3317 DEC 12 61 PULSES OCTAL CKAH SUB C = 233.1562 EPSILON = 6.7236 SUN=10

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HN N

PR 10 PASS2672 PR23 #10/10 S/WJSX DSS63B RCVR AGC -114.8 FILE 10-993 MF  
SPACECRAFT ATTITUDE ON DAY 170 JUNE 19, 1979 0700 GMT

06/19/79

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

- POST -  
- CLOSED LOOP -  
MANUVER

NEW ATTITUDE  
POST-PRECESSION

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.4930 RCSPHAK = 85.0450  
SPACECRAFT-EARTH DIRECTION: CLAT = -2.9917 CLON = 238.5953  
SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.0101 CLON = 238.1019

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PR 10 PASS2672 PR23 #10/10 S/WJSX DSS63B RCVR AGC -114.8 FILE 10-993 MF  
SPACECRAFT ATTITUDE ON DAY 170 JUNE 19, 1979 0700 GMT  
SPIN PERIOD = 12.852530 SEC RTLT = 5 HR 30 MIN 43.18 SEC

06/19/79

|                  | CNA      | CKA      | CLAT    | CLON     | K(HP)          | B(AD)      |
|------------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS      | 0.0000   | 0.0000   | -3.0101 | 238.1019 | -              | -          |
| SUN              | 0.9736   | 187.1956 | -3.1317 | 237.1345 | 0.284184050 10 | 10.9962600 |
| EARTH            | 0.4930   | 2.1257   | -2.9917 | 238.5953 | 0.297441840 10 | 19.6824759 |
| JUPITER          | 58.1511  | 178.1280 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS (R)       | 120.3102 | 230.3634 |         |          |                |            |
| BETELGEUSE (R)   | 144.5142 | 213.3767 |         |          |                |            |
| CANOPUS (R)      | 96.7415  | 259.6979 |         |          |                |            |
| ARCTURUS (R)     | 46.9471  | 131.4196 |         |          |                |            |
| RIGIL KENTAURUS  | 39.5877  | 271.2137 |         |          |                |            |
| ANTARES (R)      | 11.3790  | 351.7896 |         |          |                |            |
| CAPELLA (R)      | 149.8749 | 136.7951 |         |          |                |            |
| VEGA (R)         | 73.9079  | 68.9258  |         |          |                |            |
| ALDEBARAN (R)    | 165.8637 | 216.8404 |         |          |                |            |
| RIGEL (R)        | 141.6440 | 244.2396 |         |          |                |            |
| GAMMA CRUCIS (R) | 48.5674  | 250.6429 |         |          |                |            |
| SPICA (R)        | 34.6016  | 179.2516 |         |          |                |            |
| ACHERNAH (R)     | 95.8642  | 299.3479 |         |          |                |            |
| DENEHB (R)       | 96.0454  | 59.9614  |         |          |                |            |
| PROCYON (R)      | 120.2464 | 200.5157 |         |          |                |            |

STAR DELAY: 2.6884 SEC 688.2294 PULSES DECIMAL = 10. COARSE + 48. FINE  
75.3021 DEG 12 60 PULSES OCIAL CKAH SUB C = 177.2594 EPSILON = 9.9362 SCN = 10

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Hogden

PR 10 PASS2679 PR23 4070 S/WJSJX DSS12A RCVR AGC -133.0 FILE 10-994 KS  
SPACECRAFT ATTITUDE ON DAY 177 JUNE 26, 1979 1230 GMT

06/28/79

ROLL REFERENCE POINT IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR ROLLOFF IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASMSGRS = 180 ROSTPOS = 180  
AMPLITUDE AND PHASE ANGLE: RCBANGAK = 1.4742 RCBPHAK = 91.4428  
SPACECRAFT-EARTH DIRECTION: CLAT = -3.0019 CLON = 238.9614  
SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.1218 CLON = 237.4899

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PR 10 PASS2679 PR23 4070 S/WJSJX DSS12A RCVR AGC -133.0 FILE 10-994 KS  
SPACECRAFT ATTITUDE ON DAY 177 JUNE 26, 1979 1230 GMT  
SPIN PERIOD = 12.899950 SEC RTLT = 5.84 31 RTL = 17.24 SEC

06/28/79

|                  | ROLL     | CLAT    | CLON     | ROLL        | CLAT | CLON       |
|------------------|----------|---------|----------|-------------|------|------------|
| SC +Z AXIS       | 0.0000   | -3.1218 | 237.4899 | -           | -    | -          |
| SUN              | 0.2530   | -3.1320 | 237.2077 | 0.255037670 | 10   | 19.0553202 |
| EARTH            | 1.4742   | -3.0019 | 238.9614 | 0.257952310 | 10   | 19.9165983 |
| REF POINT        | 57.5441  | 0.0000  | 180.0000 | 0.0000000   | 0    | 0.0000000  |
| SATURN (R)       | 119.8334 |         |          |             |      |            |
| NETELNISE (R)    | 143.9422 |         |          |             |      |            |
| CAUCUS (R)       | 96.5218  |         |          |             |      |            |
| ACTUALS (R)      | 48.6301  |         |          |             |      |            |
| HTIL KENTALELS   | 39.4927  |         |          |             |      |            |
| ANTARES (R)      | 11.9695  |         |          |             |      |            |
| CAPPELLA (R)     | 100.5024 |         |          |             |      |            |
| VEGA (R)         | 79.2327  |         |          |             |      |            |
| ALDEBARAN (R)    | 165.3050 |         |          |             |      |            |
| RTHEL (R)        | 141.2749 |         |          |             |      |            |
| GAMMA CRUCIS (R) | 48.2616  |         |          |             |      |            |
| SPICA (R)        | 33.9923  |         |          |             |      |            |
| ADHERNAR (R)     | 96.0659  |         |          |             |      |            |
| OMERTE (R)       | 96.0479  |         |          |             |      |            |
| PROCYON (R)      | 119.6348 |         |          |             |      |            |

STAR DELAY: 2.6927 SEC 689.3294 PULSES DECIMAL = 10. COARSE + 09. FINE  
75.4024 DEL = 12.01 PULSES TOTAL CRAW SUB C = 169.2645 EPSILON=12.7998 SEC=1

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170811  
07/1

PN 10 PASS 65 PR23 #0/0 S/W/SJO DSS12A RCVR AG 144.9 FILE 10-9958 MF  
SPACE T ATTITUDE ON DAY 183 JULY 2, 1979 J GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1,2570 RCSPHAK = 89,3660  
SPACECRAFT-EARTH DIRECTION: CLAT = -3,0117 CLON = 239,2452  
SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3,0742 CLON = 237,9880

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PN 10 PASS2685 PR23 #0/0 S/W/SJO DSS12A RCVR AGC +144.9 FILE 10-9958 MF 07/10/79  
SPACECRAFT ATTITUDE ON DAY 183 JULY 2, 1979 1130 GMT  
SPIN PERIOD = 12,857050 SEC RTLT = 5 HR 30 MIN 23,58 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          |            |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | +3,0742 | 237,9880 | -              | -          |
| SUN             | 0,7216   | 184,6342 | +3,1322 | 237,2677 | 0,285741910 10 | 14,1003491 |
| EARTH           | 1,2570   | 2,8156   | -3,0117 | 239,2452 | 0,297147960 10 | 14,5518310 |
| JUPITER         | 58,0395  | 178,0798 | 0,0000  | 180,0000 | 0,000000000    | 0,0000000  |
| STRIUS(R)       | 120,1883 | 230,3301 |         |          |                |            |
| BETELGEUSE(R)   | 144,3845 | 213,3580 |         |          |                |            |
| CANOPUS(B)      | 96,6582  | 259,6800 |         |          |                |            |
| ARCTURUS(R)     | 46,9200  | 131,2942 |         |          |                |            |
| RIGIL KENTAURUS | 39,5262  | 271,3471 |         |          |                |            |
| ANTARES(R)      | 11,4827  | 352,1756 |         |          |                |            |
| CAPELLA(R)      | 149,8356 | 137,0034 |         |          |                |            |
| VEGA(R)         | 74,0025  | 68,8939  |         |          |                |            |
| ALDEBARAN(R)    | 165,7343 | 216,7676 |         |          |                |            |
| RIGEL(R)        | 141,5368 | 244,1396 |         |          |                |            |
| GAMMA CRUCIS(R) | 48,4693  | 250,7130 |         |          |                |            |
| SPICA(B)        | 34,4828  | 179,1503 |         |          |                |            |
| ACHERNAR(B)     | 95,8641  | 299,3285 |         |          |                |            |
| DENEBS(B)       | 96,1577  | 59,9624  |         |          |                |            |
| PROCYON(B)      | 120,1174 | 200,5213 |         |          |                |            |

STAR DELAY: 2,6900 SEC 688,6346 PULSES DECIMAL = 10, COARSE + 49, FINE  
75,3200 DEG 12 61 PULSES OCTAL CKAH SUB C = 173,7532 EPSILON=10

R. HDGA 12/79

PN 10 JS2694 PR23 #10/11 S/WSJO DSS63A RCVR GC =120.4 FILE 10-996 RC  
 SPACECRAFT ATTITUDE ON DAY 192 JULY 11, 1979 1100 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.4839 RCSPHAK = 240.3900  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.0285 CLON = 239.6376  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.2845 CLON = 240.0489

POST-MISC

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PN 10 PASS2694 PR23 #10/11 S/WSJO DSS63A RCVR AGC =120.4 FILE 10-996 RC 07/12/79  
 SPACECRAFT ATTITUDE ON DAY 192 JULY 11, 1979 1100 GMT  
 SPIN PERIOD = 12.858030 SEC RTLT = 5 HR 29 MIN 49.48 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)    |
|-----------------|----------|----------|---------|----------|----------------|----------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | =3.2845 | 240.0489 |                |          |
| SUN             | 2.6919   | 176.8414 | =3.1326 | 237.3570 | 0.286803950 10 | 19.17138 |
| EARTH           | 0.4839   | 148.0684 | =3.0285 | 239.6376 | 0.296636850 10 | 19.82866 |
| JUPITER         | 60.1031  | 178.1092 | 0.0000  | 180.0000 | 0.00000000     | 0.00000  |
| SIRIUS(B)       | 121.3230 | 231.4737 |         |          |                |          |
| BETELGEUSE(R)   | 145.9644 | 215.3920 |         |          |                |          |
| CANOPUS(B)      | 96.8135  | 260.0380 |         |          |                |          |
| ARCTURUS(R)     | 48.4529  | 132.6731 |         |          |                |          |
| RIGIL KENTAURUS | 39.3104  | 268.9582 |         |          |                |          |
| ANTARES(R)      | 9.4158   | 351.8707 |         |          |                |          |
| CAPELLA(R)      | 151.4605 | 134.8407 |         |          |                |          |
| VEGA(B)         | 73.4759  | 69.5931  |         |          |                |          |
| ALDEBARAN(R)    | 167.1801 | 223.0352 |         |          |                |          |
| RIGEL(B)        | 142.2009 | 246.7499 |         |          |                |          |
| GAMMA CRUCIS(R) | 48.9795  | 249.0676 |         |          |                |          |
| SPICA(B)        | 36.5496  | 179.0161 |         |          |                |          |
| ACHERNAR(B)     | 94.6689  | 299.5984 |         |          |                |          |
| DENEK(B)        | 95.3085  | 59.8874  |         |          |                |          |
| PROCYON(B)      | 121.9654 | 201.1949 |         |          |                |          |

STAR DELAY: 2.6774 SEC 685.4143 PULSES DECIMAL = 10. COARSE + 45. FINE  
 74.9620 DEG 12 55 PULSES OCTAL CKAH SUB C # 171.0976 EPSILON# 5.7438 SCN

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PN 10 PASS2696 PR23 #0/0 S/WSJO DSS14A RCVR AGC =125.6 FILE 10-997 RC  
 SPACECRAFT ATTITUDE ON DAY 194 JULY 13, 1979 1600 GMT

07/13/79

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.3200 RCSPHAK = 230.0000  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.0329 CLON = 239.7269  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.2451 CLON = 239.9668

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PN 10 PASS2696 PR23 #0/0 S/WSJO DSS14A RCVR AGC =125.6 FILE 10-997 RC  
 SPACECRAFT ATTITUDE ON DAY 194 JULY 13, 1979 1600 GMT  
 SPIN PERIOD = 12.857540 SEC RTLT = 5 HR 29 MIN 38.81 SEC

07/13/79

|                  | CNA      | CKA      | CLAT    | CLON     | R(KM)          | H(AU)      |
|------------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS      | 0.0000   | 0.0000   | -3.2451 | 239.9668 |                |            |
| SUN              | 2.5855   | 177.5801 | -3.1327 | 237.3798 | 0.28706487D 10 | 19.1888282 |
| EARTH            | 0.3200   | 138.4781 | -3.0329 | 239.7269 | 0.29647697D 10 | 19.8179793 |
| JUPITER          | 60.0199  | 178.1256 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)        | 121.3027 | 231.4151 |         |          |                |            |
| BETELGEUSE(F(R)) | 145.9204 | 215.2698 |         |          |                |            |
| CANOPUS(B)       | 96.8381  | 260.0228 |         |          |                |            |
| ARCTURUS(F)      | 48.3685  | 132.6386 |         |          |                |            |
| RIGIL KENTAURUS  | 39.3483  | 269.0543 |         |          |                |            |
| ANTARES(R)       | 9.5024   | 351.7024 |         |          |                |            |
| CAPELLA(R)       | 151.3748 | 134.8916 |         |          |                |            |
| VEGA(B)          | 73.4676  | 69.5616  |         |          |                |            |
| ALDEBARAN(R)     | 167.1468 | 222.6594 |         |          |                |            |
| RIGEL(B)         | 142.2046 | 246.6282 |         |          |                |            |
| GAMMA CRUCIS(R)  | 48.9870  | 249.1417 |         |          |                |            |
| SPICA(B)         | 36.4670  | 179.0628 |         |          |                |            |
| ACHERNAR(B)      | 94.7435  | 299.5895 |         |          |                |            |
| DENEBO(B)        | 95.3155  | 59.8911  |         |          |                |            |
| PROCYON(B)       | 121.9033 | 201.1489 |         |          |                |            |

STAR DELAY: 2.6778 SEC 685,5266 PULSES DECIMAL = 10, COARSE + 46, FINE  
 74.9772 DEG 12 56 PULSES OCTAL CKAH SUB C = 171.6651 EPSILON = 5.9150 SCN=10

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R. HQ 4N

PN 10 3S2702 PR23 #0/0 S/WSJO DSS12 RC GC -123.9 FILE 10-998 GN 19/79  
SPACECRAFT ATTITUDE ON DAY 200 JULY 19, 1979 1600 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.3377 RCSPHAK = 176.4300

SPACECRAFT-EARTH DIRECTION: CLAT = -3.0457 CLON = 239.9540

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3797 CLON = 239.9040

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PN 10 PASS2702 PR23 #0/0 S/WSJO DSS12 RCVR AGC -123.9 FILE 10-998 GN 07/19/79  
SPACECRAFT ATTITUDE ON DAY 200 JULY 19, 1979 1600 GMT  
SPIN PERIOD = 12.858640 SEC RTLT = 5 HR 29 MIN 5.66 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)    |
|-----------------|----------|----------|---------|----------|----------------|----------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3797 | 239.9040 |                |          |
| SUN             | 2.4729   | 174.3432 | -3.1329 | 237.4394 | 0.287773680 10 | 19.23620 |
| EARTH           | 0.3377   | 81.4845  | -3.0457 | 239.9540 | 0.295979970 10 | 19.78475 |
| JUPITER         | 59.9617  | 178.0431 | 0.0000  | 180.0000 | 0.000000000    | 0.00000  |
| SIRIUS(B)       | 121.1583 | 231.4327 |         |          |                |          |
| BETELGEUSE(R)   | 145.7913 | 215.3746 |         |          |                |          |
| CANOPUS(B)      | 96.6946  | 260.0146 |         |          |                |          |
| ARCTURUS(R)     | 48.4251  | 132.5131 |         |          |                |          |
| RIGIL KENTAURUS | 39.2127  | 269.1248 |         |          |                |          |
| ANTARES(R)      | 9.5462   | 352.5447 |         |          |                |          |
| CAPELLA(R)      | 151.4256 | 135.1439 |         |          |                |          |
| VEGA(B)         | 73.6156  | 69.5545  |         |          |                |          |
| ALDEBARAN(R)    | 167.0093 | 222.9006 |         |          |                |          |
| RIGEL(B)        | 142.0562 | 246.6192 |         |          |                |          |
| GAMMA CRUCIS(R) | 48.8389  | 249.1474 |         |          |                |          |
| SPICA(B)        | 36.4067  | 178.8753 |         |          |                |          |
| ACHERNAR(B)     | 94.6575  | 299.5759 |         |          |                |          |
| DENEK(B)        | 95.4634  | 59.8862  |         |          |                |          |
| PROCYON(B)      | 121.7961 | 201.2092 |         |          |                |          |

STAR DELAY: 2.6784 SEC 685.6602 PULSES DECIMAL = 10. COARSE + 46. FINE  
74.9854 DEG 12 56 PULSES OCTAL CKAH SUB C = 168.2370 EPSILON = 6.1062 SCN

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PN 10 PASS2709 PR23 #0/0 S/WSJO DSS43A RCVR GC -135.64 FILE 10-999 RM  
 SPACECRAFT ATTITUDE ON DAY 207 JULY26,1979 1830 GMT

26/79

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.5148 KCSFHAK = 140.1800  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.0621 CLON = 240.1918  
 SPACERAFT +Z AXIS ATTITUDE: CLAT = -3.4185 CLON = 239.8196

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PN 10 PASS2709 PR23 #0/0 S/WSJO DSS43A RCVR AGC -135.64 FILE 10-999 RM 07/26/79  
 SPACECRAFT ATTITUDE ON DAY 207 JULY26,1979 1830 GMT  
 SPIN PERIOD = 12,859680 SEC RTLT = 5 HR 28 MIN 19,30 SEC

| S/C +Z AXIS     | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AL)    |
|-----------------|----------|----------|---------|----------|----------------|----------|
| SUN             | 0.0000   | 0.0000   | -3.4185 | 239.8196 |                |          |
| EARTH           | 2.3239   | 173.0153 | -3.1332 | 237.5095 | 0,28861179D 10 | 19,29223 |
| JUPITER         | 0.5148   | 43.7863  | -3.0621 | 240.1918 | 0,29528518D 10 | 19,73831 |
| SIRIUS(B)       | 59.8789  | 178.0139 | 0.0000  | 180.0000 | 0.00000000     | 0.00000  |
| BETELGEUSE(R)   | 121.0755 | 231.4025 |         |          |                |          |
| CANOPUS(B)      | 145.7002 | 215.3444 |         |          |                |          |
| ARCTURUS(R)     | 96.6419  | 260.0007 |         |          |                |          |
| RIGIL KENTAURUS | 48.3969  | 132.4297 |         |          |                |          |
| ANTARES(R)      | 39.1727  | 269.2224 |         |          |                |          |
| CAPELLA(R)      | 9.6248   | 352.6309 |         |          |                |          |
| VEGA(B)         | 151.3931 | 135.2983 |         |          |                |          |
| ALDEBARAN(R)    | 73.6814  | 69.5303  |         |          |                |          |
| RIGEL(B)        | 166.9212 | 222.7710 |         |          |                |          |
| GAMMA CRUCIS(R) | 141.9871 | 246.5349 |         |          |                |          |
| SPICA(B)        | 48.7727  | 249.1992 |         |          |                |          |
| ACHERNAR(B)     | 36.3233  | 178.8154 |         |          |                |          |
| DENEK(B)        | 94.6653  | 299.5633 |         |          |                |          |
| PROCYON(B)      | 95.5392  | 59.8864  |         |          |                |          |
|                 | 121.7036 | 201.2077 |         |          |                |          |

STAR DELAY: 2.6791 SEC 685,8429 PULSES DECIMAL = 10. COARSE + 46. FINE  
 74.9993 DEG 12 56 PULSES OCTAL CKAH SUB C = 166,6389 EPSILON = 6,3764 SCN

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0 PASS2714 R23 #070 S/WSJO DSS438 RCOR GGC +12.0 FILE 10=1000 JMW  
SPACECRAFT ATTITUDE ON DAY 212 JULY 31, 1979 1800 GMT

08/01/79

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.5802 RCSPHAK = 119.1770

SPACECRAFT-EARTH DIRECTION: CLAT = -3.0743 CLON = 240.3369

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3239 CLON = 239.8123

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0 PASS2714 R23 #070 S/WSJO DSS438 RCOR GGC -125.0 FILE 10=1000 JMW  
SPACECRAFT ATTITUDE ON DAY 212 JULY 31, 1979 1800 GMT  
SPIN PERIOD = 12.860710 SEC RTLT = 5 HR 27 MIN 42.92 SEC

08/01/79

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AL)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3239 | 239.8123 |                |            |
| SUN             | 2,2583   | 175,2245 | -3.1334 | 237,5585 | 0,289200780 10 | 19,3316029 |
| EARTH           | 0,5802   | 25,4682  | -3,0743 | 240,3369 | 0,294739820 10 | 19,7018590 |
| JUPITER         | 59,8684  | 178,0682 | 0,0000  | 180,0000 | 0,000000000    | 0,0000000  |
| SIRIUS(B)       | 121,1449 | 231,3630 |         |          |                |            |
| BETELGEUSE(R)   | 145,7490 | 215,2246 |         |          |                |            |
| CANOPUS(B)      | 96,7337  | 259,9975 |         |          |                |            |
| ARCTURUS(R)     | 48,3222  | 132,4813 |         |          |                |            |
| RIGIL KENTAUROS | 39,2672  | 269,2324 |         |          |                |            |
| ANTARES(R)      | 9,6442   | 352,2835 |         |          |                |            |
| CAPELLA(R)      | 151,3214 | 135,1842 |         |          |                |            |
| VEGA(B)         | 73,5953  | 69,5182  |         |          |                |            |
| ALDEBARAN(R)    | 166,9799 | 222,4481 |         |          |                |            |
| RTGEL(B)        | 142,0710 | 246,4777 |         |          |                |            |
| GAMMA CRUCIS(R) | 48,8586  | 249,2341 |         |          |                |            |
| SPICA(B)        | 36,3142  | 178,9434 |         |          |                |            |
| ACHERNAR(R)     | 94,7511  | 299,5662 |         |          |                |            |
| DENEBO(S)       | 95,4610  | 59,8911  |         |          |                |            |
| PROCYON(B)      | 121,7310 | 201,1511 |         |          |                |            |

STAR DELAYS: 2,6794 SEC 685,9270 PULSES DECIMAL = 10, COARSE + 46, FINE  
75,0025 DEG 12 56 PULSES OCTAL CKAH SUB C = 168,7227 EPSILON = 6,5018 SCALE = 10

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0 PASS2714 PR23 #0/0 S/W5J0 DSS438 RCOR GGC -125.0 FILE 10-1000 JMW  
 SPACECRAFT ATTITUDE ON DAY 212 JULY 31, 1979 1800 GMT

08/01/79

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRKS = 180 RCSTPCS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.5802 RCSPHAK = 119.1770

SPACECRAFT-EARTH DIRECTIONS: CLAT = -3.0743 CLON = 240.3369

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3239 CLON = 239.8123

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0 PASS2714 PR23 #0/0 S/W5J0 DSS438 RCOR GGC -125.0 FILE 10-1000 JMW  
 SPACECRAFT ATTITUDE ON DAY 212 JULY 31, 1979 1800 GMT

08/01/79

SPLA PERIOD = 12.860710 SEC RTLT = 5.18 27 MIN 42.92 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AL)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3239 | 239.8123 | -              | -          |
| SUN             | 2,2593   | 175,2245 | -3.1334 | 237,5585 | 0.289200750 10 | 19.3316029 |
| EARTH           | 0.5802   | 25,4682  | -3.0743 | 240,3369 | 0.294739820 10 | 19.7016590 |
| JUPITER         | 59,8684  | 178,0682 | 0.0000  | 180,0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)       | 121,1449 | 231,3630 |         |          |                |            |
| BETELGEUSE(R)   | 145,7490 | 215,2246 |         |          |                |            |
| CANDORUS(B)     | 96,7337  | 259,9975 |         |          |                |            |
| ARCTURUS(R)     | 48,3222  | 132,4813 |         |          |                |            |
| REGIL KENTaurus | 39,2672  | 269,2324 |         |          |                |            |
| ANTARES(R)      | 9,6442   | 352,2835 |         |          |                |            |
| CAPELLA(R)      | 151,3214 | 135,1842 |         |          |                |            |
| VEGA(B)         | 73,5953  | 69,5182  |         |          |                |            |
| ALDEBARAN(R)    | 166,9299 | 222,4491 |         |          |                |            |
| REGEL(B)        | 142,0710 | 240,4777 |         |          |                |            |
| GAMMA CRUCIS(R) | 48,8586  | 249,2341 |         |          |                |            |
| SPICA(B)        | 36,3142  | 178,9834 |         |          |                |            |
| ADHEMAR(R)      | 90,7511  | 299,5662 |         |          |                |            |
| DENEK(B)        | 95,4010  | 59,8911  |         |          |                |            |
| PROCYON(B)      | 121,7310 | 201,1511 |         |          |                |            |

STAR DELAYS: 2.6794 SEC 685,9270 PULSES DECIMAL = 10, COARSE + 46, FINE  
 75,0025 DEG 12.56 PULSES CCIAL CKAM SUB C = 168,7227 EPSILON = 6.5018 SIN=10

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PN 10 PASS2724 PR23 #0/0 S/WSJ1 DSS12A RCVR AGC -127.2 FILE 10-1001 GN 08/10/79  
 SPACECRAFT ATTITUDE ON DAY 222 AUG 10,1979 1730 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.7279 RCSPHAK = 110.1400  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.0998 CLON = 240.5708  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3112 CLON = 239.8732

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PN 10 PASS2724 PR23 #0/0 S/WSJ1 DSS12A RCVR AGC -127.2 FILE 10-1001 GN 08/10/79  
 SPACECRAFT ATTITUDE ON DAY 222 AUG 10,1979 1730 GMT  
 SPIN PERIOD = 12.862420 SEC RTLT = 5 HR 26 MIN 22.68 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)     |
|-----------------|----------|----------|---------|----------|----------------|-----------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3112 | 239.8732 | -              | -         |
| SUN             | 2.2208   | 175.4799 | -3.1337 | 237.6560 | 0.290378000 10 | 19.410294 |
| EARTH           | 0.7279   | 16.8581  | -3.0998 | 240.5708 | 0.293537000 10 | 19.621457 |
| JUPITER         | 59.9286  | 178.0803 | 0.0000  | 180.0000 | 0.000000000    | 0.000000  |
| SIRIUS(B)       | 121.1927 | 231.3905 |         |          |                |           |
| BETELGEUSE(R)   | 145.8059 | 215.2644 |         |          |                |           |
| CANOPUS(B)      | 96.7568  | 260.0079 |         |          |                |           |
| ARCTURUS(R)     | 48.3538  | 132.5323 |         |          |                |           |
| RIGIL KENTAURUS | 39.2808  | 269.1619 |         |          |                |           |
| ANTARES(R)      | 9.5858   | 352.1642 |         |          |                |           |
| CAPELLA(R)      | 151.3555 | 135.0929 |         |          |                |           |
| VEGA(B)         | 73.5622  | 69.5371  |         |          |                |           |
| ALDEBARAN(R)    | 167.0333 | 222.5899 |         |          |                |           |
| RIGEL(B)        | 142.1068 | 246.5462 |         |          |                |           |
| GAMMA CRUCIS(R) | 48.8920  | 249.1920 |         |          |                |           |
| SPICA(B)        | 36.3747  | 178.9657 |         |          |                |           |
| ACHERNAR(B)     | 94.7322  | 299.5747 |         |          |                |           |
| DENER(B)        | 95.4196  | 59.8903  |         |          |                |           |
| PROCYON(B)      | 121.7922 | 201.1609 |         |          |                |           |

STAR DELAY: 2.6794 SEC 685.9237 PULSES DECIMAL = 10, COARSE + 46, FINE  
 74.9921 DEC 12 56 PULSES OCTAL CKAH SUB C = 168,9046 EPSILON = 6.5753 SCN =

PN 10 PASS 2732 PR23 #C/O S/W SJ2 DSS 43A RCVR AGC -131.6 FILE 10-1002  
SPACECRAFT ATTITUDE ON DAY 230 AUG 18, 1979 1715 GMT

SLB

08/20/79

RCLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPFAK IS TOWARD SOUTH ECLIPTIC POLE.

RCLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSIPUS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.5990 RCSPFAK = 105.5360

SPACECRAFT-EARTH DIRECTION: CLAT = -3.1213 CLUN = 240.7014

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3383 CLUN = 239.1147

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PN 10 PASS 2732 PR23 #C/O S/W SJ2 DSS 43A RCVR AGC -131.6 FILE 10-1002  
SPACECRAFT ATTITUDE ON DAY 230 AUG 18, 1979 1715 GMT  
SPIN PERIOD = 12.863880 SEC RTLI = 5 HR 25 MIN 13.40 SEC

SLB

08/20/79

|                 | CNA      | CKA      | CLAT    | CLUN     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3383 | 239.1147 | -              | -          |
| SUN             | 1.3802   | 171.5293 | -3.1341 | 237.7475 | 0.29149169D 10 | 19.4847386 |
| EARTH           | 1.5990   | 7.7553   | -3.1213 | 240.7014 | 0.29249858D 10 | 19.5520441 |
| JUPITER         | 59.1728  | 178.0052 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 120.6971 | 231.0029 |         |          |                |            |
| BETELGEUSE(R)   | 145.1696 | 214.6220 |         |          |                |            |
| CANOPUS(B)      | 96.5978  | 259.8772 |         |          |                |            |
| ARCTURUS(R)     | 47.8648  | 131.9692 |         |          |                |            |
| RIGIL KENTAURUS | 39.2484  | 270.0439 |         |          |                |            |
| ANTARES(R)      | 10.3330  | 352.8362 |         |          |                |            |
| CAPELLA(R)      | 150.8337 | 136.0441 |         |          |                |            |
| VEGA(B)         | 73.8538  | 69.2888  |         |          |                |            |
| ALDEBARAN(R)    | 166.4485 | 220.5007 |         |          |                |            |
| RIGEL(B)        | 141.7751 | 245.6321 |         |          |                |            |
| GAMMA CRUCIS(R) | 48.6011  | 249.7616 |         |          |                |            |
| SPICA(B)        | 35.6181  | 178.8646 |         |          |                |            |
| ACHERNAR(B)     | 95.0818  | 299.4730 |         |          |                |            |
| DENEK(B)        | 95.8228  | 59.9094  |         |          |                |            |
| PROCYON(B)      | 121.0759 | 200.9660 |         |          |                |            |

STAR DELAY: 2.6844 SEC 687.1974 PULSES DECIMAL = 10. CUARSE + 47. FINE  
75.1228 DEG 12 57 PULSES OCTAL CKAH SUB C = 162.9086 EPSILON= 8.6207 SCN=10

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HOMY  
09/12/79

PN 10 PASS 2742 PR23 #0/0 S/W SJ,3 DSS43A RCVR AGC -134.2 FILE 10-1003A GN  
SPACECRAFT ATTITUDE ON DAY 240 AUG 28,1979 1630 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180

REVISED

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1,3762 RCSPHAK = 105,4180

SPACECRAFT-EARTH DIRECTION: CLAT = -3,1486 CLON = 240,7894 REPLACES FILE NO. 10-1003

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3,3442 CLON = 239,4250

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PN 10 PASS 2742 PR23 #0/0 S/W SJ,3 DSS43A RCVR AGC -134.2 FILE 10-1003 GN 09/12/79  
SPACECRAFT ATTITUDE ON DAY 240 AUG 28,1979 1630 GMT  
SPIN PERIOD = 12,865590 SEC RTLT = 5 HR 23 MIN 44,70 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -3,3442 | 239,4250 | "              | "          |
| SUN             | 1,6066   | 172,5415 | -3,1344 | 237,8295 | 0,292497420 10 | 19,5519666 |
| EARTH           | 1,3762   | 8,1310   | -3,1486 | 240,7894 | 0,291168970 10 | 19,4631664 |
| JUPITER         | 59,4826  | 178,0261 | 0,0000  | 180,0000 | 0,00000000     | 0,0000000  |
| SIRIUS(B)       | 120,8871 | 231,1668 |         |          |                |            |
| BETELGEUSE(R)   | 145,4207 | 214,9020 |         |          |                |            |
| CANOPUS(B)      | 96,6464  | 259,9308 |         |          |                |            |
| ARCTURUS(R)     | 48,0767  | 132,1910 |         |          |                |            |
| RIGIL KENTAUROS | 39,2433  | 269,6828 |         |          |                |            |
| ANTARES(R)      | 10,0249  | 352,6692 |         |          |                |            |
| CAPELLA(R)      | 151,0601 | 135,6814 |         |          |                |            |
| VEGA(B)         | 73,7501  | 69,3916  |         |          |                |            |
| ALDEBARAN(R)    | 166,6786 | 221,3871 |         |          |                |            |
| RIGEL(B)        | 141,8966 | 246,0128 |         |          |                |            |
| GAMMA CRUCIS(R) | 48,7034  | 249,5224 |         |          |                |            |
| SPICA(B)        | 35,9279  | 178,8830 |         |          |                |            |
| ACHERNAR(B)     | 94,9241  | 299,5144 |         |          |                |            |
| DENEK(B)        | 95,6726  | 59,9002  |         |          |                |            |
| PROCYON(B)      | 121,3629 | 201,0547 |         |          |                |            |

STAR DELAY: 2,6828 SEC 686,7983 PULSES DECIMAL = 10, COARSE + 47, FINE  
75,0692 DEG 12 57 PULSES OCTAL CKAH SUB C = 164,5538 EPSILON = 7,9877 SCN=10

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*Hayden*

PN 10 PASS 2760 PR23 #0/0 S/W SJ,3 DSS11A RCVR AGC =134.20 FILE 10=1004 GN 09/17/79  
SPACECRAFT ATTITUDE ON DAY 258 SEP 15,1979 1630 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.3974 RCSPHAK = 101.7610

SPACECRAFT-EARTH DIRECTION: CLAT = -3.1973 CLON = 240.7357

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3061 CLON = 239.3403

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PN 10 PASS 2760 PR23 #0/0 S/W SJ,3 DSS11A RCVR AGC =134.20 FILE 10=1004 GN 09/17/79  
SPACECRAFT ATTITUDE ON DAY 258 SEP 15,1979 1630 GMT  
SPIN PERIOD = 12.868770 SEC RTLT = 5 HR 21 MIN 12.22 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3061 | 239.3403 | -              | -          |
| SUN             | 1.3481   | 172.7444 | -3.1350 | 238.0010 | 0.294620650 10 | 19.6938937 |
| EARTH           | 1.3974   | 4.4275   | -3.1973 | 240.7357 | 0.288883340 10 | 19.3103837 |
| JUPITER         | 59.3968  | 178.0420 | 0.0000  | 180.0000 | 0.000000000    | 0.00000000 |
| SIRIUS(B)       | 120.8637 | 231.1082 |         |          |                |            |
| BETELGEUSE(R)   | 145.3731 | 214.7818 |         |          |                |            |
| CANOPUS(B)      | 96.6691  | 259.9154 |         |          |                |            |
| ARCTURUS(R)     | 47.9918  | 132.1527 |         |          |                |            |
| RIGIL KENTAURUS | 39.2809  | 269.7815 |         |          |                |            |
| ANTARES(R)      | 10.1137  | 352.5130 |         |          |                |            |
| CAPELLA(R)      | 150.9730 | 135.7339 |         |          |                |            |
| VEGA(B)         | 73.7442  | 69.3598  |         |          |                |            |
| ALDEBARAN(R)    | 166.6401 | 221.0266 |         |          |                |            |
| RIGEL(B)        | 141.8969 | 245.8897 |         |          |                |            |
| GAMMA CRUCIS(R) | 48.7095  | 249.5987 |         |          |                |            |
| SPICA(B)        | 35.8427  | 178.9285 |         |          |                |            |
| ACHERNAR(B)     | 94.9989  | 299.5047 |         |          |                |            |
| DENEKB(B)       | 95.6820  | 59.9045  |         |          |                |            |
| PROLYON(B)      | 121.2977 | 201.0097 |         |          |                |            |

STAR DELAY: 2.6840 SEC 687.1090 PULSES DECIMAL = 10. COARSE + 47. FINE  
75.0846 DEG 12 57 PULSES OCTAL CKAH SUB C = 164.0285 EPSILON = 8.7159 SCN=10

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10 PASS 00 PR23 #00700 S/W SJ,3 DSS43A RCVR AGC -120.4 FILE 10-1005 TG 09/24/79  
 SPACECRAFT ATTITUDE ON DAY 264 SEP 21, 1979 1630 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.8648 RCSPHAK = 101.1600

SPACECRAFT-EARTH DIRECTION: CLAT = -3.2126 CLON = 240.6580

SPACECRAFT +Z AXIS ATTITUDE: LLAT = -3.3104 CLON = 239.7974

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PN 10 PASS 2766 PR23 #00700 S/W SJ,3 DSS43A RCVR AGC -120.4 FILE 10-1005 TG 09/24/79  
 SPACECRAFT ATTITUDE ON DAY 264 SEP 21, 1979 1630 GMT  
 SPIN PERIOD = 12.869070 SEC RTLT = 5 HR 20 MIN 27.48 SEC

|                 | CMA      | CKA      | CLAT    | CLON     | H(KM)          | H(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3104 | 239.7974 | -              | -          |
| SUN             | 1.7459   | 174.2891 | -3.1551 | 238.0575 | 0.29532815D 10 | 19.7411865 |
| EARTH           | 0.8648   | 8.4648   | -3.2126 | 240.6580 | 0.28821276D 10 | 19.2655588 |
| JUPITER         | 59.8530  | 178.0749 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 121.1461 | 231.3500 |         |          |                |            |
| BETELGEUSE(R)   | 145.7445 | 215.1949 |         |          |                |            |
| CANOPUS(B)      | 96.7444  | 259.9947 |         |          |                |            |
| ARCTURUS(R)     | 48.3021  | 132.4767 |         |          |                |            |
| RIGIL KENTAURUS | 30.2805  | 269.2500 |         |          |                |            |
| ANTARES(R)      | 9.6608   | 352.2158 |         |          |                |            |
| CAPELLA(R)      | 151.3013 | 135.1851 |         |          |                |            |
| VEGA(B)         | 73.5879  | 69.5118  |         |          |                |            |
| ALDEBARAN(R)    | 166.9780 | 222.3615 |         |          |                |            |
| REGEL(B)        | 142.0774 | 246.4523 |         |          |                |            |
| GAMMA CRUCIS(R) | 48.8659  | 249.2496 |         |          |                |            |
| SPICA(B)        | 36.2990  | 178.9605 |         |          |                |            |
| ACHERNAR(B)     | 94.7703  | 294.5648 |         |          |                |            |
| DENEB(B)        | 95.4568  | 59.8921  |         |          |                |            |
| PROCYON(B)      | 121.7219 | 201.1391 |         |          |                |            |

STAR DELAY: 2.6814 SEC 686.4419 PULSES DECIMAL = 10, COARSE + 46, FINE  
 75.0053 DFG 12 56 PULSES DECIMAL CKAH SUB C = 166.6587 EPSILON = 7.6304 SCN=10

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PN 10 PASS 2773 PR23 40/0 S/W SJ.3 DSS-34 RCVR AGC -121.48 FILE 10-1006 KS  
 SPACECRAFT ATTITUDE ON DAY 271 SEPT 28, 1979 1430 GMT

09/28/79

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGPRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGA = 0.7196 RCSPHAK = 99.8820  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.2294 CLON = 240.5331  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3004 CLON = 239.8157

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 PN 10 PASS 2773 PR23 40/0 S/W SJ.3 DSS434 RCVR AGC -121.48 FILE 10-1006 KS  
 SPACECRAFT ATTITUDE ON DAY 271 SEPT 28, 1979 1430 GMT  
 SPIN PERIOD = 12.871090 SEC RTLT = 5 19 MIN 41.97 SEC

09/28/79

|                 | CKA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)     |
|-----------------|----------|----------|---------|----------|----------------|-----------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3004 | 239.8157 | -              | -         |
| SUN             | 1.6987   | 174.4710 | -3.1354 | 238.1224 | 0.296143590 10 | 9.7956945 |
| EARTH           | 0.7198   | 5.6428   | -3.2294 | 240.5331 | 0.287530590 10 | 9.2199592 |
| JUPITER         | 52.8710  | 178.0821 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000 |
| SIRIUS(R)       | 121.1653 | 231.3560 |         |          |                |           |
| BETELGEUSE(R)   | 145.7652 | 215.1995 |         |          |                |           |
| CANOPUS(B)      | 96.7574  | 259.9977 |         |          |                |           |
| ARCTURUS(R)     | 48.3072  | 132.4978 |         |          |                |           |
| RIGIL KENTAURLS | 39.2907  | 269.2288 |         |          |                |           |
| ANTARES(R)      | 9.6440   | 352.1423 |         |          |                |           |
| CAPELLA(R)      | 151.3073 | 135.1497 |         |          |                |           |
| VEGA(B)         | 73.5722  | 69.5169  |         |          |                |           |
| ALDEBARAN(R)    | 166.9982 | 222.3843 |         |          |                |           |
| RIGEL(B)        | 142.0938 | 246.4699 |         |          |                |           |
| GAMMA CRUCIS(R) | 48.8817  | 249.2388 |         |          |                |           |
| SPICA(B)        | 36.3172  | 178.9755 |         |          |                |           |
| ACHERNAR(B)     | 94.7699  | 299.5678 |         |          |                |           |
| DENER(B)        | 95.4391  | 59.8922  |         |          |                |           |
| PROCYON(B)      | 121.7426 | 201.1388 |         |          |                |           |

STAR DELAY: 2.6816 SEC 688.4796 PULSES DECIMAL = 10, COARSE + 46, FINE  
 75.0023 DEG 12 SE PULSES OCTAL CKAR SUB C = 160,7220 EPSILON = 7.7489 SCN=10



PN 10 PASS 2779 PR23 #00/00 S/W SJ.3 DSS63A RCVR AGC -134.2 FILE 10-1007 TG 10/03/79  
 SPACECRAFT ATTITUDE ON DAY 276 OCT 3, 1979 2130 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRPS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.7750 RCSPHAK = 103.5090

SPACECRAFT-EARTH DIRECTION: CLAT = -3.2414 CLON = 240.4205

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3338 CLON = 239.6498

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PN 10 PASS 2779 PR23 #00/00 S/W SJ.3 DSS63A RCVR AGC -134.2 FILE 10-1007 TG 10/03/79  
 SPACECRAFT ATTITUDE ON DAY 276 OCT 3, 1979 2130 GMT  
 SPIR PERIOD = 12.871940 SEC RTLT = 5 HR 19 MIN 12.45 SEC

|                  | CNA      | CKA      | CLAT    | CLON     | R (KM)         | P (AU)     |
|------------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS      | 0.0000   | 0.0000   | -3.3338 | 239.6498 | -              | -          |
| SUN              | 1.4888   | 172.3901 | -3.1355 | 238.1719 | 0.296766860 10 | 19.8373570 |
| EARTH            | 0.7750   | 6.8235   | -3.2414 | 240.4205 | 0.287088060 10 | 19.1003783 |
| JUPITER          | 59.7065  | 178.0498 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS (R)       | 121.0357 | 231.2409 |         |          |                |            |
| BETELGEUSE (F)   | 145.6106 | 215.0901 |         |          |                |            |
| CANOPUS (B)      | 96.6958  | 259.9695 |         |          |                |            |
| ARCTURUS (F)     | 48.2200  | 132.3591 |         |          |                |            |
| RIGIL KENTAURUS  | 39.2554  | 269.4213 |         |          |                |            |
| ANTARES (R)      | 9.8037   | 352.4570 |         |          |                |            |
| CAPPELLA (R)     | 151.2130 | 135.3958 |         |          |                |            |
| VEGA (B)         | 73.6614  | 69.4651  |         |          |                |            |
| ALDEBARAN (F)    | 166.8531 | 222.0020 |         |          |                |            |
| RIGEL (R)        | 141.9969 | 246.2828 |         |          |                |            |
| GAMMA CRUCIS (R) | 48.7919  | 249.3543 |         |          |                |            |
| SPICA (R)        | 36.1521  | 178.9163 |         |          |                |            |
| ACHERNAR (B)     | 94.8226  | 299.5446 |         |          |                |            |
| DENEK (B)        | 95.5510  | 59.8947  |         |          |                |            |
| PROCYON (B)      | 121.5761 | 201.1113 |         |          |                |            |

STAR DELAY: 2.6827 SEC 686.7827 PULSES DECIMAL = 10. COARSE + 47. FINE  
 75.0305 DEG 12.57 PULSES OCTAL CKAH SUB C = 164.0814 EPSILON = 8.3087 SCN = 10

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PN 10 PASS 2786 PR23 #0/0 S/W SJ,3 DSS14B RCVR AGC =144,5 FILE 10-1008 GN 10/11/79  
 SPACECRAFT ATTITUDE ON DAY 284 OCT 11,1979 1030 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,3715 RCSPHAK = 101,9750  
 SPACECRAFT-EARTH DIRECTION: CLAT = +3,2570 CLON = 240,2097  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = +3,2990 CLON = 239,8400

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 PN 10 PASS 2786 PR23 #0/0 S/W SJ,3 DSS14B RCVR AGC =144,5 FILE 10-1008 GN 10/11/79  
 SPACECRAFT ATTITUDE ON DAY 284 OCT 11,1979 1030 GMT  
 SPIN PERIOD = 12,873280 SEC RTCT = 5 HR 18 MIN 39,65 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | +3,2990 | 239,8400 |                |            |
| SUN             | 1,6038   | 174,2041 | +3,1357 | 238,2420 | 0,297657110 10 | 19,8968656 |
| EARTH           | 0,3715   | 6,4817   | +3,2570 | 240,2097 | 0,286596410 10 | 19,1575140 |
| JUPITER         | 59,8951  | 178,0848 | 0,0000  | 180,0000 | 0,000000000    | 0,0000000  |
| SIRIUS(B)       | 121,1816 | 231,3683 |         |          |                |            |
| BETELGEUSE(R)   | 145,7858 | 215,2197 |         |          |                |            |
| CANOPUS(B)      | 96,7631  | 260,0018 |         |          |                |            |
| ARCTURUS(R)     | 48,3224  | 132,5160 |         |          |                |            |
| RIGIL KENTAURUS | 39,2925  | 269,2007 |         |          |                |            |
| ANTARES(R)      | 9,6203   | 352,1176 |         |          |                |            |
| CAPELLA(R)      | 151,3234 | 135,1180 |         |          |                |            |
| VEGA(B)         | 73,5623  | 69,5248  |         |          |                |            |
| ALDEBARAN(R)    | 167,0171 | 222,4517 |         |          |                |            |
| RIGEL(B)        | 142,1048 | 246,4990 |         |          |                |            |
| GAMMA CRUCIS(R) | 48,8917  | 249,2209 |         |          |                |            |
| SPICA(B)        | 36,3413  | 178,9795 |         |          |                |            |
| ACHERNAR(B)     | 94,7592  | 299,5704 |         |          |                |            |
| DENEK(B)        | 95,4256  | 59,8916  |         |          |                |            |
| PROCYON(B)      | 121,7657 | 201,1445 |         |          |                |            |

STAR DELAY: 2,6819 SEC 686,5581 PULSES DECIMAL = 10, COARSE + 47, FINE  
 74,9982 DEC 12 57 PULSES OCTAL CKAM SUB C = 166,2088 EPSILON# 7,9953 SCN#1

PN 10 PASS 2793 PR23 #0/0 S/W SJ,3 DSS63A RCVR AGC -120,4 FILE 10-1009 TKG 10/18/79  
 SPACECRAFT ATTITUDE ON DAY 291 OCT 17,1979 0300 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 HCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,1342 RCSPHAK = 105,8400

SPACECRAFT-EARTH DIRECTION: CLAT = -3,2673 CLON = 240,0326

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3,2942 CLON = 239,9009

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 PN 10 PASS 2793 PR23 #0/0 S/W SJ,3 DSS63A RCVR AGC -120,4 FILE 10-1009 TKG 10/18/79  
 SPACECRAFT ATTITUDE ON DAY 291 OCT 17,1979 0300 GMT  
 SPIN PERIOD = 12,874500 SEC RTLT = 5 HR 18 MIN 23,06 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -3,2942 | 239,9009 | -              | -          |
| SUN             | 1,6116   | 174,4072 | -3,1359 | 238,2945 | 0,298327260 10 | 19,9416618 |
| EARTH           | 0,1342   | 11,5650  | -3,2673 | 240,0326 | 0,286347740 10 | 19,1408917 |
| JUPITER         | 59,9557  | 178,0922 | 0,0000  | 180,0000 | 0,000000000    | 0,0000000  |
| SIRIUS(B)       | 121,2232 | 231,3988 |         |          |                |            |
| BETELGEUSE(R)   | 145,8382 | 215,2692 |         |          |                |            |
| CANOPUS(B)      | 96,7783  | 260,0124 |         |          |                |            |
| ARCTURUS(R)     | 48,3601  | 132,5622 |         |          |                |            |
| RIGIL KENTAURUS | 39,2981  | 269,1299 |         |          |                |            |
| ANTARES(R)      | 9,5607   | 352,0439 |         |          |                |            |
| CAPELLA(R)      | 151,3631 | 135,0368 |         |          |                |            |
| VEGA(B)         | 73,5366  | 69,5446  |         |          |                |            |
| ALDEBARAN(R)    | 167,0651 | 222,6188 |         |          |                |            |
| RIGEL(B)        | 142,1334 | 246,5718 |         |          |                |            |
| GAMMA CRUCIS(R) | 48,9177  | 249,1762 |         |          |                |            |
| SPICA(B)        | 36,4020  | 178,9909 |         |          |                |            |
| ACHERNAR(B)     | 94,7333  | 299,5789 |         |          |                |            |
| DENEK(B)        | 95,3910  | 59,8904  |         |          |                |            |
| PROCYON(B)      | 121,8241 | 201,1589 |         |          |                |            |

STAR DELAYS: 2,6817 SEC 686,5269 PULSES DECIMAL = 10, COARSE + 47, FINE  
 74,9876 DEG 12 57 PULSES OCTAL CKAH SUB C = 166,4326 EPSILON= 7,9746 SCN#10

PN 10 PASS 2798 PR23 #0/0 S/W SJ3 DSS63A RCVR AGC -120.4 FILE 10-1010 RWM 10/23/79  
 SPACECRAFT ATTITUDE ON DAY 296 OCT 23,1979 0200 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,141Y RCSPHAK = 278,6200  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3,2768 CLON = 239,8279  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3,2688 CLON = 239,9690

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PN 10 PASS 2798 PR23 #0/0 S/W SJ3 DSS63A RCVR AGC -120.4 FILE 10-1010 RWM 10/23/79  
 SPACECRAFT ATTITUDE ON DAY 296 OCT 23,1979 0200 GMT  
 SPIN PERIOD = 12,875360 SEC RTLT = 5 HR 18 MIN 14,09 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -3,2688 | 239,9690 | -              | -          |
| SUN             | 1,6225   | 175,3528 | -3,1361 | 238,3494 | 0,299029200 10 | 19,9885629 |
| EARTH           | 0,1411   | 183,2346 | +3,2768 | 239,8279 | 0,286213240 10 | 19,1319011 |
| JUPITER         | 60,0229  | 178,1121 | 0,0000  | 180,0000 | 0,000000000    | 0,0000000  |
| SIRIUS(B)       | 121,2855 | 231,4253 |         |          |                |            |
| BETELGEUSE(R)   | 145,9084 | 215,3004 |         |          |                |            |
| CANOPUS(B)      | 96,8151  | 260,0237 |         |          |                |            |
| ARCTURUS(R)     | 48,3874  | 132,6259 |         |          |                |            |
| RIGIL KENTAURUS | 39,3246  | 269,0513 |         |          |                |            |
| ANTARES(R)      | 9,4969   | 351,8410 |         |          |                |            |
| CAPELLA(R)      | 151,3932 | 134,9196 |         |          |                |            |
| VEGA(B)         | 73,4891  | 69,5648  |         |          |                |            |
| ALDEBARAN(R)    | 167,1323 | 222,7423 |         |          |                |            |
| RIGEL(B)        | 142,1837 | 246,6430 |         |          |                |            |
| GAMMA CRUCIS(R) | 48,9656  | 249,1327 |         |          |                |            |
| SPICA(B)        | 36,4696  | 179,0308 |         |          |                |            |
| ACHERNAR(B)     | 94,7218  | 299,5888 |         |          |                |            |
| DENEK(B)        | 95,3349  | 59,8900  |         |          |                |            |
| PROCYON(B)      | 121,8967 | 201,1633 |         |          |                |            |

STAR DELAY: 2,6815 SEC 686,74688 PULSES DECIMAL = 10, COARSE + 46, FINE  
 74,9763 DEG 12 56 PULSES OCTAL CKAH SUB C = 167,4071 EPSILON = 7,9457 SCN = 10

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PN 10 PASS 2811 PR23 #0/0 S/W SJ3 DSS63A RCVR AGC -122.2 FILE 10-1011 RC 11/04/79  
 SPACECRAFT ATTITUDE ON DAY 309 NOV 4, 1979 0200 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.6862 RCSPHAK = 281.2600  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.2908 CLON = 239.3688  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.1990 CLON = 240.0499

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PN 10 PASS 2811 PR23 #0/0 S/W SJ3 DSS63A RCVR AGC -122.2 FILE 10-1011 RC 11/04/79  
 SPACECRAFT ATTITUDE ON DAY 309 NOV 4, 1979 0200 GMT  
 SPIN PERIOD = 12.877560 SEC RTLT = 5 HR 18 MIN 24.91 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.1990 | 240.0499 | -              | -          |
| SUN             | 1.5897   | 177.7863 | -3.1364 | 238.4590 | 0.30044252D 10 | 20.0830561 |
| EARTH           | 0.6862   | 187.7021 | -3.2908 | 239.3688 | 0.28637543D 10 | 19.1427426 |
| JUPITER         | 60.1013  | 178.1583 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 121.3904 | 231.4418 |         |          |                |            |
| BETELGEUSE(R)   | 146.0147 | 215.2897 |         |          |                |            |
| CANOPUS(R)      | 96.8978  | 260.0364 |         |          |                |            |
| ARCTURUS(R)     | 48.3908  | 132.7252 |         |          |                |            |
| REGIL KENTAURUS | 39.3958  | 268.9589 |         |          |                |            |
| ANTARES(R)      | 9.4272   | 351.3606 |         |          |                |            |
| CAPELLA(R)      | 151.4006 | 134.7289 |         |          |                |            |
| VEGA(R)         | 73.3955  | 69.5846  |         |          |                |            |
| ALDEBARAN(R)    | 167.2390 | 222.7627 |         |          |                |            |
| REGEL(B)        | 142.2798 | 246.7077 |         |          |                |            |
| GAMMA CRUCIS(R) | 49.0596  | 249.0933 |         |          |                |            |
| SPICA(B)        | 36.5492  | 179.1314 |         |          |                |            |
| ACHERNAR(B)     | 94.7426  | 299.6020 |         |          |                |            |
| DENEK(B)        | 95.2341  | 59.8913  |         |          |                |            |
| PROCYON(B)      | 121.9972 | 201.1454 |         |          |                |            |

STAR DELAY: 2.6815 SEC 686.4700 PULSES DECIMAL = 10. COARSE + 46. FINE  
 74.9636 DEC 12 56 PULSES OCTAL CKAH SUB C = 169.7536 EPSILON = 8.0327 SCN=10

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PN 10 PASS 17 PR23 #070 S/W SJ.3 DSS63A RCVR AGC -144.5 FILE 10-1012 TP 11/13/79

SPACECRAFT ATTITUDE ON DAY 315 NOV 11, 1979 2220 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

FIMMEL

REFERENCE FOR RCS PHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.9789 RCS PHAK = 282.1300

SPACECRAFT-EARTH DIRECTION: CLAT = -3.2961 CLON = 239.0455

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.0595 CLON = 239.9969

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PN 10 PASS 2817 PR23 #070 S/W SJ.3 DSS63A RCVR AGC -144.5 FILE 10-1012 TP 11/13/79

SPACECRAFT ATTITUDE ON DAY 315 NOV 11, 1979 2220 GMT

SPIN PERIOD = 12.878780 SEC RTLT = 5 HR 18 MIN 54.39 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.0595 | 239.9969 | -              | -          |
| SUN             | 1.4668   | 183.0515 | -3.1366 | 238.5300 | 0.301365830 10 | 20.1447747 |
| EARTH           | 0.9789   | 194.0068 | -3.2961 | 239.0455 | 0.286817300 10 | 19.1722794 |
| JUPITER         | 60.0441  | 178.2348 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)       | 121.4664 | 231.3605 |         |          |                |            |
| BETELGEUSE(R)   | 146.0518 | 215.0724 |         |          |                |            |
| CANOPUS(B)      | 97.0260  | 260.0242 |         |          |                |            |
| ARCTURUS(R)     | 48.2525  | 132.7720 |         |          |                |            |
| RIGIL KENTAURUS | 39.5343  | 269.0232 |         |          |                |            |
| ANTARES(R)      | 9.5013   | 350.5810 |         |          |                |            |
| CAPELLA(R)      | 151.2643 | 134.6154 |         |          |                |            |
| VEGA(B)         | 73.2832  | 69.5523  |         |          |                |            |
| ALDEBARAN(R)    | 167.2941 | 222.1464 |         |          |                |            |
| RIGEL(B)        | 142.3869 | 246.5702 |         |          |                |            |
| GAMMA CRUCIS(R) | 49.1711  | 249.1762 |         |          |                |            |
| SPICA(B)        | 36.4945  | 179.3159 |         |          |                |            |
| ACHERNAR(B)     | 94.8900  | 299.6010 |         |          |                |            |
| DENEK(B)        | 95.1399  | 59.8989  |         |          |                |            |
| PROCYON(B)      | 121.9981 | 201.0494 |         |          |                |            |

STAR DELAY: 2.6822 SEC 686.6467 PULSES DECIMAL = 10. COARSE + 47. FINE  
74.9758 DEG 12 57 PULSES OCTAL CKAN SUB C = 174.6808 EPSILON = 8.3707 SCN=10

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PN 10 PASS 2621 FR23 #070 S/W SJ.3 DSS63A RCVR AGC -123.9 FILE 10-1013 TS 11/15/79

SPACECRAFT ATTITUDE ON DAY 319 NOV 15, 1979 0430 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

PRE-PRECESSION

ROLL REFERENCE PARAMETERS: ASPSGRHS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.1656 RCSPHAK = 283.6700

SPACECRAFT-EARTH DIRECTION: CLAT = -3.2973 CLON = 236.9079

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.7296 CLON = 239.9273

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PN 10 PASS 2821 FR23 #070 S/W SJ.3 DSS63A RCVR AGC -123.9 FILE 10-1013 TS 11/15/79

SPACECRAFT ATTITUDE ON DAY 319 NOV 15, 1979 0430 GMT

SPIN PERIOD = 12.879390 SEC RFLT = 5 HR 19 MIN 12.14 SEC

|                 | CMA      | CMA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -2.7296 | 239.9273 | -              | -          |
| SUN             | 1.4255   | 196.6279 | -3.1367 | 238.5595 | 0.301749900 10 | 20.1704479 |
| EARTH           | 1.1656   | 209.1713 | -3.2973 | 236.9079 | 0.287083450 10 | 19.1900702 |
| JUPITER         | 59.9650  | 178.4204 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)       | 121.6804 | 231.1968 |         |          |                |            |
| BETELGEUSE(B)   | 146.1033 | 214.6065 |         |          |                |            |
| CANOPUS(B)      | 97.3389  | 260.0048 |         |          |                |            |
| ARCTURUS(B)     | 47.9634  | 132.9241 |         |          |                |            |
| RIGIL KENTAURUS | 39.8631  | 269.1099 |         |          |                |            |
| ANTARES(B)      | 9.6290   | 348.7254 |         |          |                |            |
| CAPELLA(B)      | 150.9800 | 134.2829 |         |          |                |            |
| VEGA(B)         | 72.9985  | 69.4941  |         |          |                |            |
| ALDEBARAN(B)    | 167.4607 | 220.8336 |         |          |                |            |
| RIGEL(B)        | 142.6615 | 246.3116 |         |          |                |            |
| GAMMA CRUCIS(B) | 49.4550  | 249.3290 |         |          |                |            |
| SPICA(B)        | 36.4223  | 179.7582 |         |          |                |            |
| ACHERNAH(B)     | 95.2112  | 299.6066 |         |          |                |            |
| DENEK(B)        | 94.8893  | 59.9152  |         |          |                |            |
| PROCYON(B)      | 122.0511 | 200.8376 |         |          |                |            |

STAR DELAY: 2.6830 SEC 686.8565 PULSES DECIMAL = 10, COARSE + 47, FINE  
74.9952 DEG 12 57 PULSES OCTAL CMAH SUB C = 186.1391 EPSILON = 8.4889 SCN=1

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9/10/16

10-10-15

10-10-14

~~10-10-13~~



*inmel*

N 10 PASS 2830 PR23 #070 S/W SJ.3 DSS14A RCVR AGC -120.4 FILE 10-1017 1P 11/27/79  
SPACECRAFT ATTITUDE ON DAY 328 NOV 23, 1979 0800 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

NOTE: FILE # 10-1014-101016  
NOT DISTRIBUTED DUE  
TO "NO SOLUTION".

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRNS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.2260 RCSPHAK = 39.0820

SPACECRAFT-EARTH DIRECTION: CLAT = -3.2977 CLON = 238.5191

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.1122 CLON = 238.5899

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N 10 PASS 2830 PR23 #070 S/W SJ.3 DSS14A RCVR AGC -120.4 FILE 10-1017 1P 11/27/79  
SPACECRAFT ATTITUDE ON DAY 328 NOV 23, 1979 0800 GMT  
SPIN PERIOD = 12.879140 SEC RTLT = 5 HR 20 MIN 19.53 SEC

|                  | CMA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|------------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS      | 0.0000   | 0.0000   | -3.1122 | 238.5899 |                |            |
| SUN              | 0.2526   | 354.3670 | -3.1369 | 238.6416 | 0.302826400 10 | 20.2424064 |
| EARTH            | 0.2260   | 304.8180 | -3.2977 | 238.5191 | 0.288093580 10 | 19.2575920 |
| JUPITER          | 58.4419  | 178.0863 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)        | 120.4146 | 230.5467 |         |          |                |            |
| BETELGEUSE(R)    | 144.6980 | 213.7355 |         |          |                |            |
| CANCERUS(B)      | 96.6924  | 259.7487 |         |          |                |            |
| ARCTURUS(R)      | 47.2141  | 131.5724 |         |          |                |            |
| RIGIL KENTIAURUS | 39.4804  | 270.8830 |         |          |                |            |
| ANTARES(R)       | 11.0800  | 352.1111 |         |          |                |            |
| CABELLA(R)       | 150.1542 | 136.5974 |         |          |                |            |
| VEGA(B)          | 73.9000  | 69.0292  |         |          |                |            |
| ALDEBARAN(R)     | 166.0303 | 217.2769 |         |          |                |            |
| RIGEL(B)         | 141.6760 | 244.6387 |         |          |                |            |
| GAMMA CRUCIS(R)  | 48.5671  | 250.3890 |         |          |                |            |
| SPICA(B)         | 34.8906  | 179.1257 |         |          |                |            |
| ACHERNAR(B)      | 95.6343  | 299.3835 |         |          |                |            |
| DENEK(B)         | 95.9897  | 59.9451  |         |          |                |            |
| PROCYON(B)       | 120.4797 | 200.6462 |         |          |                |            |

STAR DELAY: 2.6921 SEC 689,1807 PULSES DECIMAL = 10. COARSE + 49. FINE  
75.2513 DEG 12 61 PULSES OCTAL CKAM SUB C = 341.4251 EPSILON=12.9420 SCN=10

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Incl

PN 10 PASS 2833 PR23 #0/0 S/W SJ,3 DSS63A RCVR AGC -144.6 FILE 10-1018 GN 11/27/79  
SPACECRAFT ATTITUDE ON DAY 330 NOV 26,1979 2000 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCS PHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.1432 RCSPHAK = 24.0680

SPACECRAFT-EARTH DIRECTION: CLAT = -3.2970 CLON = 238.4134

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.1761 CLON = 238.3366

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PN 10 PASS 2833 PR23 #0/0 S/W SJ,3 DSS63A RCVR AGC -144.6 FILE 10-1018 GN 11/27/79  
SPACECRAFT ATTITUDE ON DAY 330 NOV 26,1979 2000 GMT  
SPIN PERIOD = 12.870630 SEC RTLT = 5 HR 20 MIN 42.49 SEC

|                 | CMA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.1761 | 238.3366 | -              | -          |
| SUN             | 0.3221   | 6.9724   | -3.1370 | 238.6569 | 0.303120600 10 | 20.2620722 |
| EARTH           | 0.1432   | 302.3788 | -3.2970 | 238.4134 | 0.288437720 10 | 19.2805963 |
| JUPITER         | 58.3909  | 178.0429 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 120.3314 | 230.5436 |         |          |                |            |
| BETELGEUSE(R)   | 144.6182 | 213.7660 |         |          |                |            |
| CANOPUS(B)      | 96.6200  | 259.7410 |         |          |                |            |
| ARCTURUS(R)     | 47.2267  | 131.4934 |         |          |                |            |
| RIGIL KENTAURUS | 39.4173  | 270.9459 |         |          |                |            |
| ANTARES(R)      | 11.1241  | 352.4676 |         |          |                |            |
| CAPELLA(R)      | 150.1594 | 136.7392 |         |          |                |            |
| VEGA(B)         | 73.9787  | 69.0166  |         |          |                |            |
| ALDEBARAN(R)    | 165.9491 | 217.9454 |         |          |                |            |
| RIGEL(B)        | 141.5954 | 244.6097 |         |          |                |            |
| GAMMA CRUCIS(R) | 48.4890  | 250.4113 |         |          |                |            |
| SPICA(B)        | 34.8385  | 179.0248 |         |          |                |            |
| ACHERNAR(B)     | 95.6046  | 299.3729 |         |          |                |            |
| DENEK(B)        | 96.0717  | 59.9437  |         |          |                |            |
| PROCYON(B)      | 120.4074 | 200.6675 |         |          |                |            |

STAR DELAY: 2.6925 SEC 689,2853 PULSES DECIMAL = 10. COARSE + 49. FINE  
75.2590 SEC 12.61 PULSES DECIMAL CKAN SUB C = 5.6370 EPSILON=12.6094 SCR=10

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P 10 PASS 2835 PR23 40/0 S/W SJ.3 DSS12A RCVR AGC -120.4 FILE 10-1019 RM 11/28/79  
 SPACECRAFT ATTITUDE ON DAY 333 NOV 29, 1979 0400 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.1652 RCSPHAK = 331.1100

SPACECRAFT-EARTH DIRECTION: CLAT = -3.2961 CLON = 238.3155

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.1471 CLON = 238.3869

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P 10 PASS 2835 PR23 40/0 S/W SJ.3 DSS12A RCVR AGC -120.4 FILE 10-1019 RM 11/28/79  
 SPACECRAFT ATTITUDE ON DAY 333 NOV 29, 1979 0400 GMT  
 SPIN PERIOD = 12.880000 SEC RFLT = 5 HR 21 MIN 5.68 SEC

|                 | CKA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.1471 | 238.3869 |                |            |
| SUN             | 0.2976   | 1.9222   | -3.1371 | 238.6847 | 0.303395170 10 | 20.2804258 |
| EARTH           | 0.1652   | 244.4520 | -3.2961 | 238.3155 | 0.288785390 10 | 19.3038362 |
| JUPITER         | 58.0401  | 178.0646 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)       | 120.3858 | 230.5582 |         |          |                |            |
| BETELGEUSE(R)   | 144.6761 | 213.7740 |         |          |                |            |
| CANOPUS(B)      | 96.6575  | 259.7490 |         |          |                |            |
| ARCTURUS(R)     | 47.2382  | 131.5487 |         |          |                |            |
| RIGIL KENTAURUS | 39.4455  | 270.8872 |         |          |                |            |
| ANTARES(R)      | 11.0702  | 352.2896 |         |          |                |            |
| CAPELLA(R)      | 150.1760 | 136.6451 |         |          |                |            |
| VEGA(B)         | 73.9336  | 69.0318  |         |          |                |            |
| ALDEBARAN(R)    | 166.0005 | 217.9799 |         |          |                |            |
| RIGEL(B)        | 141.6432 | 244.6540 |         |          |                |            |
| GAMMA CRUCIS(R) | 48.5332  | 250.3810 |         |          |                |            |
| SPICA(B)        | 34.2802  | 179.0755 |         |          |                |            |
| ACHERNAR(B)     | 95.6053  | 299.3814 |         |          |                |            |
| DENEBS(B)       | 96.0214  | 59.9434  |         |          |                |            |
| PRUCYON(B)      | 120.4646 | 200.6647 |         |          |                |            |

STAR DELAY: 2.6923 SEC 689.2327 PULSES DECIMAL = 10. COARSE + 49. FINE  
 75.2510 DFG 12 61 PULSES OCTAL CKAR-SUB C = -10.8033 EPSILON=12.7256 SCNR=

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PN 10 PASS 2843 PR23 #0/0 S/W SJ3 DSS14A RCVR AGC =120.4 FILE 10=1020 RC  
 SPACECRAFT ATTITUDE ON DAY 341 DEC 6,1979 0130 GMT

12/07/79

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.4749 RCSPHAK = 283.6500  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.2917 CLON = 238.0323  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.1535 CLON = 238.4873

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PN 10 PASS 2843 PR23 #0/0 S/W SJ3 DSS14A RCVR AGC =120.4 FILE 10=1020 RC  
 SPACECRAFT ATTITUDE ON DAY 341 DEC 6,1979 0130 GMT  
 SPIN PERIOD = 12.881340 SEC RTLT = 5 HR 22 MIN 23.99 SEC

12/07/79

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.1535 | 238.4873 | =              | =          |
| SUN             | 0.2588   | 3.5970   | -3.1372 | 238.7460 | 0.304206520 10 | 20.3346604 |
| EARTH           | 0.4749   | 196.9346 | -3.2917 | 238.0323 | 0.289959180 10 | 19.3822981 |
| JUPITER         | 58.5405  | 178.0683 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 120.4445 | 230.6116 |         |          |                |            |
| BETELGEUSE(R)   | 144.7559 | 213.6659 |         |          |                |            |
| CANOPUS(B)      | 96.6691  | 259.7661 |         |          |                |            |
| ARCTURUS(R)     | 47.3096  | 131.6196 |         |          |                |            |
| RIGIL KENTAURUS | 39.4377  | 270.7709 |         |          |                |            |
| ANTARES(R)      | 10.9780  | 352.2585 |         |          |                |            |
| CAPELLA(R)      | 150.2533 | 136.5383 |         |          |                |            |
| VEGA(B)         | 73.9037  | 69.0650  |         |          |                |            |
| ALDEBARAN(R)    | 166.0815 | 218.2549 |         |          |                |            |
| RIGEL(B)        | 141.6802 | 244.7777 |         |          |                |            |
| GAMMA CRUCIS(R) | 48.5609  | 250.3011 |         |          |                |            |
| SPICA(B)        | 34.9886  | 179.0741 |         |          |                |            |
| ACHERNAR(B)     | 95.5505  | 299.3951 |         |          |                |            |
| DENEK(B)        | 95.9767  | 59.9395  |         |          |                |            |
| PROCYON(B)      | 120.5562 | 200.6946 |         |          |                |            |

STAR DELAY: 2.6920 SEC 689.1459 PULSES DECIMAL = 10. COARSE + 49. FINE  
 75.2339 DEG 12 61 PULSES COTAL CKAH SUB C = -9.3147 EPSILON=12.9116 SCN=1

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PN 10 PASS 2850 PR23 #0/0 S/W SJ,3 DSS43A RCVR AGC =123,9 FILE 10=1021 TS  
SPACECRAFT ATTITUDE ON DAY 348 DEC 14,1979 1200 GMT

12/14/79

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,8285 RCSPHAK = 281,8200

SPACECRAFT-EARTH DIRECTION: CLAT = -3,2831 CLON = 237,7044

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3,1349 CLON = 238,5208

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PN 10 PASS 2850 PR23 #0/0 S/W SJ,3 DSS43A RCVR AGC =123,9 FILE 10=1021 TS  
SPACECRAFT ATTITUDE ON DAY 348 DEC 14,1979 1200 GMT  
SPIN PERIOD = 12,882680 SEC RTLT = 5 HR 24 MIN 19,26 SEC

12/14/79

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -3,1349 | 238,5208 |                |            |
| SUN             | 0,2993   | 359,5028 | -3,1374 | 238,8206 | 0,30519905D 10 | 20,4010060 |
| EARTH           | 0,8285   | 190,3307 | -3,2831 | 237,7044 | 0,29168704D 10 | 19,4977968 |
| JUPITER         | 58,5733  | 178,0822 | 0,0000  | 180,0000 | 0,00000000     | 0,0000000  |
| SIRIUS(B)       | 120,4801 | 230,6217 |         |          |                |            |
| BETELGEUSE(R)   | 144,7940 | 213,8722 |         |          |                |            |
| CANOPUS(B)      | 96,6933  | 259,7714 |         |          |                |            |
| ARCTURUS(R)     | 47,3179  | 131,6559 |         |          |                |            |
| RIGIL KENTAURUS | 39,4558  | 270,7318 |         |          |                |            |
| ANTARES(R)      | 10,9474  | 352,1417 |         |          |                |            |
| CAPELLA(R)      | 150,2647 | 136,4762 |         |          |                |            |
| VEGA(B)         | 73,8744  | 69,0740  |         |          |                |            |
| ALDEBARAN(R)    | 166,1193 | 218,2813 |         |          |                |            |
| RIGEL(B)        | 141,7113 | 244,8078 |         |          |                |            |
| GAMMA CRUCIS(R) | 48,5897  | 250,2607 |         |          |                |            |
| SPICA(B)        | 35,0217  | 179,1033 |         |          |                |            |
| ACHERNAR(B)     | 95,5503  | 299,4007 |         |          |                |            |
| DENEK(B)        | 95,9439  | 59,9393  |         |          |                |            |
| PROCYON(B)      | 120,5940 | 200,6931 |         |          |                |            |

STAR DELAY: 2,6921 SEC 689,1701 PULSES DECIMAL = 10, COARSE + 49, FINE  
75,2286 DEG 12 61 PULSES OCTAL CKAH SUB C = 346,7856 EPSILON=12,7172 SCN=10

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PN 1 SS 2854 PR23 #6/6 S/W SJ,3 DSS14A RC GC =120,4 FILE 10=1023 RM  
 SPACECRAFT ATTITUDE ON DAY 352 DEC 18,1979 0300 GMT

12/18/79

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

FILE 10-1022  
 PRE = NO SOLUTION

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,2503 RCSPHAK = 28,8030

NEW ATTITUDE  
 POST-PRECESSION

SPACECRAFT-EARTH DIRECTION: CLAT = -3,2784 CLON = 237,5721

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3,0534 CLON = 237,4621

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PN 10 PASS 2854 PR23 #6/6 S/W SJ,3 DSS14A RCVR AGC =120,4 FILE 10=1023 RM  
 SPACECRAFT ATTITUDE ON DAY 352 DEC 18,1979 0300 GMT  
 SPIN PERIOD = 12,882930 SEC RTLT = 5 HR 25 MIN 15,10 SEC

12/18/79

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -3,0534 | 237,4621 |                |            |
| SUN             | 1,3909   | 356,4966 | -3,1375 | 238,8525 | 0,30562538D 10 | 20,4295040 |
| EARTH           | 0,2503   | 296,0038 | -3,2784 | 237,5721 | 0,29252398D 10 | 19,5537420 |
| JUPITER         | 57,5140  | 178,0536 | 0,0000  | 180,0000 | 0,00000000     | 0,0000000  |
| SIRIUS(B)       | 119,8681 | 230,0611 |         |          |                |            |
| BETELGEUSE(R)   | 143,9561 | 212,9083 |         |          |                |            |
| CANOPUS(B)      | 96,5841  | 259,5915 |         |          |                |            |
| ARCTURUS(R)     | 46,5592  | 130,9066 |         |          |                |            |
| RIGIL KENTAURUS | 39,5621  | 271,9540 |         |          |                |            |
| ANTARES(R)      | 12,0059  | 352,3879 |         |          |                |            |
| CAPELLA(R)      | 149,4358 | 137,5574 |         |          |                |            |
| VEGA(B)         | 74,1790  | 68,7261  |         |          |                |            |
| ALDEBARAN(R)    | 165,3223 | 215,4752 |         |          |                |            |
| RIGEL(B)        | 141,3238 | 243,5090 |         |          |                |            |
| GAMMA CRUCIS(R) | 48,3173  | 251,1317 |         |          |                |            |
| SPICA(B)        | 33,9634  | 179,1411 |         |          |                |            |
| ACHERNAR(B)     | 96,1391  | 299,2533 |         |          |                |            |
| DENEK(B)        | 96,4026  | 59,9855  |         |          |                |            |
| PROCYON(B)      | 119,6326 | 200,3767 |         |          |                |            |

STAR DELAY: 2,6986 SEC 690,8315 PULSES DECIMAL = 10, COARSE + 51, FINE  
 75,4085 DEG 12 63 PULSES OCTAL CKAH SUB C = 347,9072 EPSILON = 8,5894 SCN = 1

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FMM L

PN 10 PASS 2857 PR23 #0/0 S/W SJ,3 DSS14A RCVR AGC =123,9 FILE 10-1024 TS 12/21/79  
SPACECRAFT ATTITUDE ON DAY 355 DEC 21,1979 0830 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,2079 RCSPHAK = 353,3400

SPACECRAFT EARTH DIRECTION: CLAT = -3,2737 CLON = 237,4597

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3,0679 CLON = 237,4895

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PN 10 PASS 2857 PR23 #0/0 S/W SJ,3 DSS14A RCVR AGC =123,9 FILE 10-1024 TS 12/21/79  
SPACECRAFT ATTITUDE ON DAY 355 DEC 21,1979 0830 GMT  
SPIN PERIOD = 12,882930 SEC RTLT = 5 HR 26 MIN 7,81 SEC

| S/C +Z AXIS     | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| SUN             | 0,0000   | 0,0000   | -3,0679 | 237,4895 |                |            |
| EARTH           | 1,3910   | 357,0921 | -3,1376 | 238,8807 | 0,30600415D 10 | 20,4548229 |
| JUPITER         | 0,2079   | 261,7827 | -3,2737 | 237,4597 | 0,29331412D 10 | 19,6065588 |
| SIRIUS(B)       | 57,5418  | 178,0464 | 0,0000  | 180,0000 | 0,00000000     | 0,0000000  |
| BETELGEUSE(R)   | 119,8745 | 230,0800 |         |          |                |            |
| CANOPUS(B)      | 143,9712 | 212,9469 |         |          |                |            |
| ARCTURUS(R)     | 96,5748  | 259,5964 |         |          |                |            |
| RIGIL KENTAURUS | 46,5880  | 130,9186 |         |          |                |            |
| ANTARES(R)      | 39,5466  | 271,9230 |         |          |                |            |
| CAPELLA(R)      | 11,9769  | 352,4401 |         |          |                |            |
| VEGA(B)         | 149,4657 | 137,5458 |         |          |                |            |
| ALDEBARAN(R)    | 74,1826  | 68,7363  |         |          |                |            |
| RIGEL(B)        | 165,3361 | 215,5823 |         |          |                |            |
| GAMMA CRUCIS(R) | 141,3230 | 243,5491 |         |          |                |            |
| SPICA(B)        | 48,3124  | 251,1059 |         |          |                |            |
| ACHERNAR(B)     | 33,9909  | 179,1217 |         |          |                |            |
| DENEK(B)        | 96,1131  | 299,2565 |         |          |                |            |
| PROCYON(B)      | 96,4015  | 59,9815  |         |          |                |            |
|                 | 119,6532 | 200,3913 |         |          |                |            |

STAR DELAY: 2,6984 SEC 690,7870 PULSES DECIMAL = 10, COARSE + 51, FINE  
75,4036 DEG 12 63 PULSES OCTAL CKAH SUB C = 348,5030 EPSILON = 8,5891 SCN = 10

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PN 10 PASS 2865 PR23 #0/0 S/W SJ,3 DSS14A RCVR AGC -120,4 FILE 10-1025 RM  
 SPACECRAFT ATTITUDE ON DAY 363 DEC 29,1979 0600 GMT

12/31/79

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRKS = 0 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,3771 RCSPHAK = 297,9100  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3,2603 CLON = 237,2079  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3,0894 CLON = 237,5446

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PN 10 PASS 2865 PR23 #0/0 S/W SJ,3 DSS14A RCVR AGC -120,4 FILE 10-1025 RM  
 SPACECRAFT ATTITUDE ON DAY 363 DEC 29,1979 0600 GMT  
 SPIN PERIOD = 12,884390 SEC RTLT = 5 HR 28 MIN 28,67 SEC

12/31/79

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)     |
|-----------------|----------|----------|---------|----------|----------------|-----------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -3,0894 | 237,5446 |                |           |
| SUN             | 1,4040   | 357,9877 | -3,1378 | 238,9498 | 0,30690903D 10 | 20,515309 |
| EARTH           | 0,3771   | 206,9579 | -3,2603 | 237,2079 | 0,29542558D 10 | 19,747699 |
| JUPITER         | 57,5975  | 178,0369 | 0,0000  | 180,0000 | 0,00000000     | 0,000000  |
| SIRIUS(B)       | 119,8933 | 230,1151 |         |          |                |           |
| BETELGEUSE(R)   | 144,0056 | 213,0158 |         |          |                |           |
| CANOPUS(B)      | 96,5636  | 259,6060 |         |          |                |           |
| ARCTURUS(R)     | 46,6403  | 130,9475 |         |          |                |           |
| RIGIL KENTAURUS | 39,5234  | 271,8603 |         |          |                |           |
| ANTARES(R)      | 11,9196  | 352,5095 |         |          |                |           |
| CAPELLA(R)      | 149,5208 | 137,5126 |         |          |                |           |
| VEGA(B)         | 74,1827  | 68,7560  |         |          |                |           |
| ALDEBARAN(R)    | 165,3682 | 215,7747 |         |          |                |           |
| RIGEL(B)        | 141,3282 | 243,6255 |         |          |                |           |
| GAMMA CRUCIS(R) | 48,3099  | 251,0564 |         |          |                |           |
| SPICA(B)        | 34,0463  | 179,0941 |         |          |                |           |
| ACHERNAR(B)     | 96,0675  | 299,2635 |         |          |                |           |
| DENE(B)         | 96,3925  | 59,9799  |         |          |                |           |
| PROCYON(B)      | 119,6972 | 200,4166 |         |          |                |           |

STAR DELAY: 2,6983 SEC 690,7770 PULSES DECIMAL = 10, COARSE + 51, FINE  
 75,3940 DEG 12 63 PULSES OCTAL CKAH SUB C = 349,4306 EPSILON= 8,5511 SCN=

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PN 10 PASS 2870 PR23 #0/0 S/W SJ,3 DSS14A RCVR AGC =123,9 FILE 10=1026 TG 01/03/80  
 SPACECRAFT ATTITUDE ON DAY 3 JAN 3,1980 0500 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,5356 RCSPHAK = 289,5800

SPACECRAFT-EARTH DIRECTION: CLAT = -3,2506 CLON = 237,0960

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3,0845 CLON = 237,6060

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PN 10 PASS 2870 PR23 #0/0 S/W SJ,3 DSS14A RCVR AGC =123,9 FILE 10=1026 TG 01/03/80  
 SPACECRAFT ATTITUDE ON DAY 3 JAN 3,1980 0500 GMT  
 SPIN PERIOD = 12,885250 SEC RTLT = 5 HR 29 MIN 44,95 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -3,0845 | 237,6060 |                |            |
| SUN             | 1,3772   | 357,8266 | -3,1358 | 238,9843 | 0,30737579D 10 | 20,5465100 |
| EARTH           | 0,5356   | 198,0848 | -3,2506 | 237,0960 | 0,29656891D 10 | 19,8241250 |
| JUPITER         | 57,6587  | 178,0447 | 0,0000  | 180,0000 | 0,00000000     | 0,0000000  |
| SIRIUS(B)       | 119,9364 | 230,1437 |         |          |                |            |
| BETELGEUSE(R)   | 144,0597 | 213,0595 |         |          |                |            |
| CANOPUS(B)      | 96,5795  | 259,6162 |         |          |                |            |
| ARCTURUS(R)     | 46,6768  | 130,9976 |         |          |                |            |
| RIGIL KENTAURUS | 39,5263  | 271,7890 |         |          |                |            |
| ANTARES(R)      | 11,8594  | 352,4515 |         |          |                |            |
| CAPELLA(R)      | 149,5626 | 137,4392 |         |          |                |            |
| VEGA(B)         | 74,1559  | 68,7750  |         |          |                |            |
| ALDEBARAN(R)    | 165,4209 | 215,9005 |         |          |                |            |
| RIGEL(B)        | 141,3599 | 243,6948 |         |          |                |            |
| GAMMA CRUCIS(R) | 48,3345  | 251,0094 |         |          |                |            |
| SPICA(B)        | 34,1076  | 179,1061 |         |          |                |            |
| ACHERNAR(B)     | 96,0418  | 299,2727 |         |          |                |            |
| DENEK(B)        | 96,3576  | 59,9776  |         |          |                |            |
| PROCYON(B)      | 119,7565 | 200,4295 |         |          |                |            |

STAR DELAY: 2,6982 SEC 690,7300 PULSES DECIMAL = 10, COARSE + 51, FINE  
 75,3838 DEG 12 63 PULSES OCTAL CKAH SUB C = 349,1969 EPSILON= 8,6297 SCN=10

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PN 10 PASS 2880 PR23 #0/0 S/W SJ,3 DSS63A RCVR AGC -122.2 FILE 10-1027 MF 01/15/80  
 SPACECRAFT ATTITUDE ON DAY 12 JAN 12, 1979 2200 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,7414 RCSPHAK = 281,1700

SPACECRAFT EARTH DIRECTION: CLAT = -3,2277 CLON = 236,8467

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3,0923 CLON = 237,5768

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PN 10 PASS 2880 PR23 #0/0 S/W SJ,3 DSS63A RCVR AGC -122.2 FILE 10-1027 MF 01/15/80  
 SPACECRAFT ATTITUDE ON DAY 12 JAN 12, 1979 2200 GMT  
 SPIN PERIOD = 12,886960 SEC RTLT = 5 HR 33 MIN 28,16 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -3,0923 | 237,5768 |                |            |
| SUN             | 1,4985   | 358,2868 | -3,1360 | 239,0768 | 0,30865760D 10 | 20,6321925 |
| EARTH           | 0,7414   | 190,5452 | -3,2277 | 236,8467 | 0,29991476D 10 | 20,0477781 |
| JUPITER         | 57,6297  | 178,0376 | 0,0000  | 180,0000 | 0,00000000     | 0,0000000  |
| SIRIUS(B)       | 119,9117 | 230,1321 |         |          |                |            |
| BETELGEUSE(R)   | 144,0310 | 213,0450 |         |          |                |            |
| CANOPUS(B)      | 96,5666  | 259,0115 |         |          |                |            |
| ARCTURUS(R)     | 46,6635  | 130,9704 |         |          |                |            |
| RIGIL KENTAURUS | 39,5195  | 271,8232 |         |          |                |            |
| ANTARES(R)      | 11,8873  | 352,5049 |         |          |                |            |
| CAPELLA(R)      | 149,5464 | 137,4810 |         |          |                |            |
| VEGA(B)         | 74,1737  | 68,7665  |         |          |                |            |
| ALDEBARAN(R)    | 165,3926 | 215,8575 |         |          |                |            |
| RIGEL(B)        | 141,3399 | 243,6649 |         |          |                |            |
| GAMMA CRUCIS(R) | 48,3177  | 251,0302 |         |          |                |            |
| SPICA(B)        | 34,0785  | 179,0924 |         |          |                |            |
| ACHERNAR(B)     | 96,0493  | 299,2681 |         |          |                |            |
| DENEK(B)        | 96,3789  | 59,9784  |         |          |                |            |
| PRUCYON(B)      | 119,7264 | 200,4263 |         |          |                |            |

STAR DELAY: 2,6987 SEC 690,8650 PULSES DECIMAL = 10, COARSE + 51, FINE  
 75,3825 DEG 12 63 PULSES OCTAL (CAH SUB C = 350,0051 EPSILON = 8,2817 SCN = 10

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FIMMEL

PN 10 PASS 2888 PR23 #0/0 S/W SJ,3 DSS63 RCVR AGC -125.6 FILE 10-1028 SLB 01/23/80  
SPACECRAFT ATTITUDE ON DAY 20 JAN 20,1980 2030 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.9358 RCSPHAK = 277.6950

SPACECRAFT-EARTH DIRECTION: CLAT = -3.2089 CLON = 236.7173

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.1044 CLON = 237.6487

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PN 10 PASS 2888 PR23 #0/0 S/W SJ,3 DSS63 RCVR AGC -125.6 FILE 10-1028 SLB 01/23/80  
SPACECRAFT ATTITUDE ON DAY 20 JAN 20,1980 2030 GMT  
SPIN PERIOD = 12.888300 SEC RTLT = 5 HR 36 MIN 26.98 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.1044 | 237.6487 |                |            |
| SUN             | 1.4944   | 358.7414 | -3.1361 | 239.1449 | 0.309589270 10 | 20.6944699 |
| EARTH           | 0.9358   | 186.4360 | -3.2089 | 236.7173 | 0.302595300 10 | 20.2269586 |
| JUPITER         | 57.7019  | 178.0353 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)       | 119.9484 | 230.1722 |         |          |                |            |
| BETELGEUSE(R)   | 144.0846 | 213.1169 |         |          |                |            |
| CANOPUS(B)      | 96.5676  | 259.6237 |         |          |                |            |
| ARCTURUS(R)     | 46.7198  | 131.0179 |         |          |                |            |
| RIGIL KENTAURUS | 39.5051  | 271.7405 |         |          |                |            |
| ANTARES(R)      | 11.8145  | 352.5214 |         |          |                |            |
| CAPELLA(R)      | 149.6075 | 137.4174 |         |          |                |            |
| VEGA(B)         | 74.1590  | 68.7906  |         |          |                |            |
| ALDEBARAN(K)    | 165.4436 | 216.0612 |         |          |                |            |
| RIGEL(B)        | 141.3609 | 243.7560 |         |          |                |            |
| GAMMA CRUCIS(R) | 48.3296  | 250.9701 |         |          |                |            |
| SPICA(B)        | 34.1505  | 179.0800 |         |          |                |            |
| ACHERNAR(B)     | 96.0036  | 299.2779 |         |          |                |            |
| DENEK(B)        | 96.3535  | 59.9746  |         |          |                |            |
| PROCYON(B)      | 119.7894 | 200.4510 |         |          |                |            |

STAR DELAY: 2.6985 SEC 690.8244 PULSES DECIMAL = 10. COARSE + 51. FINE  
75.3763 DEG 12.63 PULSES OCTAL CKAH SUB C = 350.4481 EPSILON = 8.2933 SCN = 1

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*Fr. Mel*

PN 10 PA 895 PR23 #0/0 S/W SJ.3 DSS63 RCVR AGC -125.6 FILE 10-1029 SLB

01/28/80

SPACECRAFT ATTITUDE ON DAY 27 JAN 27, 1980 2000 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR ROLLSPEAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ABRSPRDS = 0 ROSTPOS = 100

AMPLITUDE AND PHASE ANGLE: RGSANGAK = 1.0485 ROLSPHAK = 273.5530

SPACECRAFT-EARTH DIRECTION: CLAT = -3.1914 CLON = 236.6451

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.1039 CLON = 237.6915

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PN 10 PASS 2895 PR23 #0/0 S/W SJ.3 DSS63 RCVR AGC -125.6 FILE 10-1029 SLB

01/28/80

SPACECRAFT ATTITUDE ON DAY 27 JAN 27, 1980 2000 GMT

SPIN PERIOD = 12.889526 SEC RPLT = 5 HR 29 MIN 11.91 SEC

| S/C +Z AXIS     | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| SUN             | 0.0000   | 0.0000   | -3.1039 | 237.6915 | -              | -          |
| EARTH           | 1.5112   | 358.7326 | -3.1363 | 239.2046 | 0.310410140 10 | 20.7493409 |
| JUPITER         | 1.0485   | 184.8133 | -3.1914 | 236.6451 | 0.305067440 10 | 20.3922086 |
| SIRIUS(B)       | 57.7446  | 178.0389 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| BETELGEUSE(R)   | 119.9762 | 230.1932 |         |          |                |            |
| CANOPUS(R)      | 144.1206 | 213.1510 |         |          |                |            |
| ARCTURUS(R)     | 96.5757  | 259.6309 |         |          |                |            |
| RIGIL KENTAURUS | 46.7475  | 131.0503 |         |          |                |            |
| ANTARES(R)      | 39.5043  | 271.6909 |         |          |                |            |
| CAPELLA(R)      | 11.7722  | 352.4949 |         |          |                |            |
| VEGA(R)         | 149.6337 | 137.3698 |         |          |                |            |
| ALDEBARAN(R)    | 74.1431  | 63.8042  |         |          |                |            |
| RIGEL(B)        | 165.4785 | 216.1593 |         |          |                |            |
| GAMMA CRUCIS(B) | 141.3802 | 243.8060 |         |          |                |            |
| SPICA(B)        | 48.3440  | 250.9366 |         |          |                |            |
| ACHERNAR(B)     | 24.1932  | 179.0340 |         |          |                |            |
| DENER(B)        | 95.9831  | 299.2842 |         |          |                |            |
| PROCYON(B)      | 96.3317  | 50.9729  |         |          |                |            |
|                 | 119.9296 | 200.4616 |         |          |                |            |

STAR DELAY: 2.6935 SEC 690.8242 PULSES DECIMAL = 10. COARSE + 51. FINE  
75.3691 DEG 12.63 PULSES OCTAL CKAH SUB C = 350.4861 EPSILON = 8.2465 SCN = 10

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*mel*

PN 10 PASS 2899 PR23 #0/0 S/W SJ3 DSS14A RCVR AGC -130.7 FILE 10-1030 TS  
SPACECRAFT ATTITUDE ON DAY 35 FEB 4, 1980 0500 GMT

02/05/80

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR ROSEPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGPRS = 0 ROSEPHAK = 180

AMPLITUDE AND PHASE ANGLE: ROSANGAK = 1.2179 ROSEPHAK = 273.6100

SPACECRAFT-EARTH DIRECTION: CLAT = -3.1774 CLON = 236.6166

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.1030 CLON = 237.8341

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PN 10 PASS 2899 PR23 #0/0 S/W SJ3 DSS14A RCVR AGC -130.7 FILE 10-1030 TS  
SPACECRAFT ATTITUDE ON DAY 35 FEB 4, 1980 0500 GMT  
SPIN PERIOD = 12.890250 SEC PFLT = 5 HR 41 MIN 23.80 SEC

02/05/80

|                  | CNA      | CKA      | CLAT    | CLON     | R (KM)         | R (AU)     |
|------------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS      | 0.0000   | 0.0000   | -3.1030 | 237.8341 | -              | -          |
| SUN              | 1.4150   | 358.6096 | -3.1364 | 239.2508 | 0.311048800 10 | 20.7920321 |
| EARTH            | 1.2179   | 183.5383 | -3.1774 | 236.6100 | 0.307044430 10 | 20.5243603 |
| JUPITER          | 57.3369  | 178.0502 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS (P)       | 120.0680 | 230.2638 |         |          |                |            |
| BETELGEUSE (R)   | 144.2403 | 212.2657 |         |          |                |            |
| CANCRUS (B)      | 56.6022  | 259.6548 |         |          |                |            |
| ARCTURUS (R)     | 46.8404  | 131.1599 |         |          |                |            |
| RIGIL KENTAUPUS  | 39.5012  | 271.5260 |         |          |                |            |
| ANTIARES (P)     | 11.6312  | 252.4078 |         |          |                |            |
| CAPELLA (P)      | 149.7426 | 137.2111 |         |          |                |            |
| VEGA (B)         | 74.0908  | 68.8496  |         |          |                |            |
| ALDEBARAN (R)    | 165.5937 | 216.4910 |         |          |                |            |
| PIGEL (B)        | 141.4437 | 243.9734 |         |          |                |            |
| GAMMA CRUCIS (R) | 43.3915  | 250.8250 |         |          |                |            |
| SPICA (B)        | 24.3355  | 179.0965 |         |          |                |            |
| ACHERNAR (B)     | 95.9143  | 299.3049 |         |          |                |            |
| DENEVB (R)       | 56.2596  | 59.9671  |         |          |                |            |
| PROCYON (B)      | 119.9633 | 200.4975 |         |          |                |            |

STAR DELAY: 2.6978 SEC 690.6445 PULSES DECIMAL = 10. COARSE + 51. FINE  
75.3452 DEG 12.63 PULSES TOTAL CNAH SUP C = 350.0905 EPSILON = 3.5191 SCN = 10

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PN 10 PAS 0006 0023 #0/0 S/W SJ.3 05563A RCVR AGC -123.0 FILE 10-1031 GM 02/12/80  
 SPACECRAFT ATTITUDE ON DAY 03<sup>h</sup> FEB 7, 1900 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE POS PROCRAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ABSORBS = 0 POSPOS = 150

AMPLITUDE AND PHASE ANGLE: POSANOK = 1.0512 POSPHAK = 272.9390

SPACECRAFT +Z DIRECTION: CLAT = -3.1665 CLON = 238.6147

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.1157 CLON = 237.0666

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PN 10 PAS 0006 0023 #0/0 S/W SJ.3 05563A RCVR AGC -123.0 FILE 10-1031 GM 02/12/80  
 SPACECRAFT ATTITUDE ON DAY 03<sup>h</sup> FEB 7, 1900 GMT  
 SPIN PERIOD = 12.091470 SEC RTLT = 5 HR 44 MIN 4.32 SEC

|                  | GMA      | GKA      | CLAT    | CLON     | R (KM)         | R (AU)     |
|------------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS      | 0.0000   | 0.0000   | -3.1157 | 237.0666 | -              | -          |
| SUN              | 1.6370   | 359.2301 | -3.1365 | 259.5059 | 0.311914560 10 | 20.8432193 |
| EARTH            | 1.0512   | 182.4685 | -3.1605 | 238.6147 | 0.309458130 10 | 20.6857039 |
| JUPITER          | 57.7202  | 178.0295 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS (S)       | 119.0511 | 230.1852 |         |          |                |            |
| BETELGEUSE (B)   | 144.0032 | 213.1445 |         |          |                |            |
| CANCORUS (C)     | 96.5596  | 259.6270 |         |          |                |            |
| ARCTURUS (A)     | 46.7401  | 131.0245 |         |          |                |            |
| RIGIL KENTAURIUS | 39.4032  | 271.7202 |         |          |                |            |
| ANTARES (A)      | 11.7953  | 352.5653 |         |          |                |            |
| CAPELLA (C)      | 149.6283 | 137.4120 |         |          |                |            |
| VEGA (B)         | 74.1632  | 68.7975  |         |          |                |            |
| ALDERAMAN (A)    | 165.4514 | 216.1391 |         |          |                |            |
| RIGEL (B)        | 141.3586 | 243.7833 |         |          |                |            |
| GAMMA CRUCIS (G) | 48.3247  | 250.9523 |         |          |                |            |
| SPICA (S)        | 34.1685  | 179.0647 |         |          |                |            |
| ACHERNAR (A)     | 95.9850  | 299.2799 |         |          |                |            |
| DENEK (D)        | 96.3544  | 59.9733  |         |          |                |            |
| PROCYON (P)      | 119.8022 | 200.4617 |         |          |                |            |

STAR DELAY: 2.6001 SEC 690.9647 PULSES DECIMAL = 10. COURSE + 51. FINE  
 75.3730 SEC 12.63 PULSES DECIMAL CK.H SUB C = 051.3225 EPSILON = 7.9077 SCN=10

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FIMMEL

PN 10 PASS 2912 PR23 #070 S/W SJ3 DSS63A RCVR AGC =125.6 FILE 10=1032 AG 02/13/80  
SPACECRAFT ATTITUDE ON DAY 044 FEB 13 1500 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASP8GRRS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.0337 RCSPHAK = 271.7500

SPACECRAFT-EARTH DIRECTION: CLAT = -3.1453 CLON = 236.6429

SPACECRAFT -> Z AXIS ATTITUDE: CLAT = -3.1107 CLON = 237.6776

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PN 10 PASS 2912 PR23 #070 S/W SJ3 DSS63A RCVR AGC =125.6 FILE 10=1032 AG 02/13/80  
SPACECRAFT ATTITUDE ON DAY 044 FEB 13 1500 GMT  
SPIN PERIOD = 12.892450 SEC RTLT = 5 HR 46 MIN 30.43 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C -> Z AXIS   | 0.0000   | 0.0000   | -3.1107 | 237.6776 |                |            |
| SUN             | 1.6751   | 359.0691 | -3.1366 | 239.3550 | 0.312499470 10 | 20.8890020 |
| EARTH           | 1.0337   | 181.9482 | -3.1453 | 236.6429 | 0.311640750 10 | 20.8316009 |
| JUPITER         | 57.7310  | 178.0335 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)       | 119.9621 | 230.1888 |         |          |                |            |
| BETELGEUSE(R)   | 144.1053 | 213.1476 |         |          |                |            |
| CANOPUS(B)      | 96.5666  | 259.6287 |         |          |                |            |
| ARCTURUS(R)     | 46.7435  | 131.0360 |         |          |                |            |
| RIGIL KENTAURUS | 39.4979  | 271.7073 |         |          |                |            |
| ANTARES(R)      | 11.7851  | 352.5350 |         |          |                |            |
| CAPELLA(R)      | 149.6330 | 137.3935 |         |          |                |            |
| VEGA(B)         | 74.1544  | 68.8004  |         |          |                |            |
| ALDEBARAN(R)    | 165.4633 | 216.1480 |         |          |                |            |
| RIGEL(B)        | 141.3680 | 243.7934 |         |          |                |            |
| GAMMA CRUCIS(R) | 48.3330  | 250.9456 |         |          |                |            |
| SPICA(B)        | 34.1794  | 179.0730 |         |          |                |            |
| ACHERNAR(B)     | 95.9840  | 299.2818 |         |          |                |            |
| DENEK(B)        | 96.3445  | 59.9731  |         |          |                |            |
| PROCYON(B)      | 119.8143 | 200.4617 |         |          |                |            |

STAR DELAY: 2.6992 SEC 691.0013 PULSES DECIMAL = 10. COARSE + 51. FINE  
75.3713 DEG 12.63 PULSES OCIAL CKAN SUB C = 391.2601 EPSILON = 7.8090 SCN = 10

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FILE 32

PN 10 PASS 2921 PR23 #0/0 S/W SJ.3 DSS14A RCVP AGC -127.2 FILE 10-1033 GN 02/26/80  
SPACECRAFT ATTITUDE ON DAY 53 FEB 22, 1980 2100 GMT

ROLL PREFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

PREFERENCE FOR PCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL PREFERENCE PARAMETERS: ASPSGR3S = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.9206 PCSPHAK = 269.8740

SPACECRAFT-EARTH DIRECTION: CLAT = -3.1216 CLON = 236.7445

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.1292 CLON = 237.6665

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PN 10 PASS 2921 PR23 #0/0 S/W SJ.3 DSS14A RCVP AGC -127.2 FILE 10-1033 GN 02/26/80  
SPACECRAFT ATTITUDE ON DAY 53 FEB 22, 1980 2100 GMT  
SPIN PERIOD = 12.894040 SEC RTLT = 5 HR 50 MIN 21.64 SEC

|                  | CNA      | CKA      | CLAT    | CLON     | R (KM)         | R (AU)     |
|------------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS      | 0.0000   | 0.0000   | -3.1292 | 237.6665 | -              | -          |
| SUN              | 1.7634   | 359.7077 | -3.1367 | 239.4324 | 0.31358528D 10 | 20.9615829 |
| EARTH            | 0.9206   | 179.5530 | -3.1216 | 236.7445 | 0.31510648D 10 | 21.0632674 |
| JUPITER          | 57.7205  | 179.0210 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS (R)       | 119.9407 | 230.1001 |         |          |                |            |
| BETELGEUSE (R)   | 144.0859 | 213.1600 |         |          |                |            |
| CANOPUS (R)      | 96.5464  | 259.6272 |         |          |                |            |
| ARCTURUS (R)     | 46.7502  | 131.0161 |         |          |                |            |
| RIGIL KENTAURUS  | 39.4793  | 271.7208 |         |          |                |            |
| ANTARES (R)      | 11.7937  | 352.6292 |         |          |                |            |
| CAPELLA (R)      | 149.6374 | 137.4290 |         |          |                |            |
| VEGA (R)         | 74.1757  | 69.7988  |         |          |                |            |
| ALDEBARAN (R)    | 165.4434 | 216.1797 |         |          |                |            |
| FIGEL (R)        | 141.3464 | 243.7906 |         |          |                |            |
| GAMMA CRUCIS (R) | 48.3119  | 250.9489 |         |          |                |            |
| SPICA (R)        | 34.1686  | 179.0449 |         |          |                |            |
| ACHERNAR (R)     | 95.9733  | 249.2792 |         |          |                |            |
| DENE B (R)       | 96.3661  | 59.9725  |         |          |                |            |
| PROCYON (R)      | 119.7974 | 200.4688 |         |          |                |            |

STAR DELAY: 2.6996 SEC 691.1001 PULSES DECIMAL = 10. COARSE + 51. FINE  
75.3728 DEG 12.63 PULSES OCTAL CKAH SUR C = 352.1206 EPSILON = 7.5871 SCM = 10

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PN 10 S 2929 PR23 #070 S/W SJ3 DSS14A RCVR AGC =125.6 FILE 10-1034 RC  
 SPACECRAFT ATTITUDE ON DAY 61 MAR 1,1980 2000 GMT

03/11/80

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.7716 RCSPHAK = 268.4000  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.1020 CLON = 236.8855  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.1343 CLON = 237.6576

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PN 10 PASS 2929 PR23 #070 S/W SJ3 DSS14A RCVR AGC =125.6 FILE 10-1034 RC  
 SPACECRAFT ATTITUDE ON DAY 61 MAR 1,1980 2000 GMT  
 SPIN PERIOD = 12.895380 SEC RTLT = 5 HR 53 MIN 38.09 SEC

03/11/80

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.1343 | 237.6576 |                |            |
| SUN             | 1.8383   | 359.8702 | -3.1368 | 239.4986 | 0.314519230 10 | 21.0240127 |
| EARTH           | 0.7716   | 177.6238 | -3.1020 | 236.8855 | 0.318051180 10 | 21.2601056 |
| JUPITER         | 57.7118  | 178.0171 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 119.9312 | 230.1876 |         |          |                |            |
| BETELGEUSE(R)   | 144.0756 | 213.1587 |         |          |                |            |
| CANOPUS(B)      | 96.5398  | 259.6259 |         |          |                |            |
| ARCTURUS(R)     | 46.7482  | 131.0062 |         |          |                |            |
| RIGIL KENTAURUS | 39.4750  | 271.7313 |         |          |                |            |
| ANTARES(R)      | 11.8019  | 352.6583 |         |          |                |            |
| CAPELLA(R)      | 149.6343 | 137.4452 |         |          |                |            |
| VEGA(B)         | 74.1837  | 68.7965  |         |          |                |            |
| ALDEBARAN(R)    | 165.4332 | 216.1748 |         |          |                |            |
| RIGEL(B)        | 141.3380 | 243.7829 |         |          |                |            |
| GAMMA CRUCIS(R) | 48.3042  | 250.9545 |         |          |                |            |
| SPICA(B)        | 34.1598  | 179.0367 |         |          |                |            |
| ACHERNAR(B)     | 95.9732  | 299.2777 |         |          |                |            |
| DENEK(B)        | 96.3749  | 59.9726  |         |          |                |            |
| PROCYON(B)      | 119.7873 | 200.4693 |         |          |                |            |

STAR DELAY: 2.6999 SEC 691.1846 PULSES DECIMAL = 10, COARSE + 51, FINE  
 75.3741 DEG 12 63 PULSES OCTAL CKAH SUB C = 352,4644 EPSILON= 7.4058 SCN=11

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PN 10 PASS 2934 PR23 #070 S/W SJ3 DSS14A RCVR AGC +125.6 FILE 10-1035-A RC  
SPACECRAFT ATTITUDE ON DAY 66 MAR 6, 1980 2330 GMT

03/10/80

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

REVISED

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180  
AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.6682 RCSPHAK = 266.9810  
SPACECRAFT-EARTH DIRECTION: CLAT = -3.0899 CLON = 237.0015  
SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.1379 CLON = 237.6690

REPLACES FILE NO. 10-1035

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PN 10 PASS 2934 PR23 #070 S/W SJ3 DSS14A RCVR AGC +125.6 FILE 10-1035 RC  
SPACECRAFT ATTITUDE ON DAY 66 MAR 6, 1980 2330 GMT  
SPIN PERIOD = 12.896360 SEC RTLT = 5 HR 55 MIN 42.72 SEC

03/10/80

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)    |
|-----------------|----------|----------|---------|----------|----------------|----------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.1379 | 237.6690 |                |          |
| SUN             | 1.8694   | 359.9785 | -3.1369 | 239.5412 | 0.315123020 10 | 21.06437 |
| EARTH           | 0.6682   | 175.8978 | -3.0899 | 237.0015 | 0.319919400 10 | 21.38498 |
| JUPTER          | 57.7234  | 178.0157 | 0.0000  | 180.0000 | 0.000000000    | 0.00000  |
| SIRIUS(B)       | 119.9357 | 230.1946 |         |          |                |          |
| BETELGEUSE(R)   | 144.0832 | 213.1721 |         |          |                |          |
| CANOPUS(B)      | 96.5383  | 259.6278 |         |          |                |          |
| ARCTURUS(R)     | 46.7584  | 131.0127 |         |          |                |          |
| RIGIL KENTAURUS | 39.4710  | 271.7182 |         |          |                |          |
| ANTARES(R)      | 11.7901  | 352.6690 |         |          |                |          |
| CAPELLA(R)      | 149.6451 | 137.4371 |         |          |                |          |
| VEGA(B)         | 74.1829  | 68.8005  |         |          |                |          |
| ALDEBARAN(R)    | 165.4403 | 216.2126 |         |          |                |          |
| RIGEL(B)        | 141.3398 | 243.7984 |         |          |                |          |
| GAMMA CRUCIS(R) | 48.3045  | 250.9444 |         |          |                |          |
| SPICA(B)        | 34.1713  | 179.0323 |         |          |                |          |
| ACHERNAR(B)     | 95.9645  | 299.2792 |         |          |                |          |
| DENEK(B)        | 96.3723  | 59.9719  |         |          |                |          |
| PROCYON(B)      | 119.7967 | 200.4741 |         |          |                |          |

STAR DELAY: 2.7001 SEC 691.2189 PULSES DECIMAL = 10, COARSE + 51, FINE  
75.3722 DEG 12 63 PULSES OCTAL CKAH SUB C = 352,6461 EPSILON = 7.3324 SCN

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PN 10 S 2942 PR23 #0/0 S/W SJ,3 DSS43A RCVR C -127,2 FILE 10-1036 RC  
 SPACECRAFT ATTITUDE CN DAY 75 MAR 15,1980 0500 GMT

8/80

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,4028 RCSPHAK = 260,2500  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3,0715 CLON = 237,2254  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3,1441 CLON = 237,6222

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PN 10 PASS 2942 PR23 #0/0 S/W SJ,3 DSS43A RCVR AGC -127,2 FILE 10-1036 RC  
 SPACECRAFT ATTITUDE CN DAY 75 MAR 15,1980 0500 GMT  
 SPIN PERIOD = 12,897700 SEC RILT = 5 HR 58 MIN 56,35 SEC

03/18/80

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -3,1441 | 237,6222 | -              | -          |
| SUN             | 1,9838   | 0,1512   | -3,1370 | 239,6090 | 0,316088380 10 | 21,1289024 |
| EARTH           | 0,4028   | 169,6253 | -3,0715 | 237,2254 | 0,322821820 10 | 21,5769987 |
| JUPITER         | 57,6769  | 178,0082 | 0,0000  | 180,0000 | 0,000000000    | 0,0000000  |
| SIRIUS(B)       | 119,9010 | 230,1737 |         |          |                |            |
| BETELGEUSE(R)   | 144,0407 | 213,1415 |         |          |                |            |
| CANOPUS(B)      | 96,5237  | 259,6201 |         |          |                |            |
| ARCTURUS(R)     | 46,7325  | 130,9731 |         |          |                |            |
| HIGIL KENTAURUS | 39,4662  | 271,7725 |         |          |                |            |
| ANTARES(R)      | 11,8356  | 352,7245 |         |          |                |            |
| CAPELLA(R)      | 149,6149 | 137,4963 |         |          |                |            |
| VEGA(B)         | 74,2056  | 68,7863  |         |          |                |            |
| ALDEBARAN(R)    | 165,3989 | 216,1235 |         |          |                |            |
| RIGEL(B)        | 141,3135 | 243,7469 |         |          |                |            |
| GAMMA CRUCIS(R) | 48,2834  | 250,9794 |         |          |                |            |
| SPICA(B)        | 34,1247  | 179,0193 |         |          |                |            |
| ACHERNAR(B)     | 95,9818  | 299,2720 |         |          |                |            |
| DENEK(B)        | 96,4011  | 59,9735  |         |          |                |            |
| PROCYON(B)      | 119,7508 | 200,4656 |         |          |                |            |

STAR DELAY: 2,7006 SEC 691,3612 PULSES DECIMAL = 10, COARSE + 51, FINE  
 75,3799 DEG 12 63 PULSES OCTAL CKAH SUB C = -6,9206 EPSILON= 7,0718 SCN=1

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10. PASS 2 PR23 #0/0 S/W SJ.3 DSS43A RCVR AGC - .7 FILE 10-1037 TG  
 SPACECRAFT ATTITUDE UN DAY 80 MAR 20,1980 0330 GMT

03/21/80

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPUS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.2325 RCSPHAK = 247.0100

SPACECRAFT-EARTH DIRECTION: CLAT = -3.0633 CLON = 237.3481

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.1576 CLON = 237.5610

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10 PASS 2947 PR23 #0/0 S/W SJ.3 DSS43A RCVR AGC -128.7 FILE 10-1037 TG  
 SPACECRAFT ATTITUDE UN DAY 80 MAR 20,1980 0330 GMT  
 SPIN PERIOD = 12.898550 SEC RTLT = 6 HR 0 MIN 25.91 SEC

03/21/80

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.1576 | 237.5610 | -              | -          |
| SUN             | 2.0772   | 0.5083   | -3.1371 | 239.6412 | 0.316550200 10 | 21.1597727 |
| EARTH           | 0.2325   | 156.0879 | -3.0633 | 237.3481 | 0.324164280 10 | 21.6687353 |
| JUPITER         | 57.6163  | 177.9950 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 119.8515 | 230.1483 |         |          |                |            |
| BETELGEUSE(R)   | 143.9822 | 213.1076 |         |          |                |            |
| CANOPUS(B)      | 96.4995  | 259.6102 |         |          |                |            |
| ARCTURUS(R)     | 46.7025  | 130.9179 |         |          |                |            |
| RIGIL KENTAURUS | 39.4547  | 271.8439 |         |          |                |            |
| ANTARES(R)      | 11.8946  | 352.8212 |         |          |                |            |
| CAPELLA(R)      | 149.5789 | 137.5802 |         |          |                |            |
| VEGA(B)         | 74.2403  | 68.7682  |         |          |                |            |
| ALDEBARAN(R)    | 165.3415 | 216.0238 |         |          |                |            |
| RIGEL(B)        | 141.2744 | 243.6825 |         |          |                |            |
| GAMMA CRUCIS(R) | 48.2508  | 251.0237 |         |          |                |            |
| SPICA(B)        | 34.0638  | 178.9945 |         |          |                |            |
| ACHERNAR(B)     | 96.0000  | 299.2624 |         |          |                |            |
| DENEK(B)        | 96.4434  | 59.9754  |         |          |                |            |
| PROCYON(B)      | 119.6888 | 200.4572 |         |          |                |            |

STAR DELAY: 2.7012 SEC 691.4981 PULSES DECIMAL = 10. COARSE + 51. FINE  
 75.3898 DEG 12 63 PULSES OCTAL CKAH SUB C = -6.3609 EPSILON= 6.8692 SCN=10

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PN 10 PASS 2953 PR23 #0/0 S/W SJ,3 DSS43A RCVR AGC -125,6 FILE 10-1038 RC  
 SPACECRAFT ATTITUDE ON DAY 86 MAR 26,1980 0830 GMT

26/80

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,1479 RCSPHAK = 134,5600  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3,0512 CLON = 237,5604  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3,1543 CLON = 237,4542

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PN 10 PASS 2953 PR23 #0/0 S/W SJ,3 DSS43A RCVR AGC -125,6 FILE 10-1038 RC  
 SPACECRAFT ATTITUDE ON DAY 86 MAR 26,1980 0830 GMT  
 SPIN PERIOD = 12,899650 SEC RTLT = 6 HR 2 MIN 42,22 SEC

03/26/80

|                 | CNA      | CKA      | CLAT    | CLON     | H(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -3,1543 | 237,4542 |                |            |
| SUN             | 2,2344   | 0,3791   | -3,1372 | 239,6919 | 0,317278270 10 | 21,2084405 |
| EARTH           | 0,1479   | 44,2223  | -3,0512 | 237,5604 | 0,326207480 10 | 21,8053128 |
| JUPITER         | 57,5096  | 177,9888 | 0,0000  | 180,0000 | 0,000000000    | 0,0000000  |
| SIRIUS(B)       | 119,7856 | 230,0944 |         |          |                |            |
| BETELGEUSE(R)   | 143,8946 | 213,0182 |         |          |                |            |
| CANOPUS(B)      | 96,4834  | 259,5923 |         |          |                |            |
| ARCTURUS(R)     | 46,6303  | 130,8380 |         |          |                |            |
| RIGIL KENTAURUS | 39,4615  | 271,9673 |         |          |                |            |
| ANTARES(R)      | 12,0007  | 352,8629 |         |          |                |            |
| CAPELLA(R)      | 149,4980 | 137,6924 |         |          |                |            |
| VEGA(B)         | 74,2759  | 68,7340  |         |          |                |            |
| ALDEBARAN(R)    | 165,2571 | 215,7697 |         |          |                |            |
| RIGEL(B)        | 141,2299 | 243,5559 |         |          |                |            |
| GAMMA CRUCIS(R) | 48,2193  | 251,1088 |         |          |                |            |
| SPICA(B)        | 33,9572  | 178,9907 |         |          |                |            |
| ACHERNAR(B)     | 96,0549  | 299,2468 |         |          |                |            |
| DENEK(B)        | 96,4939  | 59,9801  |         |          |                |            |
| PROCYON(B)      | 119,5901 | 200,4284 |         |          |                |            |

STAR DELAY: 2,7020 SEC 691,7210 PULSES DECIMAL = 10, COARSE + 52, FINE  
 75,4077 DEG 12 64 PULSES OCTAL CKAM SUB C = -6,1693 EPSILON= 6,5484 SCN=1

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PN 10 PASS 2963 PR23 #0/0 S/W SJ,3 DSS43A RCVR AGC =144,9 FILE 10-1039A SLB  
SPACECRAFT ATTITUDE ON DAY 96 APR 5,1980 0300 GMT

04/15/80

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

REVISED

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,5119 RCSPHAK = 103,0600

REPLACES FILE NO. 10-1039

SPACECRAFT-EARTH DIRECTION: CLAT = -3,0327 CLON = 237,9770

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3,1363 CLON = 237,4749

PN 10 PASS 2963 PR23 #0/0 S/W SJ,3 DSS43A RCVR AGC =144,9 FILE 10-1039 SLB  
SPACECRAFT ATTITUDE ON DAY 96 APR 5,1980 0300 GMT  
SPIN PERIOD = 12,090136 SEC RTLT = 6 HR 6 MIN 22,36 SEC

04/15/80

|                 | CNA      | GKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -3,1363 | 237,4749 |                |            |
| SUN             | 2,3010   | 359,9123 | -3,1373 | 239,7793 | 0,318541060 10 | 21,2928516 |
| EARTH           | 0,5119   | 11,6597  | -3,0327 | 237,9770 | 0,329507370 10 | 22,0258937 |
| JUPITER         | 57,5296  | 178,0018 | 0,0000  | 180,0000 | 0,00000000     | 0,0000000  |
| SIRIUS(B)       | 119,8127 | 230,0979 |         |          |                |            |
| BETELGEUSE(R)   | 143,9217 | 213,0140 |         |          |                |            |
| CANOPUS(B)      | 96,5049  | 259,5954 |         |          |                |            |
| ARCTURUS(R)     | 46,6302  | 130,8650 |         |          |                |            |
| RIGIL KENTAURUS | 39,4788  | 271,9427 |         |          |                |            |
| ANTARES(R)      | 11,9825  | 352,7677 |         |          |                |            |
| CAPELLA(R)      | 149,5011 | 137,6473 |         |          |                |            |
| VEGA(B)         | 74,2516  | 68,7387  |         |          |                |            |
| ALDEBARAN(R)    | 165,2844 | 215,7610 |         |          |                |            |
| RIGEL(B)        | 141,2553 | 243,5700 |         |          |                |            |
| GAMMA CRUCIS(R) | 48,2430  | 251,0977 |         |          |                |            |
| SPICA(B)        | 33,9775  | 179,0191 |         |          |                |            |
| ACHERNAR(B)     | 96,0606  | 299,2508 |         |          |                |            |
| DENEK(B)        | 96,4680  | 59,9803  |         |          |                |            |
| PROCYON(B)      | 119,6157 | 200,4241 |         |          |                |            |

STAR DELAY: 2,5324 SEC 648,2859 PULSES DECIMAL = 10, COARSE + 8, FINE  
75,4046 DEG 12 10 PULSES OCTAL CKAH SUB C = 353,4926 EPSILON = 6,4197 SCN = 10

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PN 10 PASS 2969 PR23 #0/0 S/W SJ,3 DSS43A RCVR AGC =136.6 FILE 10=1040 TG 04/14/80

SPACECRAFT ATTITUDE ON DAY 102 APR 11, 1980 0200 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.8022 RCSPHAK = 100.8800

SPACECRAFT-EARTH DIRECTION: CLAT = -3.0254 CLON = 238.1867

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.1768 CLON = 237.3977

PN 10 PASS 2969 PR23 #0/0 S/W SJ,3 DSS43A RCVR AGC =136.6 FILE 10=1040 TG 04/14/80

SPACECRAFT ATTITUDE ON DAY 102 APR 11, 1980 0200 GMT

SPIN PERIOD = 12.902340 SEC RTWT = 6 HR 7 MIN 55.86 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.1768 | 237.3977 |                |            |
| SUN             | 2.4183   | 0.8676   | -3.1374 | 239.8193 | 0.31912227D 10 | 21.3317025 |
| EARTH           | 0.8022   | 10.8545  | -3.0254 | 238.1867 | 0.33090889D 10 | 22.1195782 |
| JUPITER         | 57.4540  | 177.9701 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 119.7322 | 230.0747 |         |          |                |            |
| BETELGEUSE(R)   | 143.8350 | 212.9987 |         |          |                |            |
| CANOPUS(B)      | 96.4511  | 259.5834 |         |          |                |            |
| ARCTURUS(R)     | 46.6104  | 130.7807 |         |          |                |            |
| RIGIL KENTAURUS | 39.4410  | 272.0337 |         |          |                |            |
| ANTARES(R)      | 12.0540  | 352.9970 |         |          |                |            |
| CAPELLA(R)      | 149.4713 | 137.7819 |         |          |                |            |
| VEGA(B)         | 74.3173  | 68.7183  |         |          |                |            |
| ALDEBARAN(R)    | 165.1982 | 215.7107 |         |          |                |            |
| RIGEL(B)        | 141.1847 | 243.5024 |         |          |                |            |
| GAMMA CRUCIS(R) | 48.1798  | 251.1409 |         |          |                |            |
| SPICA(B)        | 33.9012  | 178.9527 |         |          |                |            |
| ACHERNAR(B)     | 96.0629  | 299.2373 |         |          |                |            |
| DENEK(B)        | 96.5416  | 59.9813  |         |          |                |            |
| PROCYON(B)      | 119.5293 | 200.4261 |         |          |                |            |

STAR DELAY: 2.7029 SEC 691.9474 PULSES DECIMAL = 10. COARSE + 52. FINE  
75.4166 DEG 12 64 PULSES OCTAL CKAH SUB C = 5.3354 EPSILON = 6.2030 SCN = 10

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PN 10 PASS 2974 PR23 #0/0 S/W SJ,3 DSS43A RCVR AGC =125,4 FILE 10-1041 RC 04/17/80  
 SPACECRAFT ATTITUDE ON DAY 107 APR 16,1980 0800 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,7170 RCSPHAK = 98,6130

SPACECRAFT-EARTH DIRECTION: CLAT = -3,0975 CLON = 238,4193

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3,2215 CLON = 237,7120

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PN 10 PASS 2974 PR23 #0/0 S/W SJ,3 DSS43A RCVR AGC =125,4 FILE 10-1041 RC 04/17/80  
 SPACECRAFT ATTITUDE ON DAY 107 APR 16,1980 0800 GMT  
 SPIN PERIOD = 12,903310 SEC RTLT = 6 HR 0 MIN 12,08 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -3,2215 | 237,7120 |                |            |
| SUN             | 2,1478   | 2,1844   | -3,1374 | 239,8615 | 0,31973755D 10 | 21,3728309 |
| EARTH           | 0,7170   | 9,9391   | -3,0975 | 238,4193 | 0,32395703D 10 | 21,6548817 |
| JUPITER         | 57,7692  | 177,9663 | 0,0000  | 180,0000 | 0,00000000     | 0,0000000  |
| SIRIUS(B)       | 119,8989 | 230,2468 |         |          |                |            |
| BETELGEUSE(R)   | 144,0733 | 213,3036 |         |          |                |            |
| CANOPUS(B)      | 96,4637  | 259,6368 |         |          |                |            |
| ARCTURUS(R)     | 46,8497  | 130,9940 |         |          |                |            |
| RIGIL KENTAURUS | 39,3861  | 271,6713 |         |          |                |            |
| ANTARES(R)      | 11,7370  | 353,0443 |         |          |                |            |
| CAPELLA(R)      | 149,7333 | 137,4953 |         |          |                |            |
| VEGA(B)         | 74,2454  | 68,8228  |         |          |                |            |
| ALDEBARAN(R)    | 165,4253 | 216,5722 |         |          |                |            |
| RIGEL(B)        | 141,2836 | 243,8950 |         |          |                |            |
| GAMMA CRUCIS(R) | 48,2395  | 250,8862 |         |          |                |            |
| SPICA(B)        | 34,2158  | 178,9127 |         |          |                |            |
| ACHERNAR(B)     | 95,8705  | 299,2812 |         |          |                |            |
| DENEK(B)        | 96,4232  | 59,9654  |         |          |                |            |
| PROCYON(B)      | 119,8077 | 200,5300 |         |          |                |            |

STAR DELAY: 2,7012 SEC 691,5095 PULSES DECIMAL = 10, COARSE + 52, FINE  
 75,3632 DEG 12 64 PULSES OCTAL CKAH SUB C = 4,5376 EPSILON = 6,7220 SCN=10

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PN 10 PASS 2976 PR23 #0/0 S/W SJ,3 DSS43A RCVR AGC =123,96 FILE 10=1042 RC 04/18/80  
 SPACECRAFT ATTITUDE ON DAY 109 APR 18,1980 0700 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,7480 RCSPHAK = 97,6810

SPACECRAFT-EARTH DIRECTION: CLAT = -3,0162 CLON = 238,5086

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3,0755 CLON = 237,7618

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PN 10 PASS 2976 PR23 #0/0 S/W SJ,3 DSS43A RCVR AGC =123,96 FILE 10=1042 RC 04/18/80  
 SPACECRAFT ATTITUDE ON DAY 109 APR 18,1980 0700 GMT  
 SPIN PERIOD = 12,903560 SEC RTCT = 6 HR 10 MIN 1,96 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -3,0755 | 237,7618 |                |            |
| SUN             | 2,1132   | 358,2625 | -3,1374 | 239,8772 | 0,319970480 10 | 21,3884011 |
| EARTH           | 0,7480   | 4,5213   | -3,0162 | 238,5086 | 0,332799110 10 | 22,2459298 |
| JUPITER         | 57,8139  | 178,0621 | 0,0000  | 180,0000 | 0,000000000    | 0,0000000  |
| SIRIUS(B)       | 120,0430 | 230,2177 |         |          |                |            |
| BETELGEUSE(R)   | 144,1950 | 213,1750 |         |          |                |            |
| CANOPUS(B)      | 96,6164  | 259,6421 |         |          |                |            |
| ARCTURUS(R)     | 46,7722  | 131,1220 |         |          |                |            |
| RIGIL KENTAURUS | 39,5307  | 271,6086 |         |          |                |            |
| ANTARES(R)      | 11,7063  | 352,3183 |         |          |                |            |
| CAPELLA(R)      | 149,6710 | 137,2565 |         |          |                |            |
| VEGA(B)         | 70,0912  | 68,8237  |         |          |                |            |
| ALDEBARAN(R)    | 165,5520 | 216,2348 |         |          |                |            |
| RIGEL(B)        | 141,4367 | 243,8731 |         |          |                |            |
| GAMMA CRUCIS(R) | 48,3938  | 250,8897 |         |          |                |            |
| SPICA(B)        | 34,2630  | 179,1313 |         |          |                |            |
| ACHERNAR(B)     | 95,9735  | 299,2959 |         |          |                |            |
| DENEK(B)        | 96,2719  | 59,9715  |         |          |                |            |
| PROCYON(B)      | 119,9054 | 200,4642 |         |          |                |            |

STAR DELAY: 2,7011 SEC 691,4740 PULSES DECIMAL = 10, COARSE + 51, FINE  
 75,3579 DEG 12 63 PULSES OCTAL CKAH SUB C = 351,4689 EPSILON = 6,7936 SCN=10

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RN 10 PASS 2978 PR23 #0/0 S/W SJ.3 DSS43A RCVR AGC -123.9 FILE 10-1042 PS 04/21/80  
 SPACECRAFT ATTITUDE ON DAY 111 APR 20, 1980 0700 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C. PRE-PRECESSION  
 REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.8314 RCSPHAK = 97.1300  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.0140 CLON = 238.6009  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.0805 CLON = 237.7710

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RN 10 PASS 2978 PR23 #0/0 S/W SJ.3 DSS43A RCVR AGC -123.9 FILE 10-1043 PS 04/21/80  
 SPACECRAFT ATTITUDE ON DAY 111 APR 20, 1980 0700 GMT  
 SPIN PERIOD = 12.903920 SEC RTLT = 6 HR 10 MIN 34.78 SEC

|                  | CNA      | CKA      | CLAT    | CLON     | R (KM)         | D (AU)     |
|------------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS      | 0.0000   | 0.0000   | -3.0805 | 237.7710 | -              | -          |
| SUN              | 2.1199   | 358.4042 | -3.1375 | 239.8932 | 0.720201410 10 | 21.4039376 |
| EARTH            | 0.8314   | 4.5676   | -3.0140 | 238.6009 | 0.333291050 10 | 22.2758135 |
| JUPITER          | 57.0232  | 178.0596 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS (R)       | 120.0447 | 230.2241 |         |          |                |            |
| BETELGEUSE (R)   | 144.1996 | 213.1883 |         |          |                |            |
| CANOPUS (R)      | 96.6130  | 259.6437 |         |          |                |            |
| ARCTURUS (R)     | 46.7821  | 131.1258 |         |          |                |            |
| RIGIL KENTAURUS  | 39.5254  | 271.5982 |         |          |                |            |
| ANTARES (R)      | 11.6066  | 352.3372 |         |          |                |            |
| CAPELLA (R)      | 149.6812 | 137.2527 |         |          |                |            |
| VEGA (R)         | 74.0926  | 68.6271  |         |          |                |            |
| ALDEBARAN (R)    | 165.5563 | 216.2721 |         |          |                |            |
| RIGEL (R)        | 141.4361 | 243.8867 |         |          |                |            |
| GAMMA CRUCIS (P) | 48.3920  | 250.8810 |         |          |                |            |
| SPICA (B)        | 34.2722  | 179.1245 |         |          |                |            |
| ACHERNAR (R)     | 95.8646  | 299.2969 |         |          |                |            |
| DENER (R)        | 96.2717  | 59.9709  |         |          |                |            |
| PROCYON (B)      | 119.0122 | 200.4693 |         |          |                |            |

STAR DELAY: 2.7011 SEC 691.4782 PULSES DECIMAL = 10. COARSE + 51. FINE  
 75.3563 DEG 12.63 PULSES OCTAL CKAH SUB-C = 351.6245 ERS11 DN = 6.7797 SCN = 10

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PN 10 PASS 2979 PR23 #12/13 S/W SJ.3 DSS63A PCVR AGC -144.9 FILE 10-1044 RS  
SPACECRAFT ATTITUDE ON DAY 111 APR 20, 1980 0800 GMT

04/21/80

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

NEW ATTITUDE  
POST-PRECESSION

ROLL REFERENCE PARAMETERS: ASPSCRS = 0 RCSTRS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.8495 RCSPHAK = 89.2820

SPACECRAFT-EARTH DIRECTION: CLAT = -3.0140 CLON = 238.6029

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.9211 CLON = 237.7573

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PN 10 PASS 2979 PR23 #12/13 S/W SJ.3 DSS63A PCVR AGC -144.9 FILE 10-1044 RS  
SPACECRAFT ATTITUDE ON DAY 111 APR 20, 1980 0800 GMT  
SPIN PERIOD = 12.903920 SEC RTLT = 6 HR 10 MIN 35.45 SEC

04/21/80

|                  | CMA      | CKA      | CLAT    | CLON     | R (KM)         | P (AU)    |
|------------------|----------|----------|---------|----------|----------------|-----------|
| S/C +Z AXIS      | 0.0000   | 0.0000   | -2.9211 | 237.7573 | -              | -         |
| SUN              | 2.1442   | 354.1526 | -3.1375 | 239.8936 | 0.320204280 10 | 21.004143 |
| EARTH            | 0.8495   | 353.7009 | -3.0140 | 238.6029 | 0.333301100 10 | 22.279485 |
| JUPITER          | 57.8043  | 178.1589 | 0.0000  | 180.0000 | 0.000000000    | 0.000000  |
| SIRIUS (R)       | 120.1587 | 230.1581 |         |          |                |           |
| BETELGEUSE (R)   | 144.2755 | 212.9918 |         |          |                |           |
| CANCRIUS (R)     | 96.7674  | 252.6381 |         |          |                |           |
| ARCTURUS (R)     | 46.6530  | 131.2143 |         |          |                |           |
| BIGIL KENTAURUS  | 39.6852  | 271.6086 |         |          |                |           |
| ANTARES (S)      | 11.7324  | 351.5842 |         |          |                |           |
| CAPELLA (R)      | 149.5627 | 137.0684 |         |          |                |           |
| VEGA (R)         | 73.9489  | 68.9063  |         |          |                |           |
| ALDEBARAN (R)    | 165.6390 | 215.7378 |         |          |                |           |
| RIGEL (R)        | 141.5732 | 243.7822 |         |          |                |           |
| GAMMA CRUCIS (R) | 48.5383  | 250.9379 |         |          |                |           |
| SPICA (S)        | 34.2565  | 179.3576 |         |          |                |           |
| ACHERNAR (R)     | 96.1104  | 292.3032 |         |          |                |           |
| DEMES (R)        | 96.1405  | 59.9801  |         |          |                |           |
| PROCYON (R)      | 119.9550 | 200.3798 |         |          |                |           |

STAR DELAY: 2.7013 SEC 691.5301 PULSES DECIMAL = 10. COARSE + 52. FINE  
75.3619 DEG 12.64 PULSES OCTAL CKAH SUB C = 347.4232 CRSTLON = 6.7395 CON =

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42.381 50 SHEETS 5 SQUARE  
42.382 100 SHEETS 5 SQUARE  
42.389 200 SHEETS 5 SQUARE  
MADE IN U.S.A.

*Supreme*

*10-1045*

N 10 PASS 35 PR23 #9/12 S/W SJ,3 DSS638 RCVR AGC 122,2 FILE 10-1046 RC 04/29  
SPACECRAFT ATTITUDE ON DAY 117 APR 26, 1980 0000 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C, FIMM

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE, NEW ATTITUDE POST-PRECESSION NEW ATTITUDE POST-PRECESSION

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,5804 RCSPHAK = 6,4033

SPACECRAFT-EARTH DIRECTION: CLAT = -3,0081 CLON = 238,8887

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2,5193 CLON = 239,2020

FILE 10-1046 STOPPED NO DATA

N 10 PASS 2985 PR23 #9/12 S/W SJ,3 DSS638 RCVR AGC -122,2 FILE 10-1046 RC 04/29/80  
SPACECRAFT ATTITUDE ON DAY 117 APR 26, 1980 0900 GMT  
SPIN PERIOD = 12,900750 SEC RTLT = 6 HR 12 MIN 8,56 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -2,5193 | 239,2020 | -              | -          |
| SUN             | 0,9633   | 320,0638 | -3,1375 | 239,9418 | 0,320914170 10 | 21,4514820 |
| EARTH           | 0,5804   | 237,3741 | -3,0081 | 238,8887 | 0,334696800 10 | 22,3727807 |
| JUPITER         | 59,2350  | 178,4991 | 0,0000  | 180,0000 | 0,000000000    | 0,00000000 |
| SIRIUS(B)       | 121,3874 | 230,7370 |         |          |                |            |
| BETELGEUSE(R)   | 145,7018 | 213,7140 |         |          |                |            |
| CANOPUS(B)      | 97,4194  | 259,8745 |         |          |                |            |
| ARCTURUS(R)     | 47,3173  | 132,5357 |         |          |                |            |
| RIGIL KENTAURUS | 40,0674  | 269,9433 |         |          |                |            |
| ANTARES(R)      | 10,3808  | 348,3406 |         |          |                |            |
| CAPELLA(R)      | 150,3216 | 134,9047 |         |          |                |            |
| VEGA(B)         | 73,0571  | 69,2313  |         |          |                |            |
| ALDEBARAN(R)    | 167,0346 | 218,0488 |         |          |                |            |
| RIGEL(B)        | 142,5564 | 245,3009 |         |          |                |            |
| GAMMA CRUCIS(R) | 49,4000  | 249,9401 |         |          |                |            |
| SPICA(B)        | 35,6973  | 180,0117 |         |          |                |            |
| ACHERNAR(B)     | 95,7516  | 299,5229 |         |          |                |            |
| DENEK(B)        | 95,0704  | 59,9458  |         |          |                |            |
| PROCYON(B)      | 121,4475 | 200,5243 |         |          |                |            |

STAR DELAY: 2,6922 SEC 689,1915 PULSES DECIMAL = 10, COARSE + 49, FINE  
75,1255 DEG 12 61 PULSES OCTAL CKAH SUB C = 310,0911 EPSILON = 9,9727 SCN = 10

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N 10 PASS 86 PR23 #070 S/W SJ,3 DSS63A RCVR AGI 18.6 FILE 10-1047 SLB 04/29  
 SPACECRAFT ATTITUDE ON DAY 118 APR 27,1980 0800 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C. FINN

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.5548 RCSPHAK = 10.8894

SPACECRAFT-EARTH DIRECTION: CLAT = -3.0073 CLON = 238.9349

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.5150 CLON = 239.1910

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N 10 PASS 2986 PR23 #070 S/W SJ,3 DSS63A RCVR AGC -118.6 FILE 10-1047 SLB 04/29/80  
 SPACECRAFT ATTITUDE ON DAY 118 APR 27,1980 0800 GMT

SPIN PERIOD = 12.900020 SEC RTLT = 6 HR 12 MIN 22.50 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -2.5150 | 239.1910 | -              | -          |
| SUN             | 0.9805   | 320.5662 | -3.1375 | 239.9494 | 0.32102644D 10 | 21.4589866 |
| EARTH           | 0.5548   | 242.5432 | -3.0073 | 238.9349 | 0.33490563D 10 | 22.3867400 |
| JUPITER         | 59.2239  | 178.5011 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 121.3838 | 230.7296 |         |          |                |            |
| BETELGEUSE(R)   | 145.6950 | 213.6993 |         |          |                |            |
| CANOPUS(B)      | 97.4217  | 259.8725 |         |          |                |            |
| ARCTURUS(R)     | 47.3066  | 132.5304 |         |          |                |            |
| RIGIL KENTAURUS | 40.0717  | 269.9559 |         |          |                |            |
| ANTARES(R)      | 10.3925  | 348.3290 |         |          |                |            |
| CAPELLA(R)      | 150.3108 | 134.9125 |         |          |                |            |
| VEGA(B)         | 73.0569  | 69.2272  |         |          |                |            |
| ALDEBARAN(R)    | 167.0286 | 218.0040 |         |          |                |            |
| RIGEL(B)        | 142.5557 | 245.2850 |         |          |                |            |
| GAMMA CRUCIS(R) | 49.4003  | 249.9498 |         |          |                |            |
| SPICA(B)        | 35.6863  | 180.0173 |         |          |                |            |
| ACHERNAR(B)     | 95.7608  | 299.5216 |         |          |                |            |
| DENEK(B)        | 95.0721  | 59.9464  |         |          |                |            |
| PROCYON(B)      | 121.4388 | 200.5189 |         |          |                |            |

STAR DELAY: 2.6921 SEC 689.1708 PULSES DECIMAL = 10, COARSE + 49, FINE  
 75.1275 DEG 12 61 PULSES OCTAL CKAH SUB C = 310.6542 EPSILON= 9.9121 SCN=10

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PN 10 PJ 2989 PR23 #0/0 S/W SJ,3 DSS63A RCVR -125,6 FILE 10-1048 RC 05 180  
SPAC AFT ATTITUDE ON DAY 121 - APR 30, 1980 0830 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C,

REFERENCE FOR RCS PHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,5107 RCS PHAK = 26,4440

SPACECRAFT-EARTH DIRECTION: CLAT = -3,0049 CLON = 239,0816

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2,5037 CLON = 239,1798

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PN 10 PASS 2989 PR23 #0/0 S/W SJ,3 DSS63A RCVR AGC -125,6 FILE 10-1048 RC 05/01/80  
SPACECRAFT ATTITUDE ON DAY 121 APR 30, 1980 0830 GMT  
SPIN PERIOD = 12,900630 SEC RTLT = 6 HR 13 MIN 4,88 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -2,5037 | 239,1798 |                |            |
| SUN             | 1,0149   | 321,3333 | -3,1576 | 239,9734 | 0,321380320 10 | 21,4826417 |
| EARTH           | 0,5107   | 258,9291 | -3,0049 | 239,0816 | 0,335540930 10 | 22,4292066 |
| JUPITER         | 59,2125  | 178,5071 | 0,0000  | 180,0000 | 0,000000000    | 0,0000000  |
| SIRIUS(B)       | 121,3854 | 230,7195 |         |          |                |            |
| BETELGEUSE(R)   | 145,6920 | 213,6759 |         |          |                |            |
| CANOPUS(B)      | 97,4309  | 259,8703 |         |          |                |            |
| ARCTURUS(R)     | 47,2908  | 132,5293 |         |          |                |            |
| RIGIL KENTAURUS | 40,0830  | 269,9687 |         |          |                |            |
| ANTARES(R)      | 10,4057  | 348,2808 |         |          |                |            |
| CAPELLA(R)      | 150,2949 | 134,9120 |         |          |                |            |
| VEGA(B)         | 73,0503  | 69,2223  |         |          |                |            |
| ALDEBARAN(R)    | 167,0267 | 217,9351 |         |          |                |            |
| RIGEL(B)        | 142,5613 | 245,2651 |         |          |                |            |
| GAMMA CRUCIS(R) | 49,4071  | 249,9616 |         |          |                |            |
| SPICA(B)        | 35,6752  | 180,0325 |         |          |                |            |
| ACHERNAR(B)     | 95,7761  | 299,5207 |         |          |                |            |
| DENEK(B)        | 95,0679  | 59,9472  |         |          |                |            |
| PROCYON(B)      | 121,4322 | 200,5096 |         |          |                |            |

STAR DELAY: 2,6923 SEC 689,2234 PULSES DECIMAL = 10, COARSE + 49, FINE  
75,1297 DEG 12 61 PULSES OCTAL CKAH SUB C = 311,5419 EPSILON = 9,7914 SCN = 10

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PN 10 PASS 2995 PRZS #070 SWH 30.3 D5863A RCVR AGC -125.6 FILE 10-1049 SLB  
SPACECRAFT ATTITUDE ON DAY 127 MAY 7, 1960 0830 GMT

05/07/80

FULL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF SWC.

REFERENCE FOR ROSETHA IS TOWARD SOUTH ECLIPTIC POLE.

FULL REFERENCE PARAMETERS: ASPSRNS = 0 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: ROSETHA = 0.3633 ROSETHA = 44.5580  
 SPACECRAFT-LEWTH DIRECTION: CLAT = -3.0007 CLON = 239.4278  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.6415 CLON = 239.5751

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PN 10 PASS 2995 PRZS #070 SWH 30.3 D5863A RCVR AGC -125.6 FILE 10-1049 SLB  
SPACECRAFT ATTITUDE ON DAY 127 MAY 7, 1960 0830 GMT  
SPIN PERIOD = 12.991600 SEC PERI = 3 HR 14 MIN 54.02 SEC

05/07/80

|                  | UMA      | UKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|------------------|----------|----------|---------|----------|----------------|------------|
| SWC +Z AXIS      | 0.0000   | 0.0000   | -2.6415 | 239.5751 | -              | -          |
| SUN              | 0.3215   | 322.8466 | -3.1576 | 240.9289 | 0.522200220 10 | 21.5574479 |
| ROSETHA          | 0.3633   | 276.6488 | -3.0007 | 239.4278 | 0.336877120 10 | 22.5185241 |
| JUPITER          | 39.4091  | 178.4571 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SPIRUS(A)        | 121.4007 | 230.5725 |         |          |                |            |
| DELTA DELTA(A)   | 145.7750 | 214.0109 |         |          |                |            |
| ORION(A)         | 57.5291  | 259.5067 |         |          |                |            |
| ANTARES(A)       | 77.5223  | 132.5851 |         |          |                |            |
| PIPER(A)         | 35.9456  | 289.7475 |         |          |                |            |
| ALTAIR(A)        | 10.1892  | 348.5219 |         |          |                |            |
| CAPPELLA(A)      | 156.5233 | 134.5513 |         |          |                |            |
| VEGA(L)          | 73.1106  | 69.3006  |         |          |                |            |
| ALDEBARAN(A)     | 167.0923 | 216.9559 |         |          |                |            |
| PIGEL(B)         | 142.5155 | 245.5777 |         |          |                |            |
| SARAH CRUISER(R) | 49.5441  | 245.7791 |         |          |                |            |
| SPICER(A)        | 35.8884  | 178.6502 |         |          |                |            |
| ALTAIR(A)        | 95.5611  | 299.5355 |         |          |                |            |
| ALDEBARAN(A)     | 39.3955  | 59.9549  |         |          |                |            |
| PROCYON(B)       | 121.8845 | 200.6559 |         |          |                |            |

STAR DECAT: 2.6918 SEC 036.9411 PULSES DECIAL = 10. COARSE + 49. FINE  
 75.0955 SEC 12.01 PULSES DECIAL GRAN SUB C = 312.3473 EPSILON=10.4933 SCN=10

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FIMMEL

PN 10 PASS 3004 PR23 #0/0 S/W SJ3 DSS148 RCVR AGC -122.2 FILE 10-1050 RM 05/15/80  
SPACECRAFT ATTITUDE ON DAY 137 MAY 16, 1980 0100 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.9597 RCSPHAK = 95.0170

SPACECRAFT-EARTH DIRECTION: CLAT = -2.9979 CLON = 239.8649

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.7634 CLON = 238.9331

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PN 10 PASS 3004 PR23 #0/0 S/W SJ3 DSS148 RCVR AGC -122.2 FILE 10-1050 RM 05/15/80  
SPACECRAFT ATTITUDE ON DAY 137 MAY 16, 1980 0100 GMT  
SPIN PERIOD = 12.903310 SEC RTLT = 6 HR 16 MIN 6.57 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -2.7634 | 238.9331 | -              | -          |
| SUN             | 1.2214   | 342.1245 | -3.1377 | 240.0973 | 0.323217570 10 | 21.6054525 |
| EARTH           | 0.9597   | 345.8368 | -2.9979 | 239.8649 | 0.338264430 10 | 22.6112587 |
| JUPITER         | 58.9732  | 178.3363 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)       | 121.0284 | 230.6923 |         |          |                |            |
| BETELGEUSE(R)   | 145.3428 | 213.7798 |         |          |                |            |
| CANOPUS(B)      | 97.1318  | 259.8338 |         |          |                |            |
| ARCTURUS(R)     | 47.3166  | 132.1885 |         |          |                |            |
| RIGIL KENTAURUS | 39.8238  | 270.2522 |         |          |                |            |
| ANTARES(R)      | 10.5986  | 349.8966 |         |          |                |            |
| CAPELLA(R)      | 150.3029 | 135.5282 |         |          |                |            |
| VEGA(B)         | 73.3806  | 69.1693  |         |          |                |            |
| ALDEBARAN(R)    | 166.6726 | 218.1490 |         |          |                |            |
| RIGEL(B)        | 147.2221 | 245.1048 |         |          |                |            |
| GAMMA CRUCIS(R) | 49.0788  | 250.0734 |         |          |                |            |
| SPICA(B)        | 35.4294  | 179.6569 |         |          |                |            |
| ACHERNAR(B)     | 95.6715  | 299.4751 |         |          |                |            |
| DENEK(B)        | 95.4162  | 59.9435  |         |          |                |            |
| PROCYON(B)      | 121.1103 | 200.5934 |         |          |                |            |

STAR DELAY: 2.6941 SEC 689.7014 PULSES DECIMAL = 10. COARSE + 50. FINE  
75.1662 DFG 12 62 PULSES OCTAL CKAH SUB C = 333.0186 FPSTION = 9 1059 SCN = 10

PN 10 PASS 3019 PR23 #0/0 S/W SJ,3 DSS63A RCVR AGC -125.6 FILE 10-1051 RC 06/02/80  
 SPACECRAFT ATTITUDE ON DAY 151 MAY 30, 1980 1200 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPCS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANCAK = 1.7000 RCSEPHAK = 100.0000  
 SPACECRAFT-EARTH DIRECTION: CLAT = -2.9992 CLON = 240.5924  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.2805 CLON = 239.0501

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PN 10 PASS 3019 PR23 #0/0 S/W SJ,3 DSS63A RCVR AGC -125.6 FILE 10-1051 RC 06/02/80  
 SPACECRAFT ATTITUDE ON DAY 151 MAY 30, 1980 1200 GMT  
 SPIN PERIOD = 12.905750 SEC RTLT = 6 HR 17 MIN 55.21 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -2.2805 | 239.0501 | -              | -          |
| SUN             | 1.4414   | 323.4766 | -3.1379 | 240.2102 | 0.324910120 10 | 21.7185909 |
| EARTH           | 1.7000   | 334.9560 | -2.9992 | 240.5924 | 0.339492880 10 | 22.7201123 |
| JUPITER         | 59.0773  | 178.6331 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(R)       | 121.4759 | 230.5664 |         |          |                |            |
| BETELGEUSE(R)   | 145.7070 | 213.2928 |         |          |                |            |
| CANOPUS(B)      | 97.6278  | 259.8428 |         |          |                |            |
| ARCTURUS(R)     | 47.0387  | 132.5754 |         |          |                |            |
| RIGIL KENTAURUS | 46.3063  | 270.1164 |         |          |                |            |
| ANTARES(R)      | 10.5797  | 347.2458 |         |          |                |            |
| CAPELLA(R)      | 150.0452 | 134.7923 |         |          |                |            |
| VEGA(B)         | 72.8877  | 69.1555  |         |          |                |            |
| ALDEBARAN(R)    | 167.0592 | 216.8166 |         |          |                |            |
| RIGEL(B)        | 142.7093 | 244.9827 |         |          |                |            |
| GAMMA CRUCIS(R) | 49.5727  | 250.1253 |         |          |                |            |
| SPICA(B)        | 35.5463  | 180.3393 |         |          |                |            |
| ACHERNAR(B)     | 96.0342  | 299.5150 |         |          |                |            |
| DENEK(B)        | 94.9396  | 59.9614  |         |          |                |            |
| PROCYON(B)      | 121.3887 | 200.3488 |         |          |                |            |

STAR DELAY: 2.6943 SEC 689.7491 PULSES DEGREE = 10. COARSE = 50. FINE  
 75.1572 DEG 12 62 PULSES TOTAL CNAK S/W C = 315.0330 EPSILON = 8.4430 SCN=10

PK 10 PASS 3020 PR23 #070 S/W SJ.3 DSS63A RCVR AGC 123.9 FILE 10-1052 RC 06/02/80  
SPACECRAFT ATTITUDE ON DAY 152 MAY 31, 1980 1200 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPPAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.7483 RCSPPAK = 100.0000

SPACECRAFT-EARTH DIRECTION: CLAT = -3.0000 CLON = 240.6916

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.4753 CLON = 239.0219

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PK 10 PASS 3020 PR23 #070 S/W SJ.3 DSS63A RCVR AGC 123.9 FILE 10-1052 RC 06/02/80  
SPACECRAFT ATTITUDE ON DAY 152 MAY 31, 1980 1200 GMT  
SPIN PERIOD = 12.905880 SEC RILT = 6 HR 16 MIN 5.82 SEC

|                 | CMA      | CRA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -2.4753 | 239.0219 | -              | -          |
| SUN             | 1.3728   | 331.1140 | -3.1379 | 240.2257 | 0.325144190 10 | 21.7342373 |
| EARTH           | 1.7483   | 342.4971 | -3.0000 | 240.6916 | 0.340051990 10 | 22.7307480 |
| JUPITER         | 59.0540  | 178.5148 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 121.3075 | 230.6274 |         |          |                |            |
| BETELGEUSE(R)   | 145.5763 | 213.5068 |         |          |                |            |
| CANOPUS(B)      | 97.4310  | 259.8425 |         |          |                |            |
| ARCTURUS(R)     | 47.1633  | 132.4328 |         |          |                |            |
| RIGIL KENTAURUS | 40.1115  | 270.1491 |         |          |                |            |
| ANTARES(R)      | 10.5660  | 348.2966 |         |          |                |            |
| CAPELLA(R)      | 150.1633 | 135.0651 |         |          |                |            |
| VEGA(B)         | 73.0798  | 69.1675  |         |          |                |            |
| ALDEBARAN(R)    | 166.9192 | 217.4144 |         |          |                |            |
| RIGEL(B)        | 142.5208 | 245.0558 |         |          |                |            |
| GAMMA CRUCIS(R) | 49.3799  | 250.0902 |         |          |                |            |
| SPICA(B)        | 35.5174  | 180.0655 |         |          |                |            |
| ACHERNAR(B)     | 95.8786  | 299.5013 |         |          |                |            |
| DENEK(B)        | 95.1224  | 59.9534  |         |          |                |            |
| PROCYON(B)      | 121.2944 | 200.4529 |         |          |                |            |

STAR DELAY: 2.6944 SEC 689.7587 PULSES ORIGINAL = 10. COARSE + 50. FINE  
75.1575 DEG 12.82 PULSES CITAL (KAP SUB 0 = 322.4715 EPSILON = 0.6427 SCRF10

PN 10 PASS 3020 PR23 #3/5 S/W SJ,3 DSS14A RCVR AGC -120.9 FILE 10-1053 RC 06/02/80

SPACECRAFT ATTITUDE ON DAY 152 MAY 31, 1980 2200 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

NEW ATTITUDE  
POST-PRECSSION

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.2754 RCSPHAK = 260.4800

SPACECRAFT-EARTH DIRECTION: CLAT = -3.0002 CLON = 240.7122

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.8118 CLON = 241.9752

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PN 10 PASS 3020 PR23 #3/5 S/W SJ,3 DSS14A RCVR AGC -120.9 FILE 10-1053 RC 06/02/80

SPACECRAFT ATTITUDE ON DAY 152 MAY 31, 1980 2200 GMT

SPIN PERIOD = 12.902830 SEC RTLT = 6 HR 18 MIN 7.92 SEC

|                 | CNA      | CNA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -2,8118 | 241,9752 | -              | -          |
| SUN             | 1,7742   | 190,6365 | -3,1374 | 240,2209 | 0,325192950 10 | 21,7374967 |
| EARTH           | 1,2754   | 188,5277 | -3,0002 | 240,7122 | 0,340083070 10 | 22,7328523 |
| JUPITER         | 62,0119  | 178,5043 | 0,0000  | 180,0000 | 0,000000000    | 0,0000000  |
| SIRIUS(B)       | 122,8818 | 232,3431 |         |          |                |            |
| BETELGEUSE(R)   | 147,7984 | 216,6425 |         |          |                |            |
| CANOPUS(B)      | 97,6066  | 260,3701 |         |          |                |            |
| ARCTURUS(R)     | 49,4336  | 134,2749 |         |          |                |            |
| RIGIL KENTAURUS | 39,8548  | 266,7566 |         |          |                |            |
| ANTARES(R)      | 7,6132   | 346,4536 |         |          |                |            |
| CAPELLA(R)      | 152,4354 | 131,7060 |         |          |                |            |
| VEGA(B)         | 72,3708  | 70,2000  |         |          |                |            |
| ALDEBARAN(R)    | 168,8663 | 228,0516 |         |          |                |            |
| RIGEL(B)        | 143,3640 | 248,9640 |         |          |                |            |
| GAMMA CRUCIS(R) | 50,1264  | 247,7930 |         |          |                |            |
| SPICA(B)        | 38,4681  | 179,7611 |         |          |                |            |
| ACHERNAR(B)     | 94,1255  | 294,8473 |         |          |                |            |
| DENEK(B)        | 93,9343  | 59,8745  |         |          |                |            |
| PROCYON(B)      | 123,9292 | 201,4655 |         |          |                |            |

STAR DELAY: 2,6748 SEC 684,7553 PULSES DECI= 10, COARSE + 45, FINE  
74,6299 DEG 12 55 PULSES COARSE DATA SUB C = 193,754 PPSILON = 7,5606 SEC=10

PN 10 PAS 26 PR23 4070 S/W SK,0 DSS63A RCVR AGC 23.9 FILE 10-1054 TG 06/10/80  
 SPACECRAFT ATTITUDE ON DAY 158 JUN 6, 1980 1300 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPFAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.2589 RCSPFAK = 280.0500  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.0026 CLON = 240.9388  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.2256 CLON = 241.9304  
 LAST COMS -2.8118

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 PN 10 PASS 3026 PR23 4070 S/W SK,0 DSS63A RCVR AGC 23.9 FILE 10-1054 TG 06/10/80  
 SPACECRAFT ATTITUDE ON DAY 158 JUN 6, 1980 1300 GMT  
 SPIN PERIOD = 12.903920 SEC RTLT = 6 HR 18 MIN 27.89 SEC

|                  | CKA      | CKA      | CLAT    | CLON     | R(KR)          | R(AL)      |
|------------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS      | 0.0000   | 0.0000   | -2.2256 | 241.9304 | -              | -          |
| SUN              | 1.8976   | 208.7733 | -3.1379 | 240.2647 | 0.32573394D 10 | 21.7736591 |
| EARTH            | 1.2589   | 210.1321 | -3.0026 | 240.9388 | 0.34030276D 10 | 22.7528583 |
| JUPITER          | 61.9535  | 178.8136 | 0.0000  | 189.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)        | 123.3176 | 232.0839 |         |          |                |            |
| DEIHELSEUSE(R)   | 142.1089 | 215.8431 |         |          |                |            |
| CANCRUS(B)       | 98.1770  | 260.3484 |         |          |                |            |
| ARCTURUS(R)      | 48.9837  | 134.5995 |         |          |                |            |
| RIGIL PENTAGONUS | 40.4375  | 266.6463 |         |          |                |            |
| ANTARES(R)       | 7.8139   | 342.3710 |         |          |                |            |
| CAPELLA(R)       | 151.9660 | 131.0329 |         |          |                |            |
| VEGA(B)          | 71.8346  | 70.1208  |         |          |                |            |
| ALDEBARAN(R)     | 169.2640 | 225.8085 |         |          |                |            |
| RIGEL(B)         | 143.8943 | 248.0175 |         |          |                |            |
| GAMMA CRUCIS(R)  | 50.6526  | 248.0078 |         |          |                |            |
| SPICA(B)         | 38.4247  | 180.4976 |         |          |                |            |
| ACHERNAR(B)      | 94.6562  | 299.8648 |         |          |                |            |
| DENEBO(B)        | 93.4497  | 59.8940  |         |          |                |            |
| PROCYON(B)       | 124.1002 | 201.0839 |         |          |                |            |

STAR DELAY: 2.6758 SEC 685,0122 PULSES DECIMAL = 10, COARSE + 45, FINE  
 74.6516 DEG 12 55 PULSES TOTAL GRAN SUB C = 201.5069 EPSILON = 7.2669 SCN = 10

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3033

AGC

PN 10 PASS 3033 PR23 ACC S/W SK.0 DSS63A RCVR -123.9 FILE 10-1055 JAG 06/16/80  
SPACECRAFT ATTITUDE ON DAY 165 JUN 13, 1980 00 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

06/16/80

REFERENCE FOR RCSPEAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.9800 RCSPEAK = 291.1200

SPACECRAFT-EARTH DIRECTION: CLAT = -3.0075 CLON = 241.2698

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.2789 CLON = 241.9259

10

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PN 10 PASS 3033 PR23 ACC S/W SK.0 DSS63A RCVR AGC -123.9 FILE 10-1055 JAG 06/16/80  
SPACECRAFT ATTITUDE ON DAY 165 JUN 13, 1980 1100 GMT  
SPIN PERIOD = 12.065140 SEC PULS = 6 PRK 10 MIN 47.56 SEC

|                 | CKA      | CKA      | CLAT    | CLON     | R (KM)         | R (AU)     |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -2.2789 | 241.9259 | -              | -          |
| SUN             | 1.8214   | 208.1772 | -3.1380 | 240.3100 | 0.320543470 10 | 21.8277721 |
| EARTH           | 0.9800   | 228.0407 | -3.0075 | 241.2698 | 0.340674590 10 | 22.7723656 |
| JUPITER         | 61.9501  | 178.7850 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 123.2724 | 232.1029 |         |          |                |            |
| DETELGLUSE(B)   | 148.0740 | 215.9081 |         |          |                |            |
| CANOPUS(B)      | 92.1237  | 260.3469 |         |          |                |            |
| ARCTURUS(B)     | 49.0185  | 134.5640 |         |          |                |            |
| RIGIL KENTAURUS | 58.3840  | 266.8480 |         |          |                |            |
| ANTARES(R)      | 7.6022   | 342.7510 |         |          |                |            |
| CAPELLA(R)      | 152.0032 | 131.1049 |         |          |                |            |
| VEGA(B)         | 71.8863  | 70.1252  |         |          |                |            |
| ALDEBARAN(R)    | 169.2226 | 225.9866 |         |          |                |            |
| RIGEL(B)        | 143.8430 | 248.6382 |         |          |                |            |
| GAMMA CRUCIS(R) | 50.6015  | 247.9947 |         |          |                |            |
| SPICA(B)        | 38.4197  | 180.4302 |         |          |                |            |
| ACHERNAR(P)     | 94.6122  | 299.8621 |         |          |                |            |
| DENEK(B)        | 93.4901  | 59.8924  |         |          |                |            |
| PROCYON(B)      | 124.0708 | 201.1163 |         |          |                |            |

STAR DELAY: 2.6761 SEC 685.0726 PULSES DECIMAL = 10, COARSE + 45, FINE  
74.6511 DEG 12 55 PULSES OCTAL GRAN SUB C = 200.7311 EPSILON = 7.4462 SCN=10

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PN 10 PASS 3039 PR23 1070 S/W SK.0 05563A RCVR AGC -123.9 FILE 10-1056 TS 06/19/80

SPACECRAFT ATTITUDE ON DAY 171 JUN 19, 1980 1100 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR ROSEPHAK IS TOWARD SOUTH ELLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRES = 180 RCOTPOS = 180

AMPLITUDE AND PHASE ANGLE: ROSANGAR = 0.8159 ROSPHAK = 307.4700

SPACECRAFT-EARTH DIRECTION: CLAT = -3.0131 CLON = 241.5467

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.2643 CLON = 241.8711

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PN 10 PASS 3039 PR23 1070 S/W SK.0 05563A RCVR AGC -123.9 FILE 10-1056 TS 06/19/80

SPACECRAFT ATTITUDE ON DAY 171 JUN 19, 1980 1100 GMT

SPIN PERIOD = 12.902249 SEC RFLT = 6 HR 18 MIN 54.41 SEC

|                 | C/A      | C/K      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -2.2643 | 241.8711 | -              | -          |
| SUN             | 1.7405   | 210.1635 | -3.1580 | 240.3641 | 0.327245370 10 | 21.8746905 |
| EARTH           | 0.8159   | 240.6015 | -3.0131 | 241.5467 | 0.340780230 10 | 22.7794271 |
| JUPITER         | 61.8950  | 178.7900 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(R)       | 123.2500 | 232.0665 |         |          |                |            |
| BETELGEUSE(R)   | 148.0381 | 215.8355 |         |          |                |            |
| CANOPUS(B)      | 98.1289  | 260.3306 |         |          |                |            |
| ARCTURUS(R)     | 28.9697  | 134.5308 |         |          |                |            |
| RIGIL KENTAUDUS | 40.3956  | 260.9110 |         |          |                |            |
| ANTARES(R)      | 7.8589   | 342.7003 |         |          |                |            |
| CAPELLA(R)      | 151.9502 | 131.1023 |         |          |                |            |
| VEGA(B)         | 71.0912  | 70.1040  |         |          |                |            |
| ALDEBARAN(R)    | 100.1949 | 225.7250 |         |          |                |            |
| RIGEL(B)        | 143.8300 | 248.5590 |         |          |                |            |
| GAMMA CRUCIS(R) | 50.5945  | 248.0387 |         |          |                |            |
| SPICA(B)        | 38.3051  | 180.4470 |         |          |                |            |
| ACHERNAR(B)     | 94.0521  | 299.8507 |         |          |                |            |
| DENEK(B)        | 93.5129  | 59.8930  |         |          |                |            |
| PROCYON(B)      | 124.0310 | 201.0910 |         |          |                |            |

STAR DELAY: 2.0707 SEC 085.2249 PULSES DECIMAL = 10. COARSE + 45. FINE  
70.6014 CPG 12 55 PULSES OCTAL C/KH SUB C = 202.5198 EPSILON = 7.6437 SCR = 1

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PN 10 PASS 3045 PR23 #070 S/W SK,0 DSS63A RCVR AGC =122.2 FILE 10-1057 TS 06/25/80  
 SPACECRAFT ATTITUDE ON DAY 177 JUN 25,1980 1130 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGPRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.6835 RCSPHAK = 330.5200

SPACECRAFT-EARTH DIRECTION: CLAT = -3.0198 CLON = 241.8128

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.3364 CLON = 241.8198

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 PN 10 PASS 3045 PR23 #070 S/W SK,0 DSS63A RCVR AGC =122.2 FILE 10-1057 TS 06/25/80  
 SPACECRAFT ATTITUDE ON DAY 177 JUN 25,1980 1130 GMT  
 SPIN PERIOD = 12.907220 SEC RTLT = 6 HR 18 MIN 52.72 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -2.3364 | 241.8198 | -              | -          |
| SUN             | 1.6203   | 209.6846 | -3.1381 | 240.4101 | 0.327949680 10 | 21.9217701 |
| EARTH           | 0.6834   | 269.4125 | -3.0198 | 241.8128 | 0.340754980 10 | 22.7777393 |
| JUPITER         | 61.8453  | 178.7488 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 123.1622 | 232.0670 |         |          |                |            |
| BETELGEUSE(R)   | 147.9543 | 215.8789 |         |          |                |            |
| CANOPUS(B)      | 98.0492  | 260.3311 |         |          |                |            |
| ARCTURUS(R)     | 48.9852  | 134.4589 |         |          |                |            |
| RIGIL KENTAURUS | 40.3209  | 266.9647 |         |          |                |            |
| ANTARES(R)      | 7.8869   | 343.3710 |         |          |                |            |
| CAPELLA(R)      | 151.9766 | 131.3219 |         |          |                |            |
| VEGA(R)         | 71.9764  | 70.0948  |         |          |                |            |
| ALDEBARAN(R)    | 169.1075 | 225.7937 |         |          |                |            |
| RIGEL(B)        | 143.7507 | 248.5277 |         |          |                |            |
| GAMMA CRUCIS(R) | 50.5085  | 248.0536 |         |          |                |            |
| SPICA(B)        | 38.3133  | 180.3542 |         |          |                |            |
| ACHERNAR(B)     | 94.6151  | 299.8481 |         |          |                |            |
| DENEK(B)        | 93.6010  | 59.8920  |         |          |                |            |
| PROCYON(B)      | 123.9572 | 201.1225 |         |          |                |            |

STAR DELAY: 2.6771 SEC 685.3460 PULSES DECIMAL = 10. COARSE + 45. FINE  
 74.6689 DFG 12 55 PULSES OCTAL CKAM SUB C # 201.7330 EPSILON# 7.9516 SCN#10

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PN 10 PASS 3052 PR23 #0/0 S/W SK.0 DSS63A RCVR AGC -123.9 FILE 10-1058  
 SPACECRAFT ATTITUDE ON DAY 184 JUL 2, 1980 1030 GMT

07/02/80

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.7294 RCSPHAK = 356.4560

SPACECRAFT-EARTH DIRECTION: CLAT = -3.0290 CLON = 242.1032

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.3696 CLON = 241.7912

PN 10 PASS 3052 PR23 #0/0 S/W SK.0 DSS63A RCVR AGC -123.9 FILE 10-1058  
 SPACECRAFT ATTITUDE ON DAY 184 JUL 2, 1980 1030 GMT  
 SPIN PERIOD = 12.908440 SEC RTLT = 6 HR 18 MIN 40.47 SEC

07/02/80

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -2.3696 | 241.7912 | -              | -          |
| SUN             | 1.5331   | 210.1128 | -3.1381 | 240.4630 | 0.328763590 10 | 21.9761758 |
| EARTH           | 0.7294   | 295.2948 | -3.0290 | 242.1032 | 0.340571340 10 | 22.7654639 |
| JUPITER         | 61.8174  | 178.7295 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 123.1185 | 232.0644 |         |          |                |            |
| BETELGEUSE(R)   | 147.9117 | 215.8938 |         |          |                |            |
| CANOPUS(B)      | 98.0117  | 260.3267 |         |          |                |            |
| ARCTURUS(R)     | 48.9889  | 134.4198 |         |          |                |            |
| RIGIL KENTAURUS | 40.2862  | 266.9951 |         |          |                |            |
| ANTARES(R)      | 7.9049   | 343.6579 |         |          |                |            |
| CAPELLA(R)      | 151.9826 | 131.4023 |         |          |                |            |
| VEGA(B)         | 72.0174  | 70.0885  |         |          |                |            |
| ALDEBARAN(R)    | 169.0638 | 225.8062 |         |          |                |            |
| RIGEL(B)        | 143.7094 | 248.5069 |         |          |                |            |
| GAMMA CRUCIS(R) | 50.4670  | 248.0641 |         |          |                |            |
| SPICA(B)        | 38.2845  | 180.3112 |         |          |                |            |
| ACHERNAR(B)     | 94.6005  | 299.8436 |         |          |                |            |
| DENEK(B)        | 93.6441  | 59.8914  |         |          |                |            |
| PROCYON(B)      | 123.9185 | 201.1352 |         |          |                |            |

STAR DELAY: 2.6775 SEC 685.4509 PULSES DECIMAL = 10. COARSE + 45, FINE  
 74.6733 DEG 12 55 PULSES OCTAL CKAH SUB C = 201.9269 EPSILON = 8.1860 SCN = 10

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SPACECRAFT ATTITUDE ON DAY 192 JUL 10, 1980 1000 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.8985 RCSPHAK = 15.6478

SPACECRAFT-EARTH DIRECTION: CLAT = -3.0413 CLON = 242.4101

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.4126 CLON = 241.7674

PN 10 PASS 3060 PR23 #0/0 S/W SJ,0 DSS63 RCVR AGC -122.2 FILE 10-1059 07/10/80  
SPACECRAFT ATTITUDE ON DAY 192 JUL 10, 1980 1000 GMT  
SPIN PERIOD = 12.909780 SEC RTLT = 6 HR 18 MIN 13.76 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -2.4126 | 241.7674 | -              | -          |
| SUN             | 1.4389   | 210.3071 | -3.1381 | 240.5233 | 0.329696270 10 | 22.0385207 |
| EARTH           | 0.8985   | 315.5874 | -3.0413 | 242.4101 | 0.340170910 10 | 22.7386972 |
| JUPITER         | 61.7947  | 178.7052 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)       | 123.0700 | 232.0685 |         |          |                |            |
| BETELGEUSE(R)   | 147.8673 | 215.9262 |         |          |                |            |
| CANOPUS(B)      | 97.9653  | 260.3235 |         |          |                |            |
| ARCTURUS(R)     | 49.0030  | 134.3779 |         |          |                |            |
| RIGIL KENTAURUS | 40.2420  | 267.0194 |         |          |                |            |
| ANTARES(R)      | 7.9157   | 344.0016 |         |          |                |            |
| CAPELLA(R)      | 151.9992 | 131.4882 |         |          |                |            |
| VEGA(B)         | 72.0659  | 70.0851  |         |          |                |            |
| ALDEBARAN(R)    | 169.0164 | 225.8722 |         |          |                |            |
| RIGEL(B)        | 143.6607 | 248.4973 |         |          |                |            |
| GAMMA CRUCIS(R) | 50.4183  | 248.0680 |         |          |                |            |
| SPICA(B)        | 38.2606  | 180.2559 |         |          |                |            |
| ACHERNAR(B)     | 94.5750  | 299.8393 |         |          |                |            |
| DFNEB(B)        | 93.6932  | 59.8903  |         |          |                |            |
| PROCYON(B)      | 123.8809 | 201.1554 |         |          |                |            |

STAR DELAY: 2.6779 SEC 685.5519 PULSES DECIMAL = 10. COARSE + 46. FINE  
74.6765 DEG 12 56 PULSES OCTAL CKAH SUB C = 201.8570 EPSILON= 8.4501 SCN=10

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PN 10 PASS 3062 PR23 # S/W SK.0 DSS63A RCVR AGC -122.2 FILE 10-1060  
 SPACECRAFT ATTITUDE ON DAY 194 7 12,1980 1000 GMT

07/14/80

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

PRE-PRECESSION

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.9629 RCSPHAK = 19.2630

SPACECRAFT-EARTH DIRECTION: CLAT = -3.0446 CLON = 242.4824

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.4133 CLON = 241.7545

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 PN 10 PASS 3062 PR23 # S/W SK.0 DSS63A RCVR AGC -122.2 FILE 10-1060  
 SPACECRAFT ATTITUDE ON DAY 194 7 12,1980 1000 GMT  
 SPIN PERIOD = 12.910150 SEC RTLT = 6 HR 18 MIN 5.06 SEC

07/14/80

|                  | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|------------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS      | 0.0000   | 0.0000   | -2.4133 | 241.7545 | -              | -          |
| SUN              | 1.4145   | 210.8561 | -3.1382 | 240.5384 | 0.329930380 10 | 22.0541698 |
| EARTH            | 0.9629   | 319.0115 | -3.0446 | 242.4824 | 0.340040570 10 | 22.7299846 |
| JUPITER          | 61.7818  | 178.7042 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)        | 123.0616 | 232.0616 |         |          |                |            |
| BETELGEUSE(R)    | 147.8565 | 215.9144 |         |          |                |            |
| CANOPUS(B)       | 97.9625  | 260.3212 |         |          |                |            |
| ARCTURUS(R)      | 48.9945  | 134.3690 |         |          |                |            |
| RIGIL KESTRAURUS | 40.2407  | 267.0340 |         |          |                |            |
| ANTARES(R)       | 7.9279   | 344.0309 |         |          |                |            |
| CAPELLA(R)       | 151.9911 | 131.5066 |         |          |                |            |
| VEGA(B)          | 72.0709  | 70.0807  |         |          |                |            |
| ALDEBARAN(R)     | 169.0070 | 225.8263 |         |          |                |            |
| RIGEL(B)         | 143.6554 | 248.4808 |         |          |                |            |
| GAMMA CRUCIS(R)  | 50.4129  | 248.0771 |         |          |                |            |
| SPICA(B)         | 38.2477  | 180.2546 |         |          |                |            |
| ACHERNAR(B)      | 94.5809  | 299.8378 |         |          |                |            |
| DENEK(B)         | 93.7002  | 59.8905  |         |          |                |            |
| PROCYON(B)       | 123.8687 | 201.1521 |         |          |                |            |

PRE-PRECESSION

STAR DELAY: 2.6781 SEC 685.5927 PULSES DECIMAL = 10, COARSE + 46, FINE  
 74.6788 DEG 12 56 PULSES OCTAL CKAH SUB C = 202.3357 EPSILON= 8.5204 SCN=10

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PN 10 PASS 3062 PR23 # S/W SK,0 DSS14A RCVR AGC -122.2 FILE 10-1061  
 SPACECRAFT ATTITUDE ON DAY 194 7 12,1980 1900 GMT

07/14/80

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

NEW ATTITUDE  
 POST-PRECESSION

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTIPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.3300 RCSPHAK = 184.5800

SPACECRAFT-EARTH DIRECTION: CLAT = -3.0452 CLON = 242.4956

NEW ATTITUDE  
 POST-PRECESSION

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3751 CLON = 242.4860

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PN 10 PASS 3062 PR23 # S/W SK,0 DSS14A RCVR AGC -122.2 FILE 10-1061  
 SPACECRAFT ATTITUDE ON DAY 194 7 12,1980 1900 GMT  
 SPIN PERIOD = 12.909170 SEC RTLT = 6 HR 18 MIN 3.37 SEC

07/14/80

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3751 | 242.4860 | -              | -          |
| SUN             | 1.9561   | 173.0997 | -3.1382 | 240.5412 | 0.329973820 10 | 22.0570735 |
| EARTH           | 0.3300   | 88.3481  | -3.0452 | 242.4956 | 0.340015250 10 | 22.7282921 |
| JUPITER         | 62.5378  | 178.2456 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| STRIUS(B)       | 122.7441 | 232.8525 |         |          |                |            |
| BETELGEUSE(R)   | 147.8634 | 217.8739 |         |          |                |            |
| CANOPUS(B)      | 97.1360  | 260.4748 |         |          |                |            |
| ARCTURUS(R)     | 50.1930  | 134.2788 |         |          |                |            |
| RIGIL KENTAURUS | 39.3242  | 266.1262 |         |          |                |            |
| ANTARES(R)      | 6.9985   | 349.9699 |         |          |                |            |
| CAPELLA(R)      | 153.1954 | 131.7220 |         |          |                |            |
| VEGA(B)         | 72.7294  | 70.4388  |         |          |                |            |
| ALDEBARAN(R)    | 168.7630 | 231.8875 |         |          |                |            |
| RIGEL(B)        | 143.0158 | 249.8943 |         |          |                |            |
| GAMMA CRUCIS(R) | 49.8009  | 247.2435 |         |          |                |            |
| SPICA(B)        | 38.9838  | 179.0926 |         |          |                |            |
| ACHERNAR(B)     | 93.3830  | 299.8855 |         |          |                |            |
| DENEK(B)        | 94.1653  | 59.6508  |         |          |                |            |
| PROCYON(B)      | 124.1946 | 201.9745 |         |          |                |            |

NEW ATTITUDE  
 POST-PRECESSION

NEW ATTITUDE  
 POST-PRECESSION

STAR DELAY: 2.6724 SEC 684.1300 PULSES DECIMAL = 10, COARSE + 44, FINE  
 74.5252 DEG 12 54 PULSES OCTAL CKAH SUB C = 165.9661 EPSILON= 7.1336 SCN=10

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PN 10 PASS 3067 PR23 #00/00 S/W SKO - DSS63A RCVR AGC -123.9 FILE 10-1062 JOR  
SPACECRAFT ATTITUDE ON DAY 199 JUL 17, 1980 1000 GMT

07/22/80

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTIPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.3684 RCSPHAK = 159.8500

SPACECRAFT-EARTH DIRECTION: CLAT = -3.0534 CLON = 242.6614

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3824 CLON = 242.4954

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PN 10 PASS 3067 PR23 #00/00 S/W SKO DSS63A RCVR AGC -123.9 FILE 10-1062 JOR  
SPACECRAFT ATTITUDE ON DAY 199 JUL 17, 1980 1000 GMT  
SPIN PERIOD = 12.909910 SEC RILT = 6 HR 17 MIN 40.15 SEC

07/22/80

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3824 | 242.4954 | -              | -          |
| SUN             | 1.9317   | 172.7932 | -3.1382 | 240.5760 | 0.330514810 10 | 22.0932360 |
| EARTH           | 0.3684   | 63.2517  | -3.0534 | 242.6614 | 0.339667220 10 | 22.7050281 |
| JUPITER         | 62.5473  | 178.2405 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)       | 122.7439 | 232.8607 |         |          |                |            |
| BETELGEUSE(R)   | 147.8662 | 217.8928 |         |          |                |            |
| CANCRUS(B)      | 97.1304  | 260.4767 |         |          |                |            |
| ARCTURUS(R)     | 50.2047  | 134.2806 |         |          |                |            |
| RIGIL KENTAURUS | 39.3175  | 266.1148 |         |          |                |            |
| ANTIARES(R)     | 6.9880   | 350.0160 |         |          |                |            |
| CAPELLA(R)      | 153.2070 | 131.7184 |         |          |                |            |
| VEGA(B)         | 72.7332  | 70.4428  |         |          |                |            |
| ALDEBARAN(R)    | 168.7630 | 231.9477 |         |          |                |            |
| RIGEL(B)        | 143.0122 | 249.9098 |         |          |                |            |
| GAMMA CRUCIS(R) | 49.7978  | 247.2344 |         |          |                |            |
| SPICA(B)        | 38.9932  | 179.0843 |         |          |                |            |
| ACHERNAR(B)     | 93.3720  | 299.8863 |         |          |                |            |
| DENEK(B)        | 94.1670  | 59.8505  |         |          |                |            |
| PROCYON(B)      | 124.2005 | 201.9820 |         |          |                |            |

STAR DELAY: 2.6725 SEC 084.1523 PULSES DECIMAL = 10. COARSE + 44. FINE  
74.5233 DEG 12 54 PULSES OCTAL CKAH SUB C = 165.6046 EPSILON = 7.1886 SCN = 10

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OK

PN 10 PASS 3073 PR23 #070 S/W SK,0 DSS63 RCVR AGC -120,4 FILE 10-1063 BD 07/25/80  
SPACECRAFT ATTITUDE ON DAY 205 JUL 23,1980 0900 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTIPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,4766 RCSPHAK = 131,6800

SPACECRAFT-EARTH DIRECTION: CLAT = -3,0646 CLON = 242,8391

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3,3493 CLON = 242,4561

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PN 10 PASS 3073 PR23 #070 S/W SK,0 DSS63 RCVR AGC -120,4 FILE 10-1063 BD 07/25/80  
SPACECRAFT ATTITUDE ON DAY 205 JUL 23,1980 0900 GMT  
SPIN PERIOD = 12,910880 SEC RTLT = 6 HR 17 MIN 4,99 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -3,3493 | 242,4561 | -              | -          |
| SUN             | 1,8447   | 173,4831 | -3,1382 | 240,6206 | 0,33121135D 10 | 22,1397961 |
| EARTH           | 0,4766   | 36,6564  | -3,0646 | 242,8391 | 0,33914013D 10 | 22,6697948 |
| JUPITER         | 62,5072  | 178,2548 | 0,0000  | 180,0000 | 0,00000000     | 0,0000000  |
| SIRIUS(B)       | 122,7466 | 232,8255 |         |          |                |            |
| BETELGEUSE(R)   | 147,8556 | 217,8106 |         |          |                |            |
| CANOPUS(B)      | 97,1565  | 260,4689 |         |          |                |            |
| ARCTURUS(R)     | 50,1537  | 134,2742 |         |          |                |            |
| RIGIL KENTAURUS | 39,3479  | 266,1629 |         |          |                |            |
| ANTARES(R)      | 7,0324   | 349,8044 |         |          |                |            |
| CAPELLA(R)      | 153,1562 | 131,7303 |         |          |                |            |
| VEGA(B)         | 72,7151  | 70,4256  |         |          |                |            |
| ALDEBARAN(R)    | 168,7648 | 231,6874 |         |          |                |            |
| RIGEL(B)        | 143,0298 | 249,8435 |         |          |                |            |
| GAMMA CRUCIS(R) | 49,8132  | 247,2735 |         |          |                |            |
| SPICA(B)        | 38,9536  | 179,1222 |         |          |                |            |
| ACHERNAR(B)     | 93,4203  | 299,8830 |         |          |                |            |
| DENEK(B)        | 94,1580  | 59,8519  |         |          |                |            |
| PROCYON(B)      | 124,1766 | 201,9489 |         |          |                |            |

STAR DELAY: 2,6730 SEC 684,2756 PULSES DECIMAL = 10, COARSE + 44, FINE  
74,5311 DEG 12 54 PULSES OCIAL CKAH SUB C = 166,0924 EPSILON= 7,3907 SCN=10

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PN 10 PASS 3083 PR23 #070 S/W SK.0 DSS14A RCVR AGC -125.6 FILE 10-1064 GN  
 SPACECRAFT ATTITUDE ON DAY 215 AUG 2, 1980 1300 GMT

08/05/80

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.7832 RCSPHAK = 118.7600

SPACECRAFT-EARTH DIRECTION: CLAT = -3.0855 CLON = 243.1062

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3799 CLON = 242.3793

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 PN 10 PASS 3083 PR23 #070 S/W SK.0 DSS14A RCVR AGC -125.6 FILE 10-1064 GN  
 SPACECRAFT ATTITUDE ON DAY 215 AUG 2, 1980 1300 GMT  
 SPIN PERIOD = 12.912590 SEC RILT = 6 HR 15 MIN 53.41 SEC

08/05/80

|                 | CMA      | CKA      | CLAT    | CLON     | R(KM)          | R(AL)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3799 | 242.3793 | -              | -          |
| SUN             | 1.6976   | 171.8653 | -3.1383 | 240.6963 | 0.332398460 10 | 22.2191484 |
| EARTH           | 0.7832   | 22.0625  | -3.0855 | 243.1062 | 0.338067090 10 | 22.5980675 |
| JUPITER         | 62.4315  | 178.2331 | 0.0000  | 186.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(R)       | 122.6759 | 232.7936 |         |          |                |            |
| BETELGEUSE(R)   | 147.7762 | 217.7699 |         |          |                |            |
| CANOPUS(R)      | 97.1136  | 260.4555 |         |          |                |            |
| ARCTURUS(R)     | 56.1271  | 134.2060 |         |          |                |            |
| RIGIL KENTAUROS | 39.3123  | 266.2453 |         |          |                |            |
| ANTARES(R)      | 7.1026   | 350.1508 |         |          |                |            |
| CAPPELLA(R)     | 157.1250 | 131.6790 |         |          |                |            |
| VEGA(R)         | 72.7697  | 70.4019  |         |          |                |            |
| ALDEBARAN(R)    | 168.0932 | 231.4769 |         |          |                |            |
| RTGEL(B)        | 142.9746 | 249.7575 |         |          |                |            |
| GAMMA CRUCIS(R) | 49.7553  | 247.3186 |         |          |                |            |
| SPIGA(B)        | 38.8774  | 179.0762 |         |          |                |            |
| ACHERNAR(B)     | 93.4319  | 299.6736 |         |          |                |            |
| DENEK(B)        | 94.2230  | 59.8511  |         |          |                |            |
| PROCYON(B)      | 124.0940 | 201.9442 |         |          |                |            |

STAR DELAY: 2.6738 SEC 684.4887 PULSES DECIMAL = 10, COARSE + 44, FINE  
 70.5445 DEG 12 54 PULSES OCTAL CMAH SUB C = 164.1137 EPSILON = 7.7517 SCN=1

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PN 10 PASS 3087 PR23 #0/0 S/W SK.0 D5543A RCVR AGC -127.2 FILE 10-1065 TG 08/13/80  
 SPACECRAFT ATTITUDE ON DAY 219 AUG 6, 1980 1830 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.8751 RCSPHAK = 114.9500  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.0947 CLON = 243.1978  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3654 CLON = 242.3643

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PN 10 PASS 3087 PR23 #0/0 S/W SK.0 D5543A RCVR AGC -127.2 FILE 10-1065 TG 08/13/80  
 SPACECRAFT ATTITUDE ON DAY 219 AUG 6, 1980 1830 GMT  
 SPIN PERIOD = 12.913320 SEC RTLT = 6 HR 15 MIN 20.08 SEC

| S/C +Z AXIS      | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|------------------|----------|----------|---------|----------|----------------|------------|
| SUN              | 0.0000   | 0.0000   | -3.3654 | 242.3643 | -              | -          |
| EARTH            | 0.8751   | 17.9981  | -3.1383 | 240.7276 | 0.332891710 10 | 22.2521197 |
| JUPITER          | 0.4160   | 179.2995 | -3.0946 | 243.1978 | 0.337567490 10 | 22.5646718 |
| SATURN           | 0.2774   | 202.7734 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| ARCTICUS (A)     | 147.7733 | 217.7362 |         |          |                |            |
| CANCER (B)       | 97.1255  | 260.4525 |         |          |                |            |
| SCORPIO (E)      | 53.1013  | 130.2025 |         |          |                |            |
| SIGIL KENTAURUS  | 39.3258  | 268.0676 |         |          |                |            |
| ANTARES (H)      | 7.1190   | 351.1560 |         |          |                |            |
| ARIELA (I)       | 133.1072 | 131.2010 |         |          |                |            |
| VEGA (B)         | 72.7010  | 70.8981  |         |          |                |            |
| ALCERAN (R)      | 108.5952 | 131.6722 |         |          |                |            |
| SPICA (B)        | 142.0830 | 246.7313 |         |          |                |            |
| GAMMA CRUCIS (R) | 48.7829  | 247.3243 |         |          |                |            |
| SPICA (B)        | 38.8622  | 179.1951 |         |          |                |            |
| ACHERAS (R)      | 63.4520  | 252.8704 |         |          |                |            |
| DENER (R)        | 54.2180  | 59.5517  |         |          |                |            |
| PROCYON (B)      | 124.2856 | 251.4304 |         |          |                |            |

STAR DELAY: 2.0740 SFC 684.5502 PULSES DECIMAL = 10. COARSE + 45. FINE  
 74.5475 DDB 12.55 PULSES TOTAL CKAH SUB C = 164.2610 EPSILON = 7.8744 SCN = 10

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PN 10 PASS 3194 PR23 #0/0 S/W SK.2 DSS63A RCVR AGC 122.2 FILE 10-1066 TG 08/13/80  
 SPACECRAFT ATTITUDE ON DAY 226 AUG 13, 1980 0800 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANG4K = 0.9326 RCSPHAK = 112.4300  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.1095 CLON = 243.3161  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3530 CLON = 242.4145

PN 10 PASS 3194 PR23 #0/0 S/W SK.3 DSS63A RCVR AGC -122.2 FILE 10-1066 TG 08/13/80  
 SPACECRAFT ATTITUDE ON DAY 226 AUG 13, 1980 0800 GMT  
 SPIN PERIOD = 12.914540 SEC RTLT = 6 HR 14 MIN 25.02 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3530 | 242.4145 | -              | -          |
| SUN             | 1.6498   | 172.5714 | -3.1363 | 240.7761 | 0.333659180 10 | 22.3034211 |
| EARTH           | 0.9326   | 15.1094  | -3.1095 | 243.3161 | 0.335742160 10 | 22.5095027 |
| JUPITER         | 62.4657  | 178.2497 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 122.7180 | 232.5231 |         |          |                |            |
| BETELGEUSE(B)   | 147.5205 | 217.7722 |         |          |                |            |
| CANOPUS(B)      | 97.1450  | 280.4814 |         |          |                |            |
| ARCTURUS(B)     | 50.1273  | 134.2447 |         |          |                |            |
| BIGL KENTAURUS  | 39.3415  | 258.2103 |         |          |                |            |
| ANTARES(B)      | 7.0727   | 349.3986 |         |          |                |            |
| CAPPELLA(B)     | 150.1313 | 131.7341 |         |          |                |            |
| VEGA(B)         | 72.7325  | 71.4114  |         |          |                |            |
| ALDEBARAN(B)    | 168.7361 | 231.5324 |         |          |                |            |
| RIGEL(B)        | 143.0120 | 249.7809 |         |          |                |            |
| GAMMA CRUCIS(B) | 49.7537  | 247.3123 |         |          |                |            |
| SPICA(B)        | 38.9120  | 179.1144 |         |          |                |            |
| ACHERNAR(B)     | 93.4373  | 299.8733 |         |          |                |            |
| DEIN B(B)       | 94.1921  | 50.3519  |         |          |                |            |
| PROCYON(B)      | 124.1366 | 231.4382 |         |          |                |            |

STAR DELAY: 2.6740 SEC 684.5335 PULSES DECIMAL = 10. COARSE + 45. FINE  
 74.5386 DEG 12 53 PULSES OCTAL QKAH SUB C = 164.0969 EPSILON = 7.8745 SCN = 10

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FIMMEL

PN 10 PASS 3 B PR23 #0/0 S/W SK,0 DSS14A RCVR AGC - 2.2 FILE 10-1067 BD 08/18/80  
SPACECRAFT ATTITUDE ON DAY 230 AUG 17,1980 0700 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C. PRE-PRECESSION  
REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.0015 RCSPHAK = 111.7500  
SPACECRAFT-EARTH DIRECTION: CLAT = -3.1186 CLON = 243.3728  
SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3650 CLON = 242.4005

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PN 10 PASS 3098 PR23 #0/0 S/W SK,0 DSS14A RCVR AGC -122.2 FILE 10-1067 BD 08/18/80  
SPACECRAFT ATTITUDE ON DAY 230 AUG 17,1980 0700 GMT  
SPIN PERIOD = 12.915150 SEC RTLT = 6 HR 13 MIN 50.45 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3650 | 242.4005 | -              | -          |
| SUN             | 1.6088   | 171.9476 | -3.1383 | 240.8052 | 0.334121440 10 | 22.3343209 |
| EARTH           | 1.0015   | 14.2123  | -3.1186 | 243.3728 | 0.336223990 10 | 22.4748656 |
| JUPITER         | 62.4521  | 178.2424 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 122.7006 | 232.7998 |         |          |                |            |
| BETELGEUSE(R)   | 147.8021 | 217.7729 |         |          |                |            |
| CANOPUS(B)      | 97.1318  | 260.4591 |         |          |                |            |
| ARCTURUS(R)     | 50.1261  | 134.2286 |         |          |                |            |
| RIGIL KENTAURUS | 39.3286  | 266.2260 |         |          |                |            |
| ANTARES(R)      | 7.0844   | 350.0046 |         |          |                |            |
| CAPELLA(R)      | 153.1309 | 131.8296 |         |          |                |            |
| VEGA(B)         | 72.7495  | 70.4077  |         |          |                |            |
| ALDEHARAN(R)    | 168.7180 | 231.5143 |         |          |                |            |
| RIGEL(B)        | 142.9959 | 249.7782 |         |          |                |            |
| GAMMA CRUCIS(R) | 49.7772  | 247.3084 |         |          |                |            |
| SPICA(B)        | 38.8982  | 179.0984 |         |          |                |            |
| ACHERNAR(B)     | 93.4343  | 299.8764 |         |          |                |            |
| DENEK(B)        | 94.1995  | 59.8515  |         |          |                |            |
| PROCYON(B)      | 124.1192 | 201.9414 |         |          |                |            |

STAR DELAY: 2.6742 SEC 684.5919 PULSES DECIMAL = 10. COARSE + 45. FINE  
74.5409 DEG 12 55 PULSES OCTAL CKAH SUB C = 163.9655 EPSILON = 7.9821 SCAN = 10

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PN 10 PASS 3098 PR23 #X77 S/W SK,0 DSS14A RCVR AGC =125.6 FILE 10-1068 RS  
 SPACECRAFT ATTITUDE ON DAY 230 AUG 17,1980 1600 GMT

08/17/80

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

NEW ATTITUDE  
 POST- PRECESSION

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.7637 RCSPHAK = 112,0000

SPACECRAFT-EARTH DIRECTION: CLAT = -3.1195 CLON = 243.3775

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3362 CLON = 242.6440

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PN 10 PASS 3098 PR23 #X77 S/W SK,0 DSS14A RCVR AGC =125.6 FILE 10-1068 RS  
 SPACECRAFT ATTITUDE ON DAY 230 AUG 17,1980 1600 GMT  
 SPIN PERIOD = 12.915150 SEC RTLT = 6 HR 13 MIN 47.13 SEC

08/18/80

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3362 | 242.6440 | -              | -          |
| SUN             | 1.8438   | 173.8926 | -3.1383 | 240.8079 | 0.334165230 10 | 22.3372480 |
| EARTH           | 0.7637   | 16.4624  | -3.1195 | 243.3775 | 0.336174280 10 | 22.4715428 |
| JUPITER         | 62.6942  | 178.2754 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SATURN(R)       | 122.8703 | 232.9277 |         |          |                |            |
| BTTELGEUSE(R)   | 148.0117 | 217.9890 |         |          |                |            |
| CANOPUS(B)      | 97.2004  | 260.5028 |         |          |                |            |
| ARCTURUS(R)     | 58.2754  | 134.4045 |         |          |                |            |
| RIGIL KENTAURUS | 39.3739  | 265.9468 |         |          |                |            |
| ANTARES(R)      | 6.8503   | 349.4320 |         |          |                |            |
| CAPELLA(R)      | 153.2710 | 131.4462 |         |          |                |            |
| VEGA(R)         | 72.6400  | 70.4903  |         |          |                |            |
| ALDEBARAN(R)    | 168.8905 | 232.4064 |         |          |                |            |
| RIGEL(R)        | 143.1064 | 250.0829 |         |          |                |            |
| GAMMA CRUCIS(R) | 49.8979  | 247.1429 |         |          |                |            |
| SPICA(B)        | 39.1409  | 179.1527 |         |          |                |            |
| ACHERNAR(B)     | 93.3301  | 299.9039 |         |          |                |            |
| DENEK(R)        | 94.0525  | 59.8516  |         |          |                |            |
| PROCYON(B)      | 124.3554 | 201.9994 |         |          |                |            |

STAR DELAY: 2.6726 SEC 684.1898 PULSES DECIMAL = 10. COARSE + 44. FINE  
 74.4972 DEG 12 54 PULSES OCTAL CKAH SUB C = 166.4998 EPSILON= 7.3928 SCN=10

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PN 10 PASS 3702 PR23 #070 S/W SK.0 DSS14A RCVR AGC -127.22 FILE 10-1069 JAG 08/22/80  
 SPACECRAFT ATTITUDE ON DAY 234 AUG 21, 1980 1730 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON ~~RIGHT~~ SIDE OF S/C.

REFERENCE FOR RCSPEAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.8158 RCSPEAK = 109.1020

SPACECRAFT-EARTH DIRECTION: CLAT = -3.1290 CLON = 243.4229

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3314 CLON = 242.0313

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PN 10 PASS 3702 PR23 #070 S/W SK.0 DSS14A RCVR AGC -127.22 FILE 10-1069 JAG 08/22/80  
 SPACECRAFT ATTITUDE ON DAY 234 AUG 21, 1980 1730 GMT  
 SPIN PERIOD = 12.915760 SEC MTLT = 6 HR 13 MIN 10.87 SEC

|                 | CIA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3314 | 242.0313 | -              | -          |
| SUN             | 1.8011   | 173.8983 | -3.1383 | 240.8377 | 0.334639700 10 | 22.3689639 |
| EARTH           | 0.8158   | 14.3426  | -3.1290 | 243.4229 | 0.335630720 10 | 22.4352086 |
| JUPITER         | 62.6814  | 178.2770 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 122.8665 | 232.9188 |         |          |                |            |
| BETELGEUSE(R)   | 148.0046 | 217.9697 |         |          |                |            |
| CANOPUS(B)      | 97.2031  | 260.5004 |         |          |                |            |
| ARCTURUS(B)     | 50.2631  | 130.3950 |         |          |                |            |
| RIGIL KENTHAUS  | 39.3778  | 265.9619 |         |          |                |            |
| ANTARES(R)      | 4.8636   | 349.4115 |         |          |                |            |
| CAPELLA(R)      | 153.2590 | 131.4580 |         |          |                |            |
| VEGA(B)         | 72.6397  | 70.4854  |         |          |                |            |
| ALDEBARAN(R)    | 168.8866 | 232.3397 |         |          |                |            |
| RIGEL(B)        | 143.1065 | 250.0641 |         |          |                |            |
| GAMMA CRUCIS(R) | 49.8974  | 247.1535 |         |          |                |            |
| SPICA(B)        | 39.1282  | 179.1576 |         |          |                |            |
| ACHERNAR(B)     | 53.3486  | 299.9027 |         |          |                |            |
| DENEK(B)        | 94.0547  | 59.8518  |         |          |                |            |
| PROCYON(B)      | 124.3455 | 201.9924 |         |          |                |            |

STAR DELAY: 2.6728 SEC 684.2443 PULSES DECIMAL = 10. COARSE + 44. FINE  
 74.4996 LFG 12 54 PULSES CITAL CKAN SUP C = 166.4033 EPSILON = 7.4950 SCN = 10

PN 10 PASS 3 0 PR23 #070 S/W SK.0 DSS63A RCVR AGC - 3.9 FILE 10-1070 JG  
 SPACECRAFT ATTITUDE ON DAY 242 -AUG 29,1980 0700 GMT

09/02/80

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR ROSEPEX IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGHRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.8240 RCSPHAK = 107.0200

SPACECRAFT-EARTH DIRECTION: CLAT = -3.1470 CLON = 243.4754

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3251 CLON = 242.0696

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PN 10 PASS 3110 PR23 #070 S/W SK.0 DSS63A RCVR AGC -125.9 FILE 10-1070 JG  
 SPACECRAFT ATTITUDE ON DAY 242 AUG 29,1980 0700 GMT  
 SPIN PERIOD = 12.917110 SEC ROT = 6 HR 12 MIN 2.77 SEC

09/02/80

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3251 | 242.0696 | -              | -          |
| SUN             | 1.7832   | 174.0397 | -3.1384 | 240.8934 | 0.335926500 10 | 22.4284425 |
| EARTH           | 0.8240   | 12.4507  | -3.1470 | 243.4754 | 0.334609980 10 | 22.3669773 |
| JUPITER         | 22.7194  | 178.2830 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SITLS(R)        | 122.8045 | 232.5301 |         |          |                |            |
| BETELGEUSE(R)   | 148.0386 | 216.9016 |         |          |                |            |
| CANOPUS(B)      | 57.2156  | 260.5073 |         |          |                |            |
| ACETELDUS(R)    | 56.2854  | 134.4276 |         |          |                |            |
| RIGHT HEPTAGRAM | 30.3558  | 265.9103 |         |          |                |            |
| ANTARES(R)      | 6.8272   | 349.5035 |         |          |                |            |
| CAPELLA(R)      | 153.2705 | 131.3951 |         |          |                |            |
| VEGA(B)         | 72.0211  | 70.4902  |         |          |                |            |
| ALDEBARAN(R)    | 168.9108 | 232.4706 |         |          |                |            |
| RIGEL(B)        | 143.1255 | 250.1113 |         |          |                |            |
| GAMMA CRUCIS(R) | 46.9180  | 247.1282 |         |          |                |            |
| SPICA(B)        | 30.1663  | 179.1603 |         |          |                |            |
| ACHELLUS(B)     | 62.3350  | 298.9070 |         |          |                |            |
| DRAB(B)         | 94.0301  | 59.0520  |         |          |                |            |
| PROCYON(B)      | 124.3432 | 202.0004 |         |          |                |            |

STAR DELAY: 2.6729 SEC 684.2529 PULSES DECIMAL = 10. COARSE + 44. FINE  
 74.4527 DEC 12 54 PULSES DECIMAL CRAM SUB C = 100.5011 EPSILON = 7.5385 SCR=10

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PN 10 PASS 117 PR23 #070 S/W SK,0 DSS63P RCVR AGC -123.9 FILE 10-1071 RS  
 SPACECRAFT ATTITUDE ON DAY 249 SEP 50,1980 0936 GMT

09/06/80

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.8412 RCSPHAK = 106,5720

SPACECRAFT-EARTH DIRECTION: CLAT = -3.1638 CLON = 243,4859

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3250 CLON = 242,6590

PN 10 PASS 3117 PR23 #070 S/W SK,0 DSS63P RCVR AGC -123.9 FILE 10-1071 RS  
 SPACECRAFT ATTITUDE ON DAY 249 SEP 50,1980 0936 GMT  
 SPIN PERIOD = 12,918330 SEC RTLT = 6 HR 10 MIN 58,82 SEC

09/06/80

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -3,3250 | 242,6590 | -              | -          |
| SUN             | 1,7218   | 173,6283 | -3,1384 | 240,9446 | 0,336352200 10 | 22,4834350 |
| EARTH           | 0,8412   | 11,0235  | -3,1638 | 243,4859 | 0,333651400 10 | 22,3029011 |
| JUPITER         | 62,7088  | 178,2823 | 0,0000  | 180,0000 | 0,000000000    | 0,0000000  |
| SIRIUS(B)       | 122,8882 | 232,9319 |         |          |                |            |
| BETELGEUSE(R)   | 148,0303 | 217,9904 |         |          |                |            |
| CANCORUS(B)     | 97,2140  | 260,5053 |         |          |                |            |
| ARCTURUS(R)     | 50,2779  | 134,4207 |         |          |                |            |
| RIGIL KENTAURUS | 39,3861  | 265,9305 |         |          |                |            |
| ANTARES(R)      | 6,8377   | 349,3180 |         |          |                |            |
| CAPELLA(R)      | 153,2724 | 131,4101 |         |          |                |            |
| VEGA(B)         | 72,6245  | 70,4944  |         |          |                |            |
| ALDEBARAN(R)    | 168,9085 | 232,4327 |         |          |                |            |
| RIGIL(B)        | 143,1220 | 250,0974 |         |          |                |            |
| GAMMA CRUCIS(R) | 49,9140  | 247,1358 |         |          |                |            |
| SPICA(B)        | 39,1557  | 179,1676 |         |          |                |            |
| ACHERNAR(B)     | 93,3404  | 299,9059 |         |          |                |            |
| DENE(B)         | 94,0353  | 59,6520  |         |          |                |            |
| PROCYON(B)      | 124,3735 | 201,9970 |         |          |                |            |

STAR DELAY: 2,6732 SEC 684,3353 PULSES DECIMAL = 10, COARSE + 44, FINE  
 74,4947 DEG 12 54 PULSES OCTAL CKAH SUB C = 166,1379 EPSILON = 7,6904 SCN = 10

PN 10 PASS 3120 PR23 #070 S/W SK,0 DSS63A RCVR AGC =122,2 FILE 10=1072 RS  
 SPACECRAFT ATTITUDE ON DAY 252 SEP 80,1980 0630 GMT

09/08/80

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,8303 RCSPHAK = 106,3850

SPACECRAFT-EARTH DIRECTION: CLAT = -3,1706 CLON = 243,4796

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3,3247 CLON = 242,6624

PN 10 PASS 3120 PR23 #070 S/W SK,0 DSS63A RCVR AGC =122,2 FILE 10=1072 RS  
 SPACECRAFT ATTITUDE ON DAY 252 SEP 8,1980 0630 GMT  
 SPIN PERIOD = 12,918820 SEC RTLT = 6 HR 10 MIN 33,61 SEC

09/08/80

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -3,3247 | 242,6624 |                |            |
| SUN             | 1,7045   | 173,7735 | -3,1384 | 240,9653 | 0,336687240 10 | 22,5058316 |
| EARTH           | 0,8303   | 10,6757  | -3,1706 | 243,4796 | 0,333273470 10 | 22,2776384 |
| JUPITER         | 62,7122  | 178,2827 | 0,0000  | 180,0000 | 0,00000000     | 0,0000000  |
| SIRIUS(B)       | 122,8905 | 232,9338 |         |          |                |            |
| BETELGEUSE(R)   | 148,0332 | 217,9936 |         |          |                |            |
| CANOPUS(B)      | 97,2148  | 260,5060 |         |          |                |            |
| ARCTURUS(R)     | 50,2800  | 134,4231 |         |          |                |            |
| RIGIL KENTAURUS | 39,3866  | 265,9266 |         |          |                |            |
| ANTARES(R)      | 6,8344   | 349,3109 |         |          |                |            |
| CARELLA(R)      | 153,2745 | 131,4049 |         |          |                |            |
| VEGA(B)         | 72,6231  | 70,4956  |         |          |                |            |
| ALDEBARAN(R)    | 168,9108 | 232,4458 |         |          |                |            |
| RIGEL(B)        | 143,1234 | 250,1017 |         |          |                |            |
| GAMMA CRUCIS(R) | 49,9156  | 247,1335 |         |          |                |            |
| SPICA(B)        | 39,1591  | 179,1682 |         |          |                |            |
| ACHERNAR(B)     | 93,3389  | 299,9063 |         |          |                |            |
| DENEK(B)        | 94,0334  | 59,8520  |         |          |                |            |
| PROCYON(B)      | 124,3767 | 201,9979 |         |          |                |            |

STAR DELAY: 2,6733 SEC 684,3556 PULSES DECIMAL = 10, COARSE + 44, FINE  
 74,4940 DFG 12 54 PULSES OCTAL CKAH SUB C = 166,0394 EPSILON= 7,7340 SCN=10

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PN 10 PASS 3129 PR23 #070 S/W SK,0 DSS63A RCVR AGC =125.6 FILE 10-1073 PS  
 SPACECRAFT ATTITUDE ON DAY 261 SEP 17,1980 2230 GMT

09/18/80

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPFAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRHS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.7992 RCSPFAK = 105.9600.

SPACECRAFT-EARTH DIRECTION: CLAT = -3.1928 CLON = 243.4232

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3274 CLON = 242.6342

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PN 10 PASS 3129 PR23 #070 S/W SK,0 DSS63A RCVR AGC =125.6 FILE 10-1073 PS  
 SPACECRAFT ATTITUDE ON DAY 261 SEP 17,1980 2230 GMT  
 SPIN PERIOD = 12.920400 SEC KILT = 6 HR 9 MIN 13.17 SEC

09/18/80

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3274 | 242.6342 | -              | -          |
| SUN             | 1.6079   | 173.2954 | -3.1384 | 241.0349 | 0.337812750 10 | 22.5810062 |
| EARTH           | 0.7992   | 9.6763   | -3.1928 | 243.4232 | 0.332067700 10 | 22.1970388 |
| JUPITER         | 62.6841  | 178.2792 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)       | 122.8713 | 232.9187 |         |          |                |            |
| BETELGEUSE(R)   | 148.0093 | 217.9676 |         |          |                |            |
| CANOPUS(B)      | 97.2075  | 260.5009 |         |          |                |            |
| ARCTURUS(R)     | 50.2623  | 134.4032 |         |          |                |            |
| RIGIL KENTAURUS | 39.3819  | 265.9590 |         |          |                |            |
| ANTARES(R)      | 6.8616   | 349.3748 |         |          |                |            |
| CAPELLA(R)      | 153.2579 | 131.4488 |         |          |                |            |
| VEGA(B)         | 72.6350  | 70.4859  |         |          |                |            |
| ALDEBARAN(R)    | 168.8914 | 232.3389 |         |          |                |            |
| RIGEL(B)        | 143.1112 | 250.0600 |         |          |                |            |
| GAMMA CRUCIS(R) | 49.9021  | 247.1528 |         |          |                |            |
| SPICA(B)        | 39.1309  | 179.1627 |         |          |                |            |
| ACHEKNAR(B)     | 93.3506  | 299.9051 |         |          |                |            |
| DENEK(B)        | 94.0499  | 59.6520  |         |          |                |            |
| PROCYON(B)      | 124.3496 | 201.9908 |         |          |                |            |

STAR DELAY: 2.6738 SEC 684.4861 PULSES DECIMAL = 10. COARSE + 44. FINE  
 74.4991 DEG 12 54 PULSES CITAL CKAH SUB C = 165.3111 EPSILON = 7.9844 SCN = 10

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PN 10 PASS 3137 PR23 #0/0 S/W SK,0 DSS63A RCVR AGC 25.6 FILE 10-1074 PS  
 SPACECRAFT ATTITUDE ON DAY 269 SEP 25, 1980 0230 GMT

09/26/80

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.6667 RCSPHAK = 105.9800

SPACECRAFT-EARTH DIRECTION: CLAT = -3.2085 CLON = 243.5219

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3269 CLON = 242.6647

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PN 10 PASS 3137 PR23 #0/0 S/W SK,0 DSS63A RCVR AGC -125.6 FILE 10-1074 PS  
 SPACECRAFT ATTITUDE ON DAY 269 SEP 25, 1980 0230 GMT  
 SPIN PERIOD = 12.921750 SEC RTLT = 6 HR 8 MIN 19.49 SEC

09/26/80

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3269 | 242.6647 | -              | -          |
| SUN             | 1.5871   | 173.2241 | -3.1384 | 241.0864 | 0.338651230 10 | 22.6371143 |
| EARTH           | 0.6667   | 10.2101  | -3.2085 | 243.5219 | 0.331263020 10 | 22.1432500 |
| JUPITER         | 62.7146  | 178.2817 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)       | 122.8901 | 232.9360 |         |          |                |            |
| BETELGEUSE(R)   | 148.0336 | 217.9988 |         |          |                |            |
| CANOPUS(B)      | 97.2130  | 260.5064 |         |          |                |            |
| ARCTURUS(R)     | 50.2833  | 134.4233 |         |          |                |            |
| RIGIL KENTARUS  | 39.3846  | 265.9237 |         |          |                |            |
| ANTARES(R)      | 6.8317   | 349.3257 |         |          |                |            |
| CAPELLA(R)      | 153.2777 | 131.4045 |         |          |                |            |
| VEGA(B)         | 72.6244  | 70.4967  |         |          |                |            |
| ALDEBARAN(R)    | 168.9104 | 232.4622 |         |          |                |            |
| RIGEL(B)        | 143.1221 | 250.1058 |         |          |                |            |
| GAMMA CRUCIS(R) | 49.9144  | 247.1311 |         |          |                |            |
| SPICA(B)        | 39.1614  | 179.1657 |         |          |                |            |
| ACHERNAR(B)     | 93.3359  | 299.9064 |         |          |                |            |
| DENEK(B)        | 94.0341  | 59.8519  |         |          |                |            |
| PROCYON(B)      | 124.3780 | 202.0000 |         |          |                |            |

STAR DELAY: 2.6739 SEC 084.5065 PULSES DECIMAL = 10. COARSE + 45. FINE  
 74.4936 SEC 12 55 PULSES OCTAL CNAH SUB C = 165.1843 EPSILON = 8.0398 SCN = 10

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PN 10 PASS 3144 PR23 #0/0 S/W SK.0 DSS14 RCVR C -122.2 FILE 10-1075 PD 10/02/80  
 SPACECRAFT ATTITUDE ON DAY 276 OCT 2, 1980 0630 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.5268 RCSPHAK = 105.4000

SPACECRAFT-EARTH DIRECTION: CLAT = -3.2232 CLON = 243.1953

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3155 CLON = 242.0757

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PN 10 PASS 3144 PR23 #0/0 S/W SK.0 DSS14 RCVR ALC -122.2 FILE 10-1075 PD 10/02/80  
 SPACECRAFT ATTITUDE ON DAY 276 OCT 2, 1980 0630 GMT  
 SPIN PERIOD = 12.922970 SEC RTLT = 6 HR / MIN 33.16 SEC

|                 | CRA      | CRA      | CLAT    | CLON     | R(KM)          | R(AL)     |
|-----------------|----------|----------|---------|----------|----------------|-----------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3155 | 242.0757 | -              | -         |
| SUN             | 1.5460   | 173.4677 | -3.1304 | 241.1375 | 0.339487090 10 | 22.692907 |
| EARTH           | 0.5268   | 10.0703  | -3.2232 | 243.1953 | 0.330568530 10 | 22.096826 |
| JUPITER         | 62.7253  | 178.2824 | 0.0000  | 180.0000 | 0.00000000     | 0.000000  |
| SIRIUS(B)       | 122.9059 | 232.9379 |         |          |                |           |
| BETELGEUSE(R)   | 148.0493 | 217.9959 |         |          |                |           |
| CANOPUS(B)      | 97.2261  | 260.5082 |         |          |                |           |
| ARCTURUS(R)     | 50.2828  | 134.4371 |         |          |                |           |
| RTGIL KENTAUUS  | 39.3928  | 265.9120 |         |          |                |           |
| ANTARES(R)      | 6.8230   | 349.2154 |         |          |                |           |
| CAPELLA(R)      | 153.2764 | 131.3737 |         |          |                |           |
| VEGA(B)         | 72.6100  | 70.4994  |         |          |                |           |
| ALDEBARAN(B)    | 168.9262 | 232.4720 |         |          |                |           |
| RIGEL(B)        | 143.1366 | 250.1150 |         |          |                |           |
| GAMMA CIRCIS(R) | 49.9293  | 247.1269 |         |          |                |           |
| SPICA(B)        | 39.1723  | 179.1805 |         |          |                |           |
| ACHERNAR(B)     | 93.3403  | 299.9080 |         |          |                |           |
| DENEK(B)        | 94.0187  | 59.8523  |         |          |                |           |
| PROCYON(B)      | 124.3925 | 201.9962 |         |          |                |           |

STAR DELAY: 2.6740 SEC 684.5548 PULSES DECIMAL = 10. COARSE + 45. FINE  
 74.4918 DEG 12 55 PULSES CITAL CRAH SUB C = 165.3170 EPSILON = 8.1507 SCN =

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RN 10 PASS 3151 PR23 #070 S/A SKU DSS63A RCVR AGC -125.6 FILE 10-1076 RC 10/09/80

SPACECRAFT ATTITUDE ON DAY 283 OCT 9, 1980 0000 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.3759 RCSPHAK = 107.5700

SPACECRAFT-EARTH DIRECTION: CLAT = -3.2363 CLON = 243.0416

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3119 CLON = 242.6727

RN 10 PASS 3151 PR23 #070 S/A SKU DSS63A RCVR AGC -125.6 FILE 10-1076 RC 10/09/80

SPACECRAFT ATTITUDE ON DAY 283 OCT 9, 1980 0500 GMT

SPIN PERIOD = 12.924190 SEC RTLT = 6 HR 6 MIN 56.71 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | H(KM)          | H(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3119 | 242.6727 | -              | -          |
| SUN             | 1.4938   | 173.3740 | -3.1385 | 241.1867 | 0.340296060 10 | 22.7470628 |
| EARTH           | 0.3759   | 11.5881  | -3.2363 | 243.0416 | 0.330022300 10 | 22.0603142 |
| JUPITER         | 62.7221  | 178.2901 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)       | 122.8049 | 232.9347 |         |          |                |            |
| BETELGEUSE(R)   | 148.0492 | 217.9882 |         |          |                |            |
| CANOPUS(B)      | 97.2201  | 260.5076 |         |          |                |            |
| ARCTURUS(R)     | 50.2781  | 134.4373 |         |          |                |            |
| RIGIL KENTAURUS | 39.4001  | 265.9158 |         |          |                |            |
| AKTARES(R)      | 6.8266   | 349.1905 |         |          |                |            |
| CAPPELLA(B)     | 153.2717 | 131.3733 |         |          |                |            |
| VEGA(B)         | 72.6076  | 70.4979  |         |          |                |            |
| ALDEBARAN(R)    | 168.9272 | 232.4484 |         |          |                |            |
| RIGEL(B)        | 143.1388 | 250.1094 |         |          |                |            |
| GAMMA CRUCIS(R) | 49.9314  | 247.1302 |         |          |                |            |
| SPICA(B)        | 30.1692  | 179.1847 |         |          |                |            |
| ACHERNAR(B)     | 53.3449  | 299.9078 |         |          |                |            |
| DENEK(B)        | 94.0171  | 59.8524  |         |          |                |            |
| PROCYON(B)      | 124.3911 | 201.9930 |         |          |                |            |

STAR DELAY: 2.6743 SEC 684.6252 PULSES DECIMAL = 10, COARSE + 45, FINE  
74.4924 DEG 12 55 PULSES OCTAL, CKAH SUB C = 165.0791 EPSILON = 8,2949 SCN=10

CALL

13.8

NO CONVERGED SOLUTION FOR THIS SET OF INPUT DATA

PW 10

FILE 10 - 10 77

MBF 11

PN 10 PASS 3162 PR23 #0/0 S/W SK.0 DSS63P RCVP AGC -125.6 FILE 10-1078 RS  
 SPACECRAFT ATTITUDE ON DAY 294 OCT 20, 1980 0430 GMT

10/21/80

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPLS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.7698 RCSPHAK = 193.8360 PRE-PRECESSION

SPACECRAFT-EARTH DIRECTION: CLAT = -3.2540 CLON = 242.7427

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.9791 CLON = 242.4837

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PN 10 PASS 3162 PR23 #0/0 S/W SK.0 DSS63P RCVP AGC -125.6 FILE 10-1078 RS  
 SPACECRAFT ATTITUDE ON DAY 294 OCT 20, 1980 0430 GMT  
 SPIN PERIOD = 12.926020 SEC RTLT = 6 HR 6 MIN 19.80 SEC

10/21/80

|                  | CMA      | CKA      | CLAT    | CLON     | R (KM)         | P (AU)  |
|------------------|----------|----------|---------|----------|----------------|---------|
| S/C +Z AXIS      | 0.0000   | 0.0000   | -3.9791 | 242.4837 | -              | -       |
| SUN              | 1.4793   | 145.4094 | -3.1385 | 291.2641 | 0.341575990 10 | 22.8326 |
| EARTH            | 0.7698   | 70.3705  | -3.2540 | 242.7427 | 0.329466820 10 | 22.0231 |
| JUPITER          | 62.5556  | 177.2237 | 0.0000  | 100.0000 | 0.000000000    | 0.0000  |
| SIRIUS (S)       | 122.2605 | 233.0829 |         |          |                |         |
| RETFLOUSE (R)    | 147.4875 | 218.6211 |         |          |                |         |
| CANCRUS (R)      | 96.5399  | 260.4864 |         |          |                |         |
| ARCTURUS (R)     | 50.6251  | 133.0295 |         |          |                |         |
| RIGIL KENTAUROS  | 38.7214  | 266.0783 |         |          |                |         |
| ANTARES (R)      | 6.9212   | 354.3789 |         |          |                |         |
| CAPELLA (R)      | 153.6418 | 132.5352 |         |          |                |         |
| VEGA (R)         | 73.2995  | 70.4996  |         |          |                |         |
| ALDERABAN (R)    | 168.2805 | 233.6773 |         |          |                |         |
| PIGEL (R)        | 142.4473 | 250.1623 |         |          |                |         |
| GAMMA CRUCIS (R) | 49.2434  | 247.0450 |         |          |                |         |
| SPICA (R)        | 38.2949  | 178.3464 |         |          |                |         |
| ACHERNAR (R)     | 92.8605  | 299.8623 |         |          |                |         |
| DENEK (R)        | 94.6838  | 59.8273  |         |          |                |         |
| PROCYON (S)      | 123.9646 | 202.3522 |         |          |                |         |

PRE-PRECESSION

STAR DELAY: 2.6755 SEC 684.9169 PULSES DECIMAL = 10. COARSE + 45. FINE  
 74.5136 DEG 12 55 PULSES OCTAL CKAH SJB C = 137.0739 EPSILON = 8.3356 SC

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PN 10 PASS 3162 PR23 #4/4 S/W SK.0 DSS63P RCVR GC -125.6 FILE 10-1079 RS 10/21/80  
 SPACECRAFT ATTITUDE ON DAY 294 OCT 20, 1980 0800 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPFAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180 NEW ATTITUDE  
 POST-PRECESSION

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.1342 RCSPHAK = 160.1480

SPACECRAFT-EARTH DIRECTION: CLAT = -3.2542 CLUN = 242.7383

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.6363 CLUN = 241.6685

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PN 10 PASS 3162 PR23 #4/4 S/W SK.0 DSS63P RCVR AGC -125.6 FILE 10-1079 RS 10/21/80  
 SPACECRAFT ATTITUDE ON DAY 294 OCT 20, 1980 0800 GMT  
 SPIN PERIOD = 12.926510 SEC RTILT = 6 HR 6 MIN 19.36 SEC

|                  | CNA      | CKA      | CLAT    | CLUN     | R (KM)         | R (AU)    |
|------------------|----------|----------|---------|----------|----------------|-----------|
| S/C +Z AXIS      | 0.0000   | 0.0000   | -3.6363 | 241.6685 | -              | -         |
| SUN              | 0.6403   | 128.9761 | -3.1385 | 241.2651 | 0.341592990 10 | 22.833750 |
| EARTH            | 1.1342   | 19.6553  | -3.2542 | 242.7383 | 0.329462410 10 | 22.022980 |
| JUPITER          | 61.7306  | 178.0415 | 0.0000  | 180.0000 | 0.00000000     | 0.000000  |
| SIPIUS (B)       | 122.0415 | 232.4014 |         |          |                |           |
| BETELGEUSE (R)   | 147.0575 | 217.3675 |         |          |                |           |
| CANOPUS (B)      | 96.7424  | 260.3322 |         |          |                |           |
| ARCTURUS (R)     | 49.8150  | 133.5836 |         |          |                |           |
| RIGIL KENTAURIUS | 39.0149  | 267.0570 |         |          |                |           |
| ANTARES (R)      | 7.7666   | 352.8546 |         |          |                |           |
| CAPELLA (R)      | 152.8377 | 133.2098 |         |          |                |           |
| VEGA (B)         | 73.2504  | 70.1807  |         |          |                |           |
| ALDERAPAN (R)    | 168.0440 | 229.5648 |         |          |                |           |
| RIGEL (B)        | 142.4845 | 248.9602 |         |          |                |           |
| GAMMA CRUCIS (R) | 49.2472  | 247.7516 |         |          |                |           |
| SPICA (R)        | 33.1730  | 178.6954 |         |          |                |           |
| ACHERNAR (R)     | 93.5624  | 299.7847 |         |          |                |           |
| DENEB (B)        | 94.8011  | 59.8458  |         |          |                |           |
| PROCYON (B)      | 123.3401 | 201.8828 |         |          |                |           |

NEW ATTITUDE  
 POST-PRECESSION

STAR DELAY: 2.6811 SEC 686.3600 PULSES DECIMAL = 10. COARSE + 46. FINE  
 74.6678 DEG 12 56 PULSES OCTAL CKAH SJB C = 117.7674 EPSILON=11.2087 SCN

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1-111

PN 10 PASS 3174 PR23 #070 S/W SK.0 CSS14 RCVR AGC -125.6 FILE 10-10E1 BD  
 SPACECRAFT ATTITUDE ON DAY 307 NOV 2, 1980 0400 GMT

11/03/80

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPFAK IS TOWARD SOUTH ELLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.7162 RCSPFAK = 195.1900  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.2693 CLON = 242.3188  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.8446 CLON = 241.0915

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PN 10 PASS 3174 PR23 #070 S/W SK.0 CSS14 RCVR AGC -125.6 FILE 10-10E1 BD  
 SPACECRAFT ATTITUDE ON DAY 307 NOV 2, 1980 0400 GMT  
 SPIN PERIOD = 12.927000 SEC MILT = 6 HR 6 MIN 14.19 SEC

11/03/80

|                  | CKA      | CKA      | CLAT    | CLON     | R (KM)         | R (AU)     |
|------------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS      | 0.0000   | 0.0000   | -3.8446 | 241.0915 | -              | -          |
| SUN              | 0.8883   | 127.1979 | -3.1385 | 241.3549 | 0.343088560 10 | 22.9337213 |
| EARTH            | 0.7162   | 53.4373  | -3.2693 | 242.3188 | 0.329384930 10 | 22.0177092 |
| JUPITER          | 61.9604  | 177.9488 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| STRIUS (R)       | 122.0113 | 232.6956 |         |          |                |            |
| BETELGEUSE (R)   | 147.1067 | 217.8468 |         |          |                |            |
| CANCPUS (R)      | 96.5743  | 260.3765 |         |          |                |            |
| ARCTURUS (R)     | 50.1193  | 133.6129 |         |          |                |            |
| RIGIL KENTAURUS  | 38.8188  | 266.7825 |         |          |                |            |
| ANTARES (R)      | 7.5220   | 354.2249 |         |          |                |            |
| CAPELLA (R)      | 153.1414 | 133.1767 |         |          |                |            |
| VEGA (R)         | 73.3711  | 70.2792  |         |          |                |            |
| ALDEBARAN (R)    | 168.0260 | 231.0154 |         |          |                |            |
| RIGEL (R)        | 142.3890 | 249.3415 |         |          |                |            |
| GAMMA CRUCIS (R) | 49.1392  | 247.5200 |         |          |                |            |
| SPICA (R)        | 38.4006  | 178.4531 |         |          |                |            |
| ACHERNAR (R)     | 93.2710  | 299.8046 |         |          |                |            |
| DENEK (R)        | 94.8694  | 59.8353  |         |          |                |            |
| PROCYON (R)      | 123.4685 | 202.0797 |         |          |                |            |

STAR DELAY: 2.6796 SEC 685.9794 PULSES DECIMAL = 10. COARSE + 46. FINE  
 74.6235 DEG 12 56 PULSES OCTAL CKAH SUB C = 116.9464 EPSILON=10.2515 SCN=10

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SPC CRAFT ATTITUDE ON DAY 312 NOV 7, 1980 0400 GMT

RC REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C,

REFERENCE FOR RCSPFAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.6138 RCSPHAK = 211.5200

SPACECRAFT-EARTH DIRECTION: CLAT = -3.2733 CLON = 242.1404

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.8512 CLON = 241.9331

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PN 10 PASS 3180 PR23 4070 S/W SKO CSS14A KCVR AGC -126.4 FILE 10-1082 RC 11/10/80  
SPACECRAFT ATTITUDE ON DAY 312 NOV 7, 1980 0400 GMT  
SPIN PERIOD = 12.927850 SEC RTLT = 6 HR 6 MIN 24.49 SEC

|                 | CNA      | LKA      | CLAT    | CLON     | R(KM)          | R(AL)     |
|-----------------|----------|----------|---------|----------|----------------|-----------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.8512 | 241.9331 | -              | -         |
| SUN             | 0.8957   | 127.2926 | -3.1585 | 241.5896 | 0.34367109E 10 | 22.97288E |
| EARTH           | 0.6138   | 70.2916  | -3.2733 | 242.1404 | 0.32453426E 10 | 22.02802E |
| JUPITER         | 62.0021  | 177.9489 | 0.0000  | 180.0000 | 0.00000000     | 0.000000  |
| STRIUS(B)       | 122.0312 | 232.7216 |         |          |                |           |
| BETELGEUSE(R)   | 147.1354 | 217.8970 |         |          |                |           |
| CANOPUS(B)      | 96.5747  | 260.3841 |         |          |                |           |
| ARCTURUS(R)     | 50.1527  | 135.6370 |         |          |                |           |
| RIGIL KENTAURUS | 38.8146  | 266.7333 |         |          |                |           |
| ANTARES(R)      | 7.4801   | 354.2457 |         |          |                |           |
| CAPELLA(R)      | 153.1746 | 135.1286 |         |          |                |           |
| VEGA(B)         | 73.3633  | 70.2943  |         |          |                |           |
| ALDEBARAN(R)    | 168.0469 | 231.1901 |         |          |                |           |
| RIGEL(B)        | 142.3775 | 249.3977 |         |          |                |           |
| GAMMA CRUCIS(R) | 49.1491  | 247.4874 |         |          |                |           |
| SPICA(B)        | 38.4423  | 178.4490 |         |          |                |           |
| ACHERNAR(B)     | 53.2447  | 299.8092 |         |          |                |           |
| DENEK(B)        | 94.8543  | 59.8347  |         |          |                |           |
| PROCYON(B)      | 123.5045 | 202.0968 |         |          |                |           |

STAR DELAY: 2.6795 SEC 085.9543 PULSES DECIMAL = 10. COARSE + 46. FINE  
74.6159 DEG 12 56 PULSES OCTAL CKAH SUB C = 117.0750 EPSILON=10.2170 SCN:

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PN 10 PASS 188 PR23 #0/0 S/W SK.0 DSS63A RCVR AGC -127.2 FILE 10-1083 TG 11/17/80  
 SPACECRAFT ATTITUDE ON DAY 319 NOV 14, 1980 00 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPUS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.5647 RCSPHAK = 249.4000

SPACECRAFT-EARTH DIRECTION: CLAT = -3.2774 CLON = 241.8563

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.7814 CLON = 242.1113

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PN 10 PASS 3188 PR23 #0/0 S/W SK.0 DSS63A RCVR AGC -127.2 FILE 10-1083 TG 11/17/80  
 SPACECRAFT ATTITUDE ON DAY 319 NOV 14, 1980 2000 GMT  
 SPIN PERIOD = 12.929190 SEC RTLT = 6 HR 6 MIN 54.69 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | P(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.7814 | 242.1113 | -              | -          |
| SUN             | 0.9267   | 136.0888 | -3.1385 | 241.4427 | 0.344564140 10 | 23.0323623 |
| EARTH           | 0.5647   | 116.7996 | -3.2774 | 241.8563 | 0.329991960 10 | 22.0582861 |
| JUPITER         | 62.1773  | 178.0011 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 122.1943 | 232.7957 |         |          |                |            |
| BETELGEUSE(R)   | 147.3185 | 217.9932 |         |          |                |            |
| CANOPUS(B)      | 96.6732  | 260.4150 |         |          |                |            |
| ARCTURUS(R)     | 50.2251  | 133.7961 |         |          |                |            |
| RIGIL KENTAURUS | 38.8947  | 266.5299 |         |          |                |            |
| ANTARES(P)      | 7.3107   | 353.5775 |         |          |                |            |
| CAPELLA(R)      | 153.2446 | 132.7886 |         |          |                |            |
| VEGA(B)         | 73.2377  | 70.3493  |         |          |                |            |
| ALDEBARAN(R)    | 168.2124 | 231.6561 |         |          |                |            |
| RIGEL(B)        | 142.5051 | 249.5943 |         |          |                |            |
| GAMMA CRUCIS(R) | 49.2817  | 247.3808 |         |          |                |            |
| SPICA(B)        | 38.6182  | 178.5544 |         |          |                |            |
| ACHERNAR(B)     | 93.2168  | 299.8318 |         |          |                |            |
| DENERB(B)       | 94.7046  | 59.8366  |         |          |                |            |
| PROCYON(B)      | 123.6954 | 202.1101 |         |          |                |            |

STAR DELAY: 2.6787 SEC 685.7416 PULSES DECIMAL = 10. COARSE + 46. FINE  
 74.5850 DEG 12 56 PULSES OCTAL CKAH SUB C = 125.9846 EPSILON=10.1042 SCN=10

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PN 10 PASS 3194 PR23 #070 S/W SK,0 DSS43P RCVR AGC 123.9 FILE 10-1084 RS 11/21/80  
 SPACECRAFT ATTITUDE ON DAY 326 NOV 21,1980 1300 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C,

REFERENCE FOR RCSFFAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.6639 RCSPHAK = 280.0940

SPACECRAFT-EARTH DIRECTION: CLAT = -3.2786 CLON = 241.6020

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3725 CLON = 242.2603

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PN 10 PASS 3194 PR23 #070 S/W SK,0 DSS43P RCVR AGC 123.9 FILE 10-1084 RS 11/21/80  
 SPACECRAFT ATTITUDE ON DAY 326 NOV 21,1980 1300 GMT  
 SPIN PERIOD = 12.930410 SEC RTLT = 6 HR 7 MIN 35.87 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3725 | 242.2603 |                |            |
| SUN             | 0.8047   | 163.1148 | -3.1385 | 241.4892 | 0.345345440 10 | 23.0845882 |
| EARTH           | 0.6639   | 171.8932 | -3.2786 | 241.6020 | 0.330609270 10 | 22.0995501 |
| JUPITER         | 62.3125  | 178.2280 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 122.8099 | 232.7252 |         |          |                |            |
| BETELGEUSE(R)   | 147.6868 | 217.6385 |         |          |                |            |
| CANOPUS(B)      | 97.1012  | 260.4338 |         |          |                |            |
| ARCTURUS(R)     | 50.0341  | 134.1320 |         |          |                |            |
| RIGIL KENTAURUS | 39.3121  | 266.3876 |         |          |                |            |
| ANTARES(R)      | 7.2209   | 350.2466 |         |          |                |            |
| CAPELLA(R)      | 153.0430 | 132.0363 |         |          |                |            |
| VEGA(B)         | 72.8026  | 70.3594  |         |          |                |            |
| ALDEBARAN(R)    | 168.6246 | 230.9850 |         |          |                |            |
| RIGEL(B)        | 142.9403 | 249.5995 |         |          |                |            |
| GAMMA CRUCIS(R) | 49.7164  | 247.4070 |         |          |                |            |
| SPICA(B)        | 38.7585  | 179.0780 |         |          |                |            |
| ACHERNAR(B)     | 92.4975  | 299.8606 |         |          |                |            |
| DENEB(B)        | 94.2763  | 59.8520  |         |          |                |            |
| PROCYON(B)      | 123.9866 | 201.9026 |         |          |                |            |

STAR DELAY: 2.6783 SEC 685.6334 PULSES DECIMAL = 10. COARSE + 46. FINE  
 74.5662 DEG 12 56 PULSES CITAL CNAH SUB C = 152,5572 EPSILON=10.5576 SCN=

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PALJRP, MP1, R10, 17447

IBM 360/67 TSS 9.0 PTF07R

BSN=0315 LOGON AT 04:53 ON 12/01/80

CZATC999 YOU HAVE MAIL FROM: SYSOPER0

CALL MAINSS

NO CONVERGED SOLUTION FOR THIS SET OF INPUT DATA

10-1085-

NO SOLUTION

LEFT

SIDE

PALJRP,COMP1,R10,17447

IBM 360/67 TSS 9.0 PTE078

DSN=1363 LOGON AT 05:52 ON 12/03/80

THE SYSTEM WILL BE SPLIT AT 1500 TODAY TO RUN PAYROLL ON OS.

CZAT0999 YOU HAVE MAIL FROM: SYSLEPER

CALL MAINSF

NO CONVERGED SOLUTION FOR THIS SET OF INPUT DATA

FILE # 1-10-80

PRE-PRECESSION

PRE-PRECESSION

PN 10 PASS 3206 PR23 W0/11 S/W SK.0 DSS43A RCVR AGC -130.2 FILE 10-1087 TS 12/03/80  
 SPACECRAFT ATTITUDE ON DAY 358 DEC 3, 1980 1100 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ELLIPTIC POLE.

NEW ATTITUDE  
 POST- PRECESSION

ROLL REFERENCE PARAMETERS: RCSPHAKS = 0 RCSPHOS = 180

AMPLITUDE AND PHASE ANGLE: RCSPHAK = 0.6559 RCSPHAK = 89.6000

SPACECRAFT EARTH DIRECTION: CLAT = -3.2761 CLON = 241.1521

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.4766 CLON = 240.5265

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PN 10 PASS 3206 PR23 W0/11 S/W SK.0 DSS43A RCVR AGC -130.2 FILE 10-1087 TS 12/03/80  
 SPACECRAFT ATTITUDE ON DAY 358 DEC 3, 1980 1100 GMT  
 SPIN PERIOD = 12.926870 SLL PULS = 6 HR 9 MIN 23.34 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | H(KM)          | H(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.4766 | 240.5265 |                |            |
| SUN             | 1.0955   | 17.9532  | -3.1387 | 241.5704 | 0.346732600 10 | 23.1773128 |
| EARTH           | 0.6559   | 17.7769  | -3.2761 | 241.1521 | 0.332220120 10 | 22.2072273 |
| JUPITER         | 60.5261  | 170.0372 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(R)       | 121.4653 | 231.8028 |         |          |                |            |
| BETELGEUSE(R)   | 146.2393 | 210.0067 |         |          |                |            |
| CANCRUS(B)      | 96.7064  | 260.1252 |         |          |                |            |
| ARCTURUS(R)     | 49.9178  | 130.0942 |         |          |                |            |
| RIGIL KENTAUHUS | 30.1293  | 260.3966 |         |          |                |            |
| ANTARES(R)      | 8.9174   | 550.6614 |         |          |                |            |
| CAPELLA(R)      | 151.9323 | 134.4398 |         |          |                |            |
| VEGA(R)         | 73.4905  | 69.7737  |         |          |                |            |
| ALDEBARAN(R)    | 167.3890 | 225.1453 |         |          |                |            |
| RIGEL(B)        | 142.2095 | 277.4409 |         |          |                |            |
| GAMMA CRUCIS(R) | 48.9723  | 240.0465 |         |          |                |            |
| SFICIA(B)       | 37.0300  | 170.7996 |         |          |                |            |
| ACHENAR(B)      | 94.2662  | 294.0515 |         |          |                |            |
| CFRER(B)        | 95.2353  | 59.8086  |         |          |                |            |
| PROCYON(B)      | 122.3398 | 201.4445 |         |          |                |            |

STAR DELAY: 2.6886 SEC 688.2771 PULSES DECIMAL = 10, COARSE + 48, FINE  
 74.8742 SEC 12 60 PULSES OCTAL CNAH SUB C = 8.4171 EPSILON 9.5161 SCN=10

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PN 10 PASS 3210 FR23 #0/0 S/W SK.0 DSS43P RCVR AGC -122.2 FILE 10-1088 BD  
 SPACECRAFT ATTITUDE ON DAY 342 DEC 7, 1980 1100 GMT

12/ /80

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRHS = 0 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.4528 RCSPHAK = 74.8050  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.2730 CLON = 240.9689  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.1844 CLON = 240.5242

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PN 10 PASS 3210 FR23 #0/0 S/W SK.0 DSS43P RCVR AGC -122.2 FILE 10-1088 BD  
 SPACECRAFT ATTITUDE ON DAY 342 DEC 7, 1980 1100 GMT  
 SPIN PERIOD = 12.934510 SEC KTLT = 6 FR 10 MIN 21.52 SEC

12/08/80

|                  | CIA      | CKA      | CLAT    | CLON     | R (KM)         | R (AU)     |
|------------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS      | 0.0000   | 0.0000   | -3.1844 | 240.5242 |                |            |
| SUN              | 1.0796   | 2.3902   | -3.1387 | 241.0044 | 0.347314620 10 | 23.2102179 |
| EARTH            | 0.4528   | 340.0991 | -3.2730 | 240.9689 | 0.335092270 10 | 22.2655261 |
| JUPITER          | 60.5742  | 170.2017 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS (R)       | 121.6963 | 231.0903 |         |          |                |            |
| HELENGEISE (R)   | 146.4087 | 215.7090 |         |          |                |            |
| CANOPUS (R)      | 56.9930  | 200.1173 |         |          |                |            |
| ARCTURUS (R)     | 48.7024  | 133.0000 |         |          |                |            |
| RIGIL KENTAUHI   | 39.4213  | 260.4095 |         |          |                |            |
| ANTARES (R)      | 8.9610   | 350.0456 |         |          |                |            |
| CAPELLA (R)      | 151.7210 | 134.1110 |         |          |                |            |
| VEGA (R)         | 73.2172  | 69.7400  |         |          |                |            |
| ALDEBARAN (R)    | 167.5527 | 224.2011 |         |          |                |            |
| RIGEL (R)        | 142.4783 | 247.2900 |         |          |                |            |
| GAMMA CRUCIS (R) | 49.2430  | 240.7400 |         |          |                |            |
| SPICA (R)        | 37.0000  | 179.1007 |         |          |                |            |
| ACHERNAR (R)     | 94.5012  | 299.0023 |         |          |                |            |
| DEHEDE (R)       | 94.5030  | 89.0017  |         |          |                |            |
| PROCYON (R)      | 122.4000 | 201.2710 |         |          |                |            |

STAR DELAY: 2.0000 SEC 0-0.5034 ROLDSO DELTAL = 10. CLANOF + 0. PINE  
 78.0000 SEC 12.61 ROLDSO DELTAL CLAN OF 0 = 0.01750 PPS1000 = 9.5098 CLAN210

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PK 10 PASS 3216 PR23 40/C S/W SK.0 DSS63A RCVR AC -123.9- FILE 10-1089  
 SPACECRAFT ATTITUDE ON DAY 348 DEC 13, 1980 0000 GMT

12/15/80

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR ROSEFAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASHSCRRS = 0 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: ROSANGAK = 0.2708 ROSEFAK = 49.5770  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.2090 CLON = 240.0079  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.0000 CLON = 240.0000

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PK 10 PASS 3216 PR23 40/C S/W SK.0 DSS63A RCVR AC -123.9- FILE 10-1089  
 SPACECRAFT ATTITUDE ON DAY 348 DEC 13, 1980 0000 GMT  
 SPIN PERIOD = 12.532370 SEC RTOT = 6 MIN 11 SEC 20.92 SEC

12/15/80

|                 | CRX      | CRY      | CLAT    | CLON     | R (KM)         | R (AU)     |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.0000 | 240.0000 | -              | -          |
| SUN             | 1.0271   | 357.0457 | -3.1004 | 241.0352 | 0.34784350E 10 | 23.2515749 |
| EARTH           | 0.2708   | 317.4775 | -3.2090 | 240.0079 | 0.33398204E 10 | 22.3250428 |
| JUPITER         | 67.8570  | 178.2031 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(R)       | 121.0254 | 231.0970 |         |          |                |            |
| BETELGEUSE(R)   | 146.5341 | 215.0009 |         |          |                |            |
| CAPPELLA(B)     | 97.1051  | 269.1300 |         |          |                |            |
| ARCTICUS(R)     | 78.0074  | 133.1540 |         |          |                |            |
| RIGIL KENTAURO  | 30.5021  | 200.3109 |         |          |                |            |
| ANTARES(R)      | 6.5553   | 350.1439 |         |          |                |            |
| CAPPELLA(R)     | 151.7100 | 133.0775 |         |          |                |            |
| VEGA(R)         | 73.0959  | 69.7607  |         |          |                |            |
| ALDEBARAN(R)    | 107.7213 | 224.1499 |         |          |                |            |
| RIGEL(R)        | 102.0119 | 207.3001 |         |          |                |            |
| GAMMA CRUCIS(R) | 49.3057  | 248.7104 |         |          |                |            |
| SPICA(B)        | 37.1049  | 179.3239 |         |          |                |            |
| ACHERNAR(R)     | 60.5053  | 299.0700 |         |          |                |            |
| CERES(B)        | 94.0557  | 59.0843  |         |          |                |            |
| PROCYON(B)      | 122.5577 | 201.2507 |         |          |                |            |

STAR DELAY: 2.6095 SEC 088.5124 PULSES DECIMAL = 10, COARSE + 49, FINE  
 70.0000 UFG 12 01 PULSES TOTAL CRAX SUN C = 347.2965 EPSILON = 9.7493 SCN=10

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PN 10 PASS 3221 PR23 #0/0 S/W SK.0 DSS63 RCVR AGC =120.4 FILE 10-1090  
SPACECRAFT ATTITUDE ON DAY 352 DEC 17, 1980 2300 GMT

12/18/80

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPGRKS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.1886 RCSPHAK = 357.0700

SPACECRAFT-EARTH DIRECTION: CLAT = -3.2641 CLON = 240.6395

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.0762 CLON = 240.6560

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PN 10 PASS 3221 PR23 #0/0 S/W SK.0 DSS63 RCVR AGC =120.4 FILE 10-1090  
SPACECRAFT ATTITUDE ON DAY 352 DEC 17, 1980 2300 GMT  
SPIN PERIOD = 12.933220 SEC RTLT = 0 FR 12 MIN 32.68 SEC

12/18/80

|                 | CRA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)   |
|-----------------|----------|----------|---------|----------|----------------|---------|
| 6/C +Z AXIS     | 0.0000   | 0.0000   | -3.0762 | 240.6560 |                |         |
| SUN             | 1.0132   | 356.4390 | -3.1387 | 241.6687 | 0.348420240 10 | 23.2901 |
| EARTH           | 0.1886   | 264.9967 | -3.2641 | 240.6395 | 0.335058250 10 | 22.3909 |
| JUPITER         | 60.7624  | 178.2720 | 0.0000  | 180.0000 | 0.000000000    | 0.0000  |
| SIRIUS(B)       | 121.8627 | 231.7200 |         |          |                |         |
| BETELGEUSE(R)   | 146.5787 | 215.6798 |         |          |                |         |
| CANCER(B)       | 97.1230  | 280.1403 |         |          |                |         |
| ARCTURUS(R)     | 48.7135  | 133.2233 |         |          |                |         |
| RIGIL KENTAURUS | 39.5333  | 268.2608 |         |          |                |         |
| ANTARES(R)      | 8.8498   | 350.5320 |         |          |                |         |
| CAPELLA(R)      | 151.7351 | 133.8033 |         |          |                |         |
| VEGA(B)         | 73.0702  | 69.7759  |         |          |                |         |
| ALDEBARAN(R)    | 167.7625 | 224.2737 |         |          |                |         |
| RIGEL(B)        | 142.6288 | 217.4036 |         |          |                |         |
| GAMMA CRUCIS(R) | 49.3922  | 248.6778 |         |          |                |         |
| SPICA(B)        | 37.1527  | 179.5352 |         |          |                |         |
| ACHERNAR(B)     | 94.5501  | 299.6829 |         |          |                |         |
| DENEK(B)        | 94.8242  | 59.8858  |         |          |                |         |
| PROCYON(B)      | 122.6659 | 201.2445 |         |          |                |         |

STAR DELAY: 2.6894 SEC 688.4817 PULSES DECIMAL = 10. COARSE + 48. FINE  
74.8597 SEC 12 60 PULSES OCTAL CRAM SUB C = 340.6417 EPSILON = 9.7973 50

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PN 10 PASS 3227 PR23 400 S/W 820 05310 R/LIN ACC -125.6 FILE 10-1091 CR 12/24/80  
 SPACECRAFT ALTITUDE ON DAY 359 DEC 23, 1980 0530 GMT

ROLL REFERENCE BODY IS SUN SUN IN ON LEFT SIDE OF S/W.

REFERENCE FOR ROSSPAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSRMS = 1 ROSTPOS = 180

AXELITUDE AND PHASE ANGLE: ROSSAVAL = 0.3204 ROSSPHAX = 300.7406

SPACECRAFT-EARTH DIRECTION: CLAT = -3.2563 CLON = 240.4401

SPACECRAFT IZ AXIS ATTITUDE: CLAT = -3.0685 CLON = 240.7081

PN 10 PASS 3227 PR23 400 S/W 820 05310 R/LIN ACC -125.6 FILE 10-1091 CR 12/24/80  
 SPACECRAFT ALTITUDE ON DAY 359 DEC 23, 1980 0530 GMT  
 SPIN PERIOD = 12.934320 SEC R10 = 0.78 14 MIN 13.32 SEC

|                 | CLAT    | CLON     | R(KM)          | R(AL)   |
|-----------------|---------|----------|----------------|---------|
| S/W IZ AXIS     | 0.0000  | 0.0000   | -              | -       |
| SUN             | -3.0685 | 240.7081 | 0.349149800 10 | 23.3308 |
| EARTH           | -3.1560 | 241.7110 | 0.330500000 10 | 22.7977 |
| JUPITER         | -3.2563 | 240.4401 | 0.000000000    | 0.0000  |
| SATURN          | 0.0000  | 180.0000 |                |         |
| SIRIUS(B)       |         |          |                |         |
| DELTACEPHEI(R)  |         |          |                |         |
| CANOPUS(B)      |         |          |                |         |
| ARCTURUS(R)     |         |          |                |         |
| RIGIL KENTAUCHI |         |          |                |         |
| ANTARES(R)      |         |          |                |         |
| CAPELLA(R)      |         |          |                |         |
| VEGA(R)         |         |          |                |         |
| ALDEBARAN(R)    |         |          |                |         |
| RIGEL(B)        |         |          |                |         |
| GAMMA CRUCIS(R) |         |          |                |         |
| SPICA(B)        |         |          |                |         |
| ACHERNAR(B)     |         |          |                |         |
| DENEB(B)        |         |          |                |         |
| PRUCYON(B)      |         |          |                |         |

STAR DELAYS: 2.0000 SEC ONE-WAY PHOTONS DELTA = 10.0000 + NO. FILE

SPACECRAFT ATTITUDE ON DAY 2 JAN 10, 1980 1600 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPEAK IS TOWARD SOUTH ELLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRKS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.5730 RCSPEAK = 292.9800

SPACECRAFT-EARTH DIRECTION: CLAT = -3.2432 CLON = 240.2003

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.0583 CLON = 240.7435

SPACECRAFT ATTITUDE ON DAY 2 JAN 10, 1980 1600 GMT

SPIN PERIOD = 12.935780 SEC RTLT = 6 HR 16 MIN 45.00 SEC

|                 | ENA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.0583 | 240.7435 | -              | -          |
| SUN             | 1.0257   | 555.4934 | -3.1384 | 241.7676 | 0.350131760 10 | 23.4045294 |
| EARTH           | 0.5730   | 198.8479 | -3.2432 | 240.2003 | 0.338840430 10 | 22.8497614 |
| JUPITER         | 60.7892  | 178.2882 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 121.9309 | 231.7605 |         |          |                |            |
| DETELGEISE(R)   | 176.6601 | 215.7548 |         |          |                |            |
| CANOPUS(B)      | 97.1550  | 260.1554 |         |          |                |            |
| ARCTURUS(R)     | 48.7603  | 133.2946 |         |          |                |            |
| RIGIL KENTAUUS  | 39.5539  | 268.1604 |         |          |                |            |
| ANTARES(R)      | 8.7669   | 349.8241 |         |          |                |            |
| CAFELLA(R)      | 151.7825 | 133.6673 |         |          |                |            |
| VEGA(B)         | 73.6231  | 69.8037  |         |          |                |            |
| ALDEBARAN(R)    | 167.8375 | 224.5020 |         |          |                |            |
| RIGEL(B)        | 142.6789 | 247.5051 |         |          |                |            |
| GAMMA CRUCIS(R) | 26.4407  | 248.6163 |         |          |                |            |
| SPICA(B)        | 37.2399  | 179.3680 |         |          |                |            |
| ACHERNAR(B)     | 94.5224  | 299.6943 |         |          |                |            |
| LENEB(B)        | 56.7648  | 59.8829  |         |          |                |            |
| PROCYON(B)      | 122.6938 | 201.2588 |         |          |                |            |

STAR DELAY: 2.0854 SEC ORB. 4792 PULSES DECIMAL = 10. COARSE + 48. FINE  
 74.8406 DEG 12 60 PULSES OCTAL CKAH SUB C = 345,7394 EPSILON = 9.7539 SCN=10

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PN 10 PASS 3345 PR23 RC7C S/C 35.0 35503A RCVR AGC =123.9 FILE 10-1093 16  
 SPACECRAFT ATTITUDE ON DAY 11 JAN 11, 1980 0200 GMT

01/12/81

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR COORDINATES IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSUNRS = 0 ROSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCBANGAK = 0.8205 RCBPHAK = 255.4800

SPACECRAFT-EARTH DIRECTION: CLAT = -3.2224 CLON = 239.9788

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.0508 CLON = 240.7823

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PN 10 PASS 3345 PR23 RC7C S/C 35.0 35503A RCVR AGC =123.9 FILE 10-1093 16  
 SPACECRAFT ATTITUDE ON DAY 11 JAN 11, 1980 0200 GMT  
 SPIN PERIOD = 12.937370 SEC RTLT = 0 MK 19 MIN 53.98 SEC

01/12/81

|                  | RA       | DEC      | CLAT    | CLON     | R (KM)         | R (AU) |
|------------------|----------|----------|---------|----------|----------------|--------|
| S/C +Z AXIS      | 0.0000   | 0.0000   | -3.0508 | 240.7823 | -              | -      |
| SUN              | 1.0561   | 353.1743 | -3.1380 | 241.0303 | 0.351226590 10 | 25.477 |
| EARTH            | 0.8205   | 192.1275 | -3.2224 | 239.9788 | 0.341673250 10 | 22.834 |
| JUPITER          | 0.8277   | 170.295  | 0.0000  | 130.0000 | 0.000000000    | 0.0000 |
| SIRIUS (A)       | 121.9618 | 231.7785 |         |          |                |        |
| BETELGEUSE (R)   | 144.6919 | 215.7871 |         |          |                |        |
| CANOPUS (B)      | 07.1690  | 200.1621 |         |          |                |        |
| ARCTURUS (A)     | 27.7019  | 133.5231 |         |          |                |        |
| 104 (KENTAURUS)  | 37.5827  | 280.1109 |         |          |                |        |
| ANTARES (R)      | 4.7507   | 349.7335 |         |          |                |        |
| CAPELLA (A)      | 15.8039  | 133.0071 |         |          |                |        |
| VEGA (B)         | 73.0027  | 69.0100  |         |          |                |        |
| ALDEBARAN (A)    | 167.6713 | 224.0030 |         |          |                |        |
| RYGEL (A)        | 140.7283 | 207.5580 |         |          |                |        |
| GAMMA CRUCIS (R) | 20.0010  | 240.0910 |         |          |                |        |
| SPICA (A)        | 37.2710  | 177.3813 |         |          |                |        |
| ACHENAR (A)      | 81.5037  | 299.0915 |         |          |                |        |
| DEHA (A)         | 91.7100  | 64.0000  |         |          |                |        |
| PROCYON (A)      | 120.7300 | 20.2230  |         |          |                |        |

STAR DELAYS: 0.000000000 0.000000000 0.000000000 0.000000000 0.000000000 0.000000000 0.000000000  
 0.000000000 0.000000000 0.000000000 0.000000000 0.000000000 0.000000000 0.000000000

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PN 10 PASS 3251 PR23 #070 S/W SK 0 DSS634 RCVR AGE -123.9 FILE 10-1094 PS  
 SPACECRAFT ATTITUDE ON DAY 17 JAN 17, 1981 2130 GMT

01/17/81

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR POSPAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRHS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: POSARGAK = 0.8851 POSPAK = 282.1500

SPACECRAFT-EARTH DIRECTION: CLAT = -3.2130 CLON = 237.0533

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.0552 CLON = 240.7256

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PN 10 PASS 3251 PR23 #070 S/W SK 0 DSS634 RCVR AGE -123.9 FILE 10-1094 PS  
 SPACECRAFT ATTITUDE ON DAY 17 JAN 17, 1981 2130 GMT  
 SPIN PERIOD = 12.938590 SEC RTLT = 6 HR 22 MIN 21.02 SEC

01/19/81

|                  | RA       | DEC      | CLAT    | CLON     | R (KM)         | R (AU)     |
|------------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS      | 0.0000   | 0.0000   | -3.0552 | 240.7256 | -              | -          |
| SUN              | 1.1511   | 355.8130 | -3.1386 | 241.6753 | 0.352017750 10 | 23.5305983 |
| EARTH            | 0.8851   | 190.2984 | -3.2130 | 237.0533 | 0.343686230 10 | 22.9870475 |
| JUPITER          | 60.7712  | 178.2880 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS (R)       | 121.9223 | 231.7490 |         |          |                |            |
| BETELGEUSE (R)   | 146.6475 | 215.7392 |         |          |                |            |
| CANOPUS (R)      | 97.1556  | 260.1521 |         |          |                |            |
| ARCTURUS (R)     | 48.7450  | 133.2642 |         |          |                |            |
| RIGIL KENTARUS   | 39.5505  | 268.1810 |         |          |                |            |
| ANTARES (R)      | 8.7850   | 349.6237 |         |          |                |            |
| CAPELLA (R)      | 151.7679 | 133.0864 |         |          |                |            |
| VEGA (R)         | 73.0264  | 69.7973  |         |          |                |            |
| ALDEBARAN (R)    | 167.8209 | 224.4327 |         |          |                |            |
| RIGEL (R)        | 142.6749 | 247.4809 |         |          |                |            |
| GAMMA CRUCIS (R) | 49.4371  | 248.0326 |         |          |                |            |
| SPICA (R)        | 37.2220  | 179.3717 |         |          |                |            |
| ACHERNAR (R)     | 94.5339  | 299.0922 |         |          |                |            |
| DENEK (R)        | 94.7711  | 59.6834  |         |          |                |            |
| PROCYON (R)      | 122.6783 | 201.2510 |         |          |                |            |

STAR DELAY: 2.6901 SEC 686.6585 PULSES DECIMAL = 10. COARSE + 49. FINE  
 70.6079 SEC 12 01 PULSES LOCAL (NAH SUB C = 346.4809) EPSILON = 9.3321 SCN = 10

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PN 10 PASS 3257 PR23 4070 S/W 9X0 DSS63A RCVR AGC -135.4 FILE 10-1095 RC  
 SPACECRAFT ATTITUDE ON DAY 22 JAN 22, 1981 1830 GMT

01/22/81

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/W.

REFERENCE FOR ROSETHAR IS TOWARD SOUTH ELLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 ROSETHOS = 180

AMPLITUDE AND PHASE ANGLE: ROSARGAN = 1.4072 ROSETHAK = 282.0500

SPACECRAFT-EARTH DIRECTION: CLAT = -3.2027 CLON = 239.7825

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.0661 CLON = 241.1845

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PN 10 PASS 3257 PR23 4070 S/W 9X0 DSS63A RCVR AGC -135.4 FILE 10-1095 RC  
 SPACECRAFT ATTITUDE ON DAY 22 JAN 22, 1981 1830 GMT  
 SPIN PERIOD = 12.930751 SEC PULS = 6 PK 24 PLS 12.18 SEC

01/22/81

|                 | CLAT     | CLON     | CLAT    | CLON     | R (KM)         | R (AU)     |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/W +Z AXIS     | 3.0661   | 241.1845 | -3.0661 | 241.1845 | -              | -          |
| SUN             | 0.7262   | 353.7004 | -3.1500 | 241.9075 | 0.352584670 10 | 23.5804940 |
| EARTH           | 1.4072   | 185.0558 | -3.2027 | 239.7825 | 0.345543590 10 | 23.0978336 |
| JUPITER         | 61.2295  | 178.5179 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)       | 122.2013 | 230.0010 |         |          |                |            |
| BETELGEUSE(R)   | 147.0155 | 210.1819 |         |          |                |            |
| CANOPUS(B)      | 97.2288  | 260.2327 |         |          |                |            |
| ARCTURUS(R)     | 49.0505  | 133.5955 |         |          |                |            |
| RIGIL KENTAUUS  | 39.5882  | 207.0511 |         |          |                |            |
| ANTARES(R)      | 8.3334   | 349.3290 |         |          |                |            |
| CAPPELLA(R)     | 152.0804 | 133.0920 |         |          |                |            |
| VEGA(B)         | 72.0734  | 69.9543  |         |          |                |            |
| ALDEBARAN(R)    | 118.1462 | 220.0023 |         |          |                |            |
| RIGEL(B)        | 142.8437 | 248.0059 |         |          |                |            |
| GAMMA CRUCIS(R) | 40.0007  | 240.2917 |         |          |                |            |
| SPICA(B)        | 37.0803  | 179.3901 |         |          |                |            |
| ACHERNAR(B)     | 40.3024  | 299.7473 |         |          |                |            |
| DENEBO(H)       | 74.5454  | 59.0754  |         |          |                |            |
| PROCYON(H)      | 123.1034 | 201.3871 |         |          |                |            |

STAR DELAY: 2.6873 SEC 687.9537 PULSES COARSE = 10, COARSE + 48, FINE  
 74.7003 SEC 12.00 PULSES COARSE, GRAN SUB C = 342.9170 EPSILON=10.8627 SEC=10

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PN 10 PASS 3261 PR23 40/0 S/W 0K.0 DSS030 ROVR 260 -136.6 FILE 10-1098 RS 01/20/81  
 SPACECRAFT ATTITUDE ON DAY 26 JAN 26, 1981 1800 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR POSRA IS TOWARD GEOG. GALACTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSSPRS = 0 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RDBANAS = 1.4212 PCSPHAK = 280.4790  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.1940 CLON = 239.7368  
 SPACECRAFT +Z AXIS DIRECTION: CLAT = -3.0712 CLON = 241.1547

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PN 10 PASS 3261 PR23 40/0 S/W 0K.0 DSS030 ROVR 260 -136.6 FILE 10-1098 RS 01/20/81  
 SPACECRAFT ATTITUDE ON DAY 26 JAN 26, 1981 1800 GMT  
 SPIN PERIOD = 12.04710 SEC WFLT = 0K 25 MIN 45.07 SEC

|                 | CLAT    | CLON     | CLAT    | CLON     | R(KM)          | R(AL)      |
|-----------------|---------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | -3.0712 | 241.1547 | -3.0712 | 241.1547 | -              | -          |
| SUN             | -3.1940 | 239.7368 | -3.1940 | 239.7368 | 0.35504801E 10 | 23.5994859 |
| EARTH           | -3.1940 | 239.7368 | -3.1940 | 239.7368 | 0.34043598E 10 | 23.1909018 |
| JUPITER         | 0.0000  | 180.0000 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       |         | 231.7800 |         |          |                |            |
| BETELGEUSE(R)   |         | 210.1600 |         |          |                |            |
| CANOPUS(B)      |         | 260.2200 |         |          |                |            |
| ARCTURUS(R)     |         | 133.3000 |         |          |                |            |
| RIGIL KENTHAUS  |         | 287.0000 |         |          |                |            |
| ANTARES(R)      |         | 349.4300 |         |          |                |            |
| CAPPELLA(R)     |         | 133.1000 |         |          |                |            |
| VEGA(B)         |         | 69.7900  |         |          |                |            |
| ALDEBARAN(R)    |         | 275.9300 |         |          |                |            |
| RIGEL(B)        |         | 248.0300 |         |          |                |            |
| GAMMA CRUCIS(R) |         | 240.3100 |         |          |                |            |
| SPICA(B)        |         | 179.3700 |         |          |                |            |
| ACHERNAR(B)     |         | 209.7000 |         |          |                |            |
| LEAEB(B)        |         | 89.0700  |         |          |                |            |
| PROCYON(B)      |         | 281.3000 |         |          |                |            |

STAR DELAY: 2.04710 SEC OFF. 0201 PULSES DELTA = 10.0000E + 48. FINE  
 20.7714 LB. 120 PULSES TOTAL \* INAH SUB C = 344.3800 EPSILON=10.6494 SCN=10

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PN 10 PASS 3271 PR23 #0/0 S/W SKO DSS14A RCVR AGC -127.2 FILE 10-1097 HC  
 SPACECRAFT ATTITUDE ON DAY 37 FEB 6, 1981 0130 GMT

02/06/81

RCLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPFAK IS TOWARD SOUTH ECLIPTIC POLE.

RCLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.1738 RC8PHAK = 278.9900  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.1707 CLON = 239.6714  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.0522 CLON = 240.8409

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PN 10 PASS 3271 PR23 #0/0 S/W SKO DSS14A RCVR AGC -127.2 FILE 10-1097 HC  
 SPACECRAFT ATTITUDE ON DAY 37 FEB 6, 1981 0130 GMT  
 SPIN PERIOD = 12.941890 SEC RTLT = 6 HR 29 MIN 53.41 SEC

02/06/81

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.0522 | 240.8409 | -              | -          |
| SUN             | 1.1619   | 355.7091 | -3.1385 | 242.0013 | 0.354245580 10 | 23.6795154 |
| EARTH           | 1.1738   | 185.8277 | -3.1707 | 239.6714 | 0.350658430 10 | 23.4397346 |
| JUPITER         | 60.8863  | 178.2983 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 121.9959 | 231.8110 |         |          |                |            |
| BETELGEUSE(R)   | 146.7426 | 215.8442 |         |          |                |            |
| CANOPUS(B)      | 97.1782  | 260.1725 |         |          |                |            |
| ARCTURUS(R)     | 48.8227  | 133.3655 |         |          |                |            |
| RIGIL KENTAUKUS | 39.5632  | 268.0481 |         |          |                |            |
| ANTARES(R)      | 8.6722   | 349.6774 |         |          |                |            |
| CAPELLA(R)      | 151.8453 | 133.5332 |         |          |                |            |
| VEGA(B)         | 72.9839  | 69.8362  |         |          |                |            |
| ALDEBARAN(R)    | 167.9109 | 224.8055 |         |          |                |            |
| RIGEL(B)        | 142.7216 | 247.6253 |         |          |                |            |
| GAMMA CRUCIS(R) | 49.4819  | 248.5479 |         |          |                |            |
| SPICA(B)        | 37.3371  | 179.3834 |         |          |                |            |
| ACHERNAR(B)     | 94.4794  | 299.7064 |         |          |                |            |
| DENEK(B)        | 94.7107  | 59.8814  |         |          |                |            |
| PROCYON(B)      | 122.7867 | 201.2831 |         |          |                |            |

STAR DELAY: 2.6900 SEC 688.6468 PULSES DECIMAL = 10. COARSE + 49, FINE  
 74.8275 DEG 12 61 PULSES OCTAL CKAH SUB C = 346.4121 EPSILON = 9.2970 SCN = 10

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PN 10 PASS 3378 PR23 #0/0 S/W SK.0 DSS63 RCVR AGC -125.6 FILE 10-1098

02/12/81

SPACECRAFT ATTITUDE ON DAY 43 FEB 12, 1981 1630 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRKS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.1069 RCSPHAK = 277.7900

SPACECRAFT-EARTH DIRECTION: CLAT = -3.1555 CLON = 239.6705

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.0550 CLON = 240.7745

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PN 10 PASS 3378 PR23 #0/0 S/W SK.0 DSS63 RCVR AGC -125.6 FILE 10-1098

02/12/81

SPACECRAFT ATTITUDE ON DAY 43 FEB 12, 1981 1630 GMT

SPIN PERIOD = 12.942990 SEC RTLT = 6 HR 32 MIN 37.44 SEC

|                 | CNA      | LKA      | CLAT    | CLON     | R(KM)          | R(AL)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.0550 | 240.7745 | -              | -          |
| SUN             | 1.2708   | 356.2003 | -3.1585 | 242.0445 | 0.355016280 10 | 23.7310348 |
| EARTH           | 1.1069   | 185.2358 | -3.1555 | 239.6705 | 0.353117210 10 | 23.6040916 |
| JUPITER         | 60.8201  | 178.2921 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 121.9526 | 231.7760 |         |          |                |            |
| BETELGEUSE(R)   | 146.6872 | 215.7850 |         |          |                |            |
| CANCPUS(B)      | 97.1641  | 260.1600 |         |          |                |            |
| ARCTURUS(R)     | 48.7792  | 133.3180 |         |          |                |            |
| RIGIL KENTAURUS | 39.5582  | 268.1247 |         |          |                |            |
| ANTARES(R)      | 8.7370   | 349.7692 |         |          |                |            |
| CAPELLA(R)      | 151.8016 | 133.6229 |         |          |                |            |
| VEGA(B)         | 73.0094  | 69.8139  |         |          |                |            |
| ALDEBARAN(R)    | 167.8618 | 224.5939 |         |          |                |            |
| RIGEL(B)        | 142.6937 | 247.5427 |         |          |                |            |
| GAMMA CRUCIS(R) | 49.4551  | 248.5963 |         |          |                |            |
| SPICA(B)        | 37.2709  | 179.3752 |         |          |                |            |
| ACHEKNAR(B)     | 94.5098  | 299.6982 |         |          |                |            |
| DENEK(B)        | 94.7465  | 59.6825  |         |          |                |            |
| PROCYON(B)      | 122.7639 | 201.2657 |         |          |                |            |

STAR DELAY: 2.6907 SEC 088.8130 PULSES DECIMAL = 10. COARSE + 49. FINE  
74.8392 DEC 12 01 PULSES OCTAL LKAH SUB C = 347,2443 EPSILON = 8.9510 SCN=10



PN 10 PASS 3286 PR23 4070 S/W SM.0 DSS 63P RCVR AGC -125.6 FILE 10-1099 RS 02/21/81

SPACECRAFT ATTITUDE ON DAY 51 FEB 20, 1981 1915 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRKS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.0852 RCSPHAK = 270.4110

SPACECRAFT-EARTH DIRECTION: CLAT = -3.1371 CLON = 234.7136

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.0731 CLON = 240.7985

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PN 10 PASS 3286 PR23 4070 S/W SM.0 DSS 63P RCVR AGC -125.6 FILE 10-1099 RS 02/21/81

SPACECRAFT ATTITUDE ON DAY 51 FEB 20, 1981 1915 GMT

SPIN PERIOD = 12.944450 SEC RTLT = 8 FR 35 MIN 59.79 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AL)     |
|-----------------|----------|----------|---------|----------|----------------|-----------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.0731 | 240.7985 | -              | -         |
| SUN             | 1.2983   | 357.0800 | -3.1384 | 242.0971 | 0.355958890 10 | 23.794041 |
| EARTH           | 1.0852   | 183.4104 | -3.1371 | 234.7136 | 0.350150320 10 | 23.806834 |
| JUPITER         | 60.8406  | 178.2837 | 0.0000  | 180.0000 | 0.000000000    | 0.000000  |
| SIRIUS(B)       | 121.9533 | 231.7901 |         |          |                |           |
| BETELGEUSE(R)   | 146.6960 | 215.6300 |         |          |                |           |
| CANOPUS(B)      | 97.1504  | 260.1654 |         |          |                |           |
| ARCTURUS(H)     | 48.8088  | 133.3237 |         |          |                |           |
| RIGIL KENTAUROS | 39.5409  | 268.0902 |         |          |                |           |
| ANTARES(R)      | 8.7102   | 349.0590 |         |          |                |           |
| CAPELLA(R)      | 151.8312 | 133.0151 |         |          |                |           |
| VEGA(B)         | 73.0181  | 69.0240  |         |          |                |           |
| ALDEBARAN(R)    | 167.8062 | 224.7334 |         |          |                |           |
| RIGEL(B)        | 142.6862 | 247.5821 |         |          |                |           |
| GAMMA CRUCIS(R) | 89.4470  | 240.5720 |         |          |                |           |
| SPICA(B)        | 37.2950  | 179.3531 |         |          |                |           |
| ACHEKNAR(B)     | 94.4822  | 299.7004 |         |          |                |           |
| DENEK(B)        | 94.7501  | 59.0013  |         |          |                |           |
| PROCYON(B)      | 122.7397 | 201.2833 |         |          |                |           |

STAR DELAY: 2.0908 SEC 088.0401 PULSES DECIMAL = 10. COARSE + 49. FINE

70.0340 SEC 12.01 PULSES LOCAL CNAH SUB C = 340.2141 EPSILON = 8.8066 SEC

PN 10 PASS 293 PR23 #0/0 S/W SK.0 DSS 63A RCVR AGC 122.2 FILE 10-1100 TG 03/04/81  
 SPACECRAFT ATTITUDE ON DAY 58 FEB 27, 1981 1900 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR ROCPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPGRRS = 0 RCSTPLS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.9890 ROCPHAK = 274.3200  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.1211 CLON = 239.7867  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.0712 CLON = 240.7749

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PN 10 PASS 293 PR23 #0/0 S/W SK.0 DSS 63A RCVR AGC -122.2 FILE 10-1100 TG 03/04/81  
 SPACECRAFT ATTITUDE ON DAY 58 FEB 27, 1981 1900 GMT  
 SPIN PERIOD = 12.945670 SEC RTLT = 6 HR 28 MIN 53.69 SEC

| S/C +Z AXIS      | CMA      | CKA      | CLAT    | CLON     | R (KM)         | R (AU)     |
|------------------|----------|----------|---------|----------|----------------|------------|
| SUN              | 0.0000   | 0.0000   | -3.0712 | 240.7749 | -              | -          |
| SUN              | 1.3669   | 357.1455 | -3.1394 | 242.1422 | 0.356770740 10 | 23.8483115 |
| EARTH            | 0.9890   | 182.9197 | -3.1211 | 239.7867 | 0.358757040 10 | 23.9810856 |
| JUPITER          | 60.8210  | 173.2831 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS (R)       | 121.0407 | 221.7825 |         |          |                |            |
| BETELGEUSE (R)   | 146.6780 | 215.8054 |         |          |                |            |
| CANOPUS (R)      | 67.1482  | 260.1612 |         |          |                |            |
| ARCTURUS (R)     | 48.7912  | 133.3086 |         |          |                |            |
| RIGIL KENTAURUS  | 29.5420  | 268.1236 |         |          |                |            |
| ANTARES (R)      | 8.7327   | 349.8726 |         |          |                |            |
| CAPPELLA (R)     | 151.8136 | 122.6433 |         |          |                |            |
| VEGA (R)         | 73.0244  | 69.9157  |         |          |                |            |
| ALDEBARAN (R)    | 167.8507 | 224.6488 |         |          |                |            |
| RIGEL (R)        | 142.6789 | 247.5513 |         |          |                |            |
| GAMMA CRUCIS (R) | 49.4401  | 248.5909 |         |          |                |            |
| SPICA (R)        | 27.2714  | 179.3540 |         |          |                |            |
| ACHERNAR (R)     | 54.4956  | 299.6976 |         |          |                |            |
| DENEVB (R)       | 94.7603  | 59.8818  |         |          |                |            |
| PROCYON (R)      | 122.7184 | 291.2756 |         |          |                |            |

STAR DELAY: 2.6012 SEC 688.9518 PULSES DECIMAL = 10. COARSE + 49. FINE  
 74.8288 DEC 12.61 PULSES OCTAL CMAH SUB C = 348.4854 EPSILON = 9.6601 SCN=10

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N 10 PASS 3300 PR23 #070 S/W SK.0 DSS 14P RCVR AGC -127.2 FILE 10-1101 PS  
 SPACECRAFT ATTITUDE ON DAY 05 MAR 6, 1981 0200 GMT

03/06/81

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ELLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRKS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.8911 RCSPHAK = 275.5000

SPACECRAFT-EARTH DIRECTION: CLAT = -3.1057 CLON = 239.8950

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.0810 CLON = 240.7871

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N 10 PASS 3300 PR23 #070 S/W SK.0 DSS 14P RCVR AGC -127.2 FILE 10-1101 PS  
 SPACECRAFT ATTITUDE ON DAY 05 MAR 6, 1981 0200 GMT  
 SPIN PERIOD = 12.946890 SEC RTLT = 0 HR 41 MIN 46.00 SEC

03/06/81

|                 | CNA      | CHA      | CLAT    | CLON     | U (MAG)        | V (AL)     |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.0810 | 240.7871 | -              | -          |
| SUN             | 1,3994   | 357,0358 | -3.1384 | 242.1077 | 0.357585370 10 | 25.9029059 |
| EARTH           | 0.8911   | 181,5754 | -3.1057 | 239.8950 | 0.361340000 10 | 24.1543360 |
| JUPITER         | 60,8334  | 170,2702 | 0.0000  | 100.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)       | 121,9395 | 231,7931 |         |          |                |            |
| BETELGEUSE(R)   | 146,6818 | 215,8296 |         |          |                |            |
| CANOPUS(B)      | 97,1401  | 260,1630 |         |          |                |            |
| ARCTURUS(R)     | 48,8071  | 133,3107 |         |          |                |            |
| RIGIL KENTARUS  | 39,5321  | 260,1091 |         |          |                |            |
| ANTARES(R)      | 8,7200   | 349,9250 |         |          |                |            |
| CAPELLA(R)      | 151,8294 | 133,0409 |         |          |                |            |
| VEGA(B)         | 73,0300  | 69,8209  |         |          |                |            |
| ALDEBARAN(R)    | 167,8521 | 224,7252 |         |          |                |            |
| RIGEL(B)        | 142,6740 | 247,5710 |         |          |                |            |
| GAMMA CRUCIS(R) | 49,4349  | 248,5707 |         |          |                |            |
| SPICA(B)        | 37,2837  | 179,3412 |         |          |                |            |
| ACHERNAR(B)     | 94,4006  | 299,6907 |         |          |                |            |
| DENEK(B)        | 94,7631  | 59,8812  |         |          |                |            |
| PROCYON(B)      | 122,7259 | 201,2852 |         |          |                |            |

STAR DELAY: 2,6914 SEC 688,9949 PULSES DECIMAL = 10, COARDE + 49, FINE  
 70,8364 DEC 12 01 PULSES DECIMAL, COAR SUB C = 349,0710 EPSILON = 8,5644 SCAL=10

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PN 10 PASS 3305 PR23 #070 S/W SK,0 DSS 63 RCVR AGC =125.6 FILE 10-1102 PD  
 SPACECRAFT ATTITUDE ON DAY 70 MAR 11, 1981 1800 GMT

03/12/81

*Pmoc*

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.8046 RCSPHAK = 272.5700

SPACECRAFT-EARTH DIRECTION: CLAT = -3.0954 CLON = 239.9900

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.0750 CLON = 240.7954

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 PN 10 PASS 3305 PR23 #070 S/W SK,0 DSS 63 RCVR AGC =125.6 FILE 10-1102 PD  
 SPACECRAFT ATTITUDE ON DAY 70 MAR 11, 1981 1800 GMT  
 SPIN PERIOD = 12.947500 SEC RTLT = 6 HR 43 MIN 45.21 SEC

03/12/81

|                 | CNA      | LKA      | CLAT    | CLON     | R(KM)          | R(AU)    |
|-----------------|----------|----------|---------|----------|----------------|----------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.0750 | 240.7954 |                |          |
| SUN             | 1.4227   | 357.4111 | -3.1383 | 242.2188 | 0.358159250 10 | 23.94112 |
| EARTH           | 0.8046   | 181.4705 | -3.0954 | 239.9900 | 0.303126770 10 | 24.27317 |
| JUPITER         | 60.8415  | 178.2824 | 0.0000  | 180.0000 | 0.000000000    | 0.00000  |
| SIRIUS(B)       | 121.9498 | 231.7951 |         |          |                |          |
| BETELGEUSE(R)   | 148.0924 | 215.8294 |         |          |                |          |
| CANCOPUS(B)     | 97.1479  | 260.1649 |         |          |                |          |
| ARCTURUS(R)     | 48.8081  | 133.3204 |         |          |                |          |
| RIGIL KENTAURUS | 39.5389  | 268.0997 |         |          |                |          |
| ANTARES(R)      | 3.7129   | 349.8747 |         |          |                |          |
| CAPELLA(R)      | 151.8305 | 133.6216 |         |          |                |          |
| VEGA(B)         | 73.0210  | 69.8231  |         |          |                |          |
| ALDEBARAN(R)    | 167.8626 | 224.7295 |         |          |                |          |
| RIGEL(B)        | 142.6832 | 247.5791 |         |          |                |          |
| GAMMA CRUCIS(R) | 49.4440  | 248.5745 |         |          |                |          |
| SPICA(B)        | 37.2920  | 179.3503 |         |          |                |          |
| ACHERNAR(B)     | 90.4821  | 299.6949 |         |          |                |          |
| DENEK(B)        | 90.7533  | 59.8813  |         |          |                |          |
| PROCYON(B)      | 122.7361 | 201.2837 |         |          |                |          |

STAR DELAY: 2.6915 SEC 689.0150 PULSES DECIMAL = 10, COARSE + 49, FINE  
 70.8351 SEC 12 61 PULSES OCTAL CKAH SUB C = 348,9143 EPSILON = 8.4968 SEC

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PN 10 PASS 3316 PR23 #0/0 S/W SK,0 DSS 63 RCVR AGC -123.9 FILE 10-1103  
 SPACECRAFT ATTITUDE ON DAY 62 MAR 23, 1981 1100 GMT

03/24/81

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ELLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180

PRE-PRECESSION

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.4772 RCSPHAK = 269.7490

SPACECRAFT-EARTH DIRECTION: CLAT = -3.0726 CLON = 240.2750

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.0905 CLON = 240.7526

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PN 10 PASS 3316 PR23 #0/0 S/W SK,0 DSS 63 RCVR AGC -123.9 FILE 10-1103  
 SPACECRAFT ATTITUDE ON DAY 62 MAR 23, 1981 1100 GMT  
 SPIN PERIOD = 12.949700 SEC RTLT = 6 HR 48 MIN 16.41 SEC

03/24/81

|                 | CRA      | CKA      | CLAT    | CLON     | H (KM)         | H (AU)     |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.0905 | 240.7526 |                |            |
| SUN             | 1.5392   | 358.1799 | -3.1383 | 242.2933 | 0.359518290 10 | 24.0319713 |
| EARTH           | 0.4772   | 177.8638 | -3.0726 | 240.2750 | 0.367192040 10 | 24.5449225 |
| JUPITER         | 60.7992  | 178.2708 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)       | 121.9112 | 231.7778 |         |          |                |            |
| BETELGEUSE(R)   | 146.6486 | 215.8081 |         |          |                |            |
| CANCPUS(B)      | 97.1254  | 260.1576 |         |          |                |            |
| ARCTURUS(R)     | 48.7900  | 133.2815 |         |          |                |            |
| RIGIL KENTAURUS | 39.5220  | 268.1486 |         |          |                |            |
| ANTARES(R)      | 8.7523   | 350.0203 |         |          |                |            |
| CAPELLA(K)      | 151.8121 | 133.6971 |         |          |                |            |
| VEGA(B)         | 73.0503  | 69.8102  |         |          |                |            |
| ALDEBARAN(K)    | 167.8213 | 224.6385 |         |          |                |            |
| RIGEL(B)        | 142.6526 | 247.5327 |         |          |                |            |
| GAMMA CRUCIS(R) | 49.4100  | 248.6015 |         |          |                |            |
| SPICA(B)        | 37.2493  | 179.3270 |         |          |                |            |
| ACHERNAR(B)     | 94.4899  | 299.6941 |         |          |                |            |
| DENEK(B)        | 94.7882  | 59.8814  |         |          |                |            |
| PROCYON(B)      | 122.6906 | 201.2807 |         |          |                |            |

STAR DELAY: 2.6922 SEC 689.1984 PULSES DECIMAL = 10. COARSE + 49. FINE  
 74.8424 DEG 12 61 PULSES OCTAL CKAH SUB C = 350.0106 EPSILON = 8.1693 SCN=10

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PN 10 PASS 3316 PR23 #2/4 S/W SK,0 DSS 63 RCVR AGC -125,6 FILE 10-1104  
 SPACECRAFT ATTITUDE ON DAY 62 MAR 23, 1981 1810 GMT

03/24/81

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 KCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,8174 KCSPHAK = 284,1860  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3,0721 CLON = 240,2832  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2,9682 CLON = 241,0952

NEW ATTITUDE  
 POST- PRECESSION

PN 10 PASS 3316 PR23 #2/4 S/W SK,0 DSS 63 RCVR AGC -125,6 FILE 10-1104  
 SPACECRAFT ATTITUDE ON DAY 62 MAR 23, 1981 1810 GMT  
 SPIN PERIOD = 12,949700 SEC RLTT = 6 HR 48 MIN 23,09 SEC

03/24/81

|                 | CNA      | CKA      | CLAT    | CLON     | R (KM)         | R (AU)     |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -2,9682 | 241,0952 |                |            |
| SUN             | 1,2103   | 351,8889 | -3,1383 | 242,2952 | 0,359552940 10 | 24,0342874 |
| EARTH           | 0,8174   | 187,3238 | -3,0721 | 240,2832 | 0,367292130 10 | 24,5516130 |
| JUPITER         | 61,1376  | 178,3623 | 0,0000  | 180,0000 | 0,000000000    | 0,0000000  |
| SIRIUS(B)       | 122,2187 | 231,9171 |         |          |                |            |
| BETELGEUSE(R)   | 146,9975 | 215,9814 |         |          |                |            |
| CANOPUS(B)      | 97,3042  | 260,2158 |         |          |                |            |
| ARCTURUS(R)     | 48,9364  | 133,5901 |         |          |                |            |
| RIGIL KENTAURUS | 39,6565  | 267,7586 |         |          |                |            |
| ANTARES(R)      | 8,4384   | 348,8273 |         |          |                |            |
| CAPELLA(R)      | 151,9583 | 133,0928 |         |          |                |            |
| VEGA(B)         | 72,8176  | 69,9140  |         |          |                |            |
| ALDEBARAN(R)    | 168,1497 | 225,3873 |         |          |                |            |
| RIGEL(B)        | 142,8955 | 247,9065 |         |          |                |            |
| GAMMA CRUCIS(R) | 49,6533  | 248,3863 |         |          |                |            |
| SPICA(B)        | 37,5902  | 179,5096 |         |          |                |            |
| ACHEKNAR(B)     | 94,4265  | 299,7401 |         |          |                |            |
| DENEK(B)        | 94,5107  | 59,8804  |         |          |                |            |
| PROCYON(B)      | 123,0538 | 201,3054 |         |          |                |            |

STAR DELAY: 2,6901 SEC 688,6635 PULSES DECIMAL = 10, COARSE + 49, FINE  
 74,7842 DEG 12 61 PULSES OCTAL CKAH SUB C = 342,7480 EPSILON = 9,1410 SCN=10

PN 10 PASS 2220 PR22 #0/0 S/W SK.0 DSS 63 RCVR AGC -128.7 FILE 10-1105 PD  
SPACECRAFT ATTITUDE ON DAY 85 MAR 26, 1981 1835 GMT

03/26/81

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRPS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.8274 RCSPHAK = 311.2800

SPACECRAFT-EARTH DIRECTION: CLAT = -3.0667 CLON = 240.3469

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.7406 CLON = 241.1083

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PN 10 PASS 3320 PR22 #0/0 S/W SK.0 DSS 63 RCVR AGC -128.7 FILE 10-1105 PD  
SPACECRAFT ATTITUDE ON DAY 85 MAR 26, 1981 1835 GMT  
SPIN PERIOD = 12.949580 SEC RILT = 6 HR 49 MIN 29.43 SEC

03/26/81

|                  | CNA      | CKA      | CLAT    | CLON     | R (KM)         | R (AU)     |
|------------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS      | 0.0000   | 0.0000   | -2.7406 | 241.1083 | -              | -          |
| SUN              | 1.2729   | 341.7627 | -2.1282 | 242.3190 | 0.359989660 10 | 24.0624799 |
| EARTH            | 0.8274   | 203.2729 | -2.0667 | 240.3469 | 0.268286480 10 | 24.6180802 |
| JUPITER          | 61.1445  | 178.4896 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS (A)       | 122.4059 | 201.3554 |         |          |                |            |
| BETELGEUSE (R)   | 147.1415 | 215.7091 |         |          |                |            |
| CANCRUS (R)      | 97.5208  | 260.2121 |         |          |                |            |
| ADITHUS (R)      | 49.7909  | 170.7364 |         |          |                |            |
| SIGIL KENTAURUS  | 29.2244  | 267.7542 |         |          |                |            |
| ANTARS (R)       | 8.4726   | 247.7116 |         |          |                |            |
| CAPPELLA (R)     | 151.8006 | 122.7351 |         |          |                |            |
| VEGA (R)         | 72.5992  | 69.8941  |         |          |                |            |
| ALDEBARAN (A)    | 153.3200 | 224.6601 |         |          |                |            |
| RIGEL (B)        | 142.1112 | 247.4094 |         |          |                |            |
| GAMMA CRUCIS (R) | 49.8697  | 249.4475 |         |          |                |            |
| SPICA (R)        | 37.6020  | 179.8059 |         |          |                |            |
| ACHERNAR (R)     | 34.6171  | 299.7504 |         |          |                |            |
| DENEB (R)        | 64.3072  | 59.8990  |         |          |                |            |
| RECYON (R)       | 123.1485 | 201.1709 |         |          |                |            |

STAR DELAY: 2.6902 SEC 688.6319 PULSES DECIMAL = 10. COARSE + 49. FINE  
74.7849 DEG 12 61 PULSES OCTAL 'CKAH SUB C = 332.8178 EPSILON= 8.9449 SCN=10

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PN 10 PASS 3353 PR23 #0/0 S/W SK.0 DSS 63A RCVR AGC 27.2 FILE 10-1110 CJ 05/01/81  
 SPACECRAFT ATTITUDE ON DAY 118 APR 28, 1981 0900 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRPS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.7162 RCSPHAK = 84.2930

SPACECRAFT-EARTH DIRECTION: CLAT = -3.0240 CLON = 241.5361

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.8457 CLON = 240.8415

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PN 10 PASS 3353 PR23 #0/0 S/W SK.0 DSS 63A RCVR AGC -127.2 FILE 10-1110 CJ 05/01/81  
 SPACECRAFT ATTITUDE ON DAY 118 APR 28, 1981 0900 GMT  
 SPIN PERIOD = 12.055100 SEC PULS = 6 HR 59 MIN 35.71 SEC

|                  | CNA      | CKA      | CLAT    | CLON     | R (KM)         | R (AU)     |
|------------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS      | 0.0000   | 0.0000   | -3.8457 | 240.8415 | -              | -          |
| SUN              | 1.6999   | 350.0526 | -3.1391 | 242.5183 | 0.363684590 10 | 24.3104672 |
| EARTH            | 0.7162   | 345.5646 | -3.0240 | 241.5361 | 0.377274510 10 | 25.2255689 |
| LIGHTS           | 60.8100  | 178.4134 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| STARUS (R)       | 122.1595 | 221.7312 |         |          |                |            |
| ARCTURUS (R)     | 146.2626 | 215.5024 |         |          |                |            |
| CAMRUS (R)       | 97.3312  | 260.1691 |         |          |                |            |
| ARCTURUS (R)     | 42.6731  | 132.4904 |         |          |                |            |
| BETELGEUSE (R)   | 39.7696  | 249.0559 |         |          |                |            |
| ANTARES (R)      | 3.7110   | 348.3595 |         |          |                |            |
| CAPPELLA (R)     | 151.6956 | 123.2731 |         |          |                |            |
| VEGA (R)         | 72.7392  | 60.3144  |         |          |                |            |
| ALDEBARAN (R)    | 163.0561 | 224.1149 |         |          |                |            |
| RIHEL (R)        | 142.0128 | 247.5922 |         |          |                |            |
| SARIM CRUCIS (R) | 42.6744  | 248.6117 |         |          |                |            |
| SPICA (S)        | 37.0260  | 179.6542 |         |          |                |            |
| ALHENA (S)       | 94.6525  | 200.1126 |         |          |                |            |
| DIENA (S)        | 64.5218  | 50.8299  |         |          |                |            |
| PROCYON (S)      | 122.8620 | 201.1590 |         |          |                |            |

STAR DELAY: 2.6829 SEC 689.3951 PULSES DECIMAL = 10. COARSE + 49. FINE  
 74.8310 DEG 12.61 PULSES OCTAL GRAH SUB C = 342.3066 EPSILON = 7.7459 SCN = 10

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PM 10 PASS 3362 PR23 4070 S/W SM.0 USS 43A RCVR AGC -126.7 FILE 10-1111 TG 05/08/81  
 SPACECRAFT ATTITUDE ON DAY 128 MAY 8, 1981 0500 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C,

REFERENCE FOR RCSPEAK IS TOWARD SOUTH ELLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.1622 RCSPEAK = 90.0070

SPACECRAFT-EARTH DIRECTION: CLAT = -3.0174 CLON = 241.9692

SPACECRAFT +Z-AXIS ATTITUDE: CLAT = -2.8019 CLON = 240.8257

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PM 10 PASS 3362 PR23 4070 S/W SM.0 USS 43A RCVR AGC -126.7 FILE 10-1111 TG 05/08/81  
 SPACECRAFT ATTITUDE ON DAY 128 MAY 8, 1981 0500 GMT  
 SPIN PERIOD = 12.956900 SEC RILT = 7 HR 1 MIN 49.30 SEC

|                  | CKA      | CKB      | CLAT    | CLON     | R (KM)         | R (AU)     |
|------------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z-AXIS      | 0.0000   | 0.0000   | -2.8019 | 240.8257 |                |            |
| SUN              | 1.7830   | 349.0900 | -3.1380 | 242.5790 | 0.364824530 10 | 24.3866664 |
| EARTH            | 1.1622   | 349.2674 | -3.0174 | 241.9692 | 0.379376920 10 | 25.3594198 |
| JUPITER          | 07.8639  | 178.4367 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS (R)       | 122.1530 | 231.7050 |         |          |                |            |
| WITELGEUSE (R)   | 146.8752 | 215.5190 |         |          |                |            |
| CANOPUS (B)      | 97.4222  | 260.1643 |         |          |                |            |
| AKTURSUS (R)     | 48.6304  | 133.5080 |         |          |                |            |
| RIGIL KENTAURUS  | 30.6128  | 268.0759 |         |          |                |            |
| ANTARES (R)      | 0.7354   | 348.0915 |         |          |                |            |
| CAPELLA (R)      | 151.6529 | 133.2331 |         |          |                |            |
| VEGA (R)         | 72.7542  | 69.8094  |         |          |                |            |
| RIGEBARAN (R)    | 168.0750 | 223.9131 |         |          |                |            |
| RIGEL (B)        | 142.9471 | 207.4798 |         |          |                |            |
| GAMMA CRUCIS (R) | 69.7094  | 248.6370 |         |          |                |            |
| SPICA (B)        | 37.3189  | 179.7107 |         |          |                |            |
| ACHERNAR (B)     | 58.7064  | 299.7145 |         |          |                |            |
| DENEK (B)        | 54.5019  | 59.8918  |         |          |                |            |
| PROCYON (B)      | 122.8630 | 201.1282 |         |          |                |            |

STAR DELAY: 2.6934 SEC 669.5209 PULSES DECIMAL = 10, COARSE + 50, FINE  
 74.8357 DEC 12 62 PULSES OCTAL CKAH SUB C = 341.5516 EPSILON = 7.5391 SUN = 10

PN 10 PASS 3365 PR23 #0/0 S/W SK.0 DSS 14 RCVR AGC -122.23 FILE 10-1112 RS

05/11/81

SPACECRAFT ATTITUDE ON DAY 130 MAY 10, 1981 1800 GMT

PRE-PRECESSION

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

PRE-PRECESSION

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPUS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.2999 RCSPHAK = 91.8485

SPACECRAFT-EARTH DIRECTION: CLAT = -3.0162 CLGN = 242.0794

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.7556 CLGN = 240.8042

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PN 10 PASS 3365 PR23 #0/0 S/W SK.0 DSS 14 RCVR AGC -122.23 FILE 10-1112 RS

05/11/81

SPACECRAFT ATTITUDE ON DAY 130 MAY 10, 1981 1800 GMT

SPIN PERIOD = 12.957270 SEC RTLT = 7 HR 2 MIN 19.66 SEC

|                 | CNA      | CKA      | CLAT    | CLGN     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -2.7556 | 240.8042 | -              | -          |
| SUN             | 1.8284   | 347.8055 | -3.1380 | 242.5946 | 0.365119120 10 | 24.4063583 |
| EARTH           | 1.2999   | 348.4068 | -3.0162 | 242.0794 | 0.379832070 10 | 25.3898443 |
| JUPITER         | 60.9413  | 178.4612 | 0.0000  | 130.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 122.2061 | 231.6759 |         |          |                |            |
| BETELGEUSE(R)   | 146.8856 | 215.4412 |         |          |                |            |
| CANOPUS(B)      | 97.4641  | 260.1595 |         |          |                |            |
| ARCTURUS(F)     | 48.5822  | 133.5194 |         |          |                |            |
| RIGIL KENTAURUS | 59.9534  | 268.1023 |         |          |                |            |
| ANTARES(R)      | 3.7000   | 347.8255 |         |          |                |            |
| CAPELLA(R)      | 151.6045 | 133.2022 |         |          |                |            |
| VEGA(R)         | 72.7182  | 69.7921  |         |          |                |            |
| ALDEBARAN(R)    | 188.0916 | 223.0837 |         |          |                |            |
| PIGEL(B)        | 142.9817 | 247.4291 |         |          |                |            |
| GAMMA CRUCIS(R) | 49.7447  | 248.6671 |         |          |                |            |
| SPTCA(B)        | 37.2953  | 179.7702 |         |          |                |            |
| ACHERNAK(B)     | 94.7552  | 299.7133 |         |          |                |            |
| DENER(B)        | 94.4726  | 59.8940  |         |          |                |            |
| PROCYON(B)      | 122.8597 | 201.0943 |         |          |                |            |

STAR DELAY: 2.6937 SEC 689.5851 PULSES DECIMAL = 10. COARSE + 50. FINE

74.8405 DEG 12 62 PULSES OCTAL CRAH SUB C = 340.4562 EPSILON = 7.4293 SCN =

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PN 10 PASS 3366 PR23 #173 S/W SK 0 DSS 14A RCVR AGC -127.2 FILE 10-1113 TG 05/12/81  
 SPAC CRAFT ATTITUDE ON DAY 132 MAY 12, 1981 0000 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.8966 RCSPHAK = 61.8790  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.0157 CLON = 242.1339  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.1274 CLON = 242.2561

NEW ATTITUDE  
 POST-PRECESSION

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PN 10 PASS 3366 PR23 #173 S/W SK 0 DSS 14A RCVR AGC -127.2 FILE 10-1113 TG 05/12/81  
 SPACECRAFT ATTITUDE ON DAY 132 MAY 12, 1981 0000 GMT  
 SPIN PERIOD = 12.952630 SEC TILT = 7 HR 2 MIN 31.18 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -2.1274 | 242.2561 | -              | -          |
| SUN             | 1.0681   | 288.8838 | -3.1380 | 242.6023 | 0.365264010 10 | 24.4160434 |
| EARTH           | 0.8966   | 262.1729 | -3.0157 | 242.1339 | 0.380004680 10 | 25.4013824 |
| JUPITER         | 62.2769  | 178.0814 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)       | 123.5948 | 232.2263 |         |          |                |            |
| BETELGEUSE(R)   | 148.4300 | 216.0358 |         |          |                |            |
| CANOPUS(B)      | 98.3282  | 260.4049 |         |          |                |            |
| ARCTURUS(R)     | 49.1430  | 134.8723 |         |          |                |            |
| RIGIL KENTAURUS | 40.5545  | 266.4849 |         |          |                |            |
| ANTARES(R)      | 7.5359   | 340.9313 |         |          |                |            |
| CAPELLA(R)      | 152.1040 | 130.4601 |         |          |                |            |
| VEGA(B)         | 71.0318  | 70.2233  |         |          |                |            |
| ALDEBARAN(R)    | 169.5600 | 226.7157 |         |          |                |            |
| RIGEL(B)        | 144.1035 | 248.9967 |         |          |                |            |
| GAMMA CRUCIS(R) | 50.8660  | 247.8040 |         |          |                |            |
| SPICA(B)        | 38.7511  | 180.6290 |         |          |                |            |
| ACHERNAR(B)     | 94.5792  | 299.9039 |         |          |                |            |
| DENEK(B)        | 93.2015  | 59.8929  |         |          |                |            |
| PROCYON(B)      | 124.4392 | 201.1137 |         |          |                |            |

STAR DELAY: 2.6839 SEC 687.0773 PULSES DECIMAL = 10, COARSE + 07, FINE  
 74.5951 DEG 12 57 PULSES OCTAL CKAH SUB C = 279.2752 EPSILON = 9.0086 SCN=10

PN 10 PASS 3371 PR23 #0/0 S/W SK.0 DSS 63 RCVR AGC -125.6 FILE 10-1114 PD  
 SPACECRAFT ATTITUDE ON DAY 136 MAY 16, 1981 1640 GMT

05/19/81

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.7517 RCSPHAK = 76.0766

SPACECRAFT-EARTH DIRECTION: CLAT = -3.0142 CLON = 242.3390

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -2.3223 ✓ CLON = 242.0447 ✓

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PN 10 PASS 3371 PR23 #0/0 S/W SK.0 DSS 63 RCVR AGC -125.6 FILE 10-1114 PD  
 SPACECRAFT ATTITUDE ON DAY 136 MAY 16, 1981 1640 GMT  
 SPIN PERIOD = 12.953480 SEC RTLT = 7 HR 3 MIN 23.79 SEC

05/19/81

| S/C +Z AXIS     | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)   |
|-----------------|----------|----------|---------|----------|----------------|---------|
| SUN             | 0.0000   | 0.0000   | -2.3223 | 242.0447 | -              | -       |
| EARTH           | 1.0041   | 305.6667 | -3.1379 | 242.6310 | 0.365806720 10 | 24.4523 |
| JUPITER         | 0.7517   | 293.0134 | -3.0142 | 242.3390 | 0.380793240 10 | 25.4540 |
| SIRIUS(B)       | 62.0697  | 178.7680 | 0.0000  | 180.0000 | 0.00000000     | 0.0000  |
| BETELGEUSE(R)   | 123.3113 | 232.1868 |         |          |                |         |
| CANOPUS(B)      | 148.1445 | 216.0814 |         |          |                |         |
| ARCTURUS(R)     | 98.1008  | 260.3713 |         |          |                |         |
| RIGIL KENTAURUS | 49.1328  | 134.6156 |         |          |                |         |
| ANTARES(R)      | 40.3474  | 266.7104 |         |          |                |         |
| CAPELLA(R)      | 7.6760   | 342.8029 |         |          |                |         |
| VEGA(B)         | 152.1139 | 130.9947 |         |          |                |         |
| ALDEBARAN(R)    | 71.8868  | 70.1713  |         |          |                |         |
| RIGEL(B)        | 169.2733 | 226.6013 |         |          |                |         |
| GAMMA CRUCIS(R) | 143.8456 | 248.8159 |         |          |                |         |
| SPICA(B)        | 50.6058  | 247.8957 |         |          |                |         |
| ACHERNAR(B)     | 38.5382  | 180.3793 |         |          |                |         |
| DENEK(B)        | 94.5154  | 299.8734 |         |          |                |         |
| PROCYON(B)      | 93.4761  | 59.8896  |         |          |                |         |
|                 | 124.1719 | 201.1776 |         |          |                |         |

STAR DELAY: 2.6853 SEC 687.4316 PULSES DECIMAL = 10. COARSE + 47. FINE  
 74.6287 DEG 12 57 PULSES OCTAL CKAH SUB C = 295.8375 EPSILON= 9.8292 SC

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PN 10 PASS 3395 PR23 #070 S/W SK.0 DSS 63 RCVR AGC =123.9 FILE 10-1118 CJ  
 SPACECRAFT ATTITUDE ON DAY 100 JUN 9, 1981 1530 GMT

06/10/81

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.2710 RCSPHAK = 254.2100  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.0175 CLON = 243.3837  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.7376 CLON = 244.4329

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PN 10 PASS 3395 PR23 #070 S/W SK.0 DSS 63 RCVR AGC =123.9 FILE 10-1118 CJ  
 SPACECRAFT ATTITUDE ON DAY 100 JUN 9, 1981 1530 GMT  
 SPIN PERIOD = 12.954220 SEC RTLT = 7 HR 6 MIN 3.34 SEC

06/10/81

| S/C +Z AXIS     | CNA      | CKA      | CLAT    | CLON     | R(KM)          | H(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| SUN             | 0.0000   | 0.0000   | -3.7376 | 244.4329 |                |            |
| EARTH           | 1.7588   | 160.1051 | -3.1376 | 242.7766 | 0.36858289D 10 | 24.6378937 |
| JUPITER         | 1.2710   | 145.5213 | -3.0175 | 243.3837 | 0.38318485D 10 | 25.5139606 |
| SIRIUS(B)       | 64.4912  | 178.2137 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| BETELGEUSE(R)   | 123.6088 | 234.1356 |         |          |                |            |
| CANOPUS(B)      | 149.1413 | 220.4566 |         |          |                |            |
| ARCTURUS(R)     | 97.0937  | 260.8423 |         |          |                |            |
| RIGIL KENTAURUS | 51.8194  | 135.3092 |         |          |                |            |
| ANTARES(R)      | 39.1330  | 263.8368 |         |          |                |            |
| CAPELLA(R)      | 5.0220   | 350.3250 |         |          |                |            |
| VEGA(B)         | 154.7336 | 129.3002 |         |          |                |            |
| ALDEBARAN(R)    | 72.4329  | 71.1728  |         |          |                |            |
| RIGEL(B)        | 149.5293 | 241.5291 |         |          |                |            |
| GAMMA CRUCIS(R) | 143.2969 | 252.6267 |         |          |                |            |
| SPICA(B)        | 50.2435  | 245.7489 |         |          |                |            |
| ACHERNAR(B)     | 40.9332  | 178.8229 |         |          |                |            |
| DENEK(B)        | 92.0979  | 300.0782 |         |          |                |            |
| PROCYON(B)      | 93.5027  | 59.8467  |         |          |                |            |
|                 | 125.8528 | 202.8494 |         |          |                |            |

STAR DELAY: 2.6685 SEC 683.1324 PULSES DECIMAL = 10, COARSE + 43, FINE  
 74.1577 DEG 12.51 PULSES OCTAL CKAH SUB C = 152.5067 EPSILON = 7.4984 SCHELO

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PN 10 PASS 3398 PR23 #0/0 S/W SK.0 DSS 43 RCVR AGC -127.2 FILE 10-1119 BD  
 SPACECRAFT ATTITUDE ON DAY 164 JUN 12, 1981 000 GMT

06/15/81

RCLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

RCLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPUS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.1808 RCSPHAK = 250.3000  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.0188 CLUN = 243.4830  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.7918 CLUN = 244.3772

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PN 10 PASS 3398 PR23 #0/0 S/W SK.0 DSS 43 RCVR AGC -127.2 FILE 10-1119 BD  
 SPACECRAFT ATTITUDE ON DAY 164 JUN 12, 1981 0000 GMT  
 SPIN PERIOD = 12.954710 SEC RTLT = 7 HR 6 MIN 13.24 SEC

06/15/81

|                 | CNA      | CKA      | CLAT    | CLUN     | R (KM)         | R (AU)     |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.7918 | 244.3772 | -              | -          |
| SUN             | 1.7134   | 157.6037 | -3.1376 | 242.7908 | 0.368855520 10 | 24.6561176 |
| EARTH           | 1.1808   | 139.1387 | -3.0188 | 243.4830 | 0.383332240 10 | 25.6238797 |
| JUPITER         | 64.4374  | 178.1834 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 123.5324 | 234.1231 |         |          |                |            |
| BETELGEUSE(R)   | 149.0639 | 220.4616 |         |          |                |            |
| CANDORUS(B)     | 97.0314  | 260.8329 |         |          |                |            |
| ARCTURUS(R)     | 51.8180  | 135.2446 |         |          |                |            |
| RIGIL KENTAURUS | 39.0732  | 263.8939 |         |          |                |            |
| ANTARES(R)      | 5.0680   | 351.0287 |         |          |                |            |
| CAPELLA(R)      | 154.7403 | 129.4603 |         |          |                |            |
| VEGA(B)         | 72.5021  | 71.1580  |         |          |                |            |
| ALDEBARAN(R)    | 169.4552 | 241.4019 |         |          |                |            |
| RIGEL(B)        | 143.2286 | 252.5738 |         |          |                |            |
| GAMMA CRUCIS(R) | 50.1713  | 245.7689 |         |          |                |            |
| SPICA(B)        | 40.8788  | 178.7554 |         |          |                |            |
| ACHERNAR(B)     | 92.0789  | 300.0718 |         |          |                |            |
| DENEK(R)        | 93.5775  | 59.8444  |         |          |                |            |
| PROCYON(B)      | 125.7806 | 202.8662 |         |          |                |            |

STAR DELAY: 2.6689 SEC 683.2447 PULSES DECIMAL = 10. COARSE + 43. FINE  
 74.1671 DEG 12 53 PULSES OCTAL CKAH SUB C = 149.8919 EPSILON = 7.7117 SCN =

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PN 10 PASS 3403 PR23 #070 S/W SM 0 DSS 43P RCVR AGC =123.9 FILE 10-1120 BD  
 SPACECRAFT ATTITUDE ON DAY 169 JUN 18, 1981 0000 GMT

06/17/81

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ELLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.1862 RCSPHAK = 240.7000

SPACECRAFT-EARTH DIRECTION: CLAT = -3.0229 CLON = 243.7304

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.8470 CLON = 244.5852

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PN 10 PASS 3403 PR23 #070 S/W SM 0 DSS 43P RCVR AGC =123.9 FILE 10-1120 BD  
 SPACECRAFT ATTITUDE ON DAY 169 JUN 18, 1981 0000 GMT  
 SPIN PERIOD = 12.955556 SEC RTLT = 7 HR 6 MIN 26.08 SEC

06/17/81

| S/C +Z AXIS     | CNA      | CKA      | CLAT    | CLON     | R (KM)         | R (AU)     |
|-----------------|----------|----------|---------|----------|----------------|------------|
| SUN             | 0.0000   | 0.0000   | -3.8470 | 244.5852 |                |            |
| SUN             | 1.8931   | 158.0451 | -3.1375 | 242.8268 | 0.369550260 10 | 24.7025575 |
| EARTH           | 1.1862   | 136.0220 | -3.0229 | 243.7304 | 0.383525700 10 | 25.6367447 |
| JUPITER         | 64.6465  | 178.1741 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)       | 123.6090 | 234.2701 |         |          |                |            |
| BETELGEUSE(R)   | 149.1855 | 220.7715 |         |          |                |            |
| CANOPUS(B)      | 97.0099  | 260.8731 |         |          |                |            |
| ARCTURUS(R)     | 52.0044  | 135.3421 |         |          |                |            |
| RIGIL KENTAURUS | 39.0408  | 263.6462 |         |          |                |            |
| ANTARES(R)      | 4.8545   | 351.3044 |         |          |                |            |
| CAPELLA(R)      | 154.9145 | 129.2072 |         |          |                |            |
| VEGA(B)         | 72.4875  | 71.2395  |         |          |                |            |
| ALDEBARAN(R)    | 169.5039 | 242.5419 |         |          |                |            |
| RIGEL(B)        | 143.2375 | 252.8748 |         |          |                |            |
| GAMMA CRUCIS(R) | 50.2064  | 245.6062 |         |          |                |            |
| SPICA(B)        | 41.0875  | 178.7110 |         |          |                |            |
| ACHERNAR(B)     | 91.9271  | 300.0910 |         |          |                |            |
| DENEK(B)        | 93.5210  | 59.8454  |         |          |                |            |
| PROCYON(B)      | 125.9502 | 202.9753 |         |          |                |            |

STAR DELAY: 2.6677 SEC 682.9193 PULSES DECIMAL = 10. COARSE + 43. FINE  
 74.1269 DEG 12 53 PULSES OCTAL CNAH SUB C = 150.7678 EPSILON = 7.2773 SCN = 10

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PN 10 PASS 3413 PR23 #070 S/W SM,0 DSS 14P RCVR AGC =123.9 FILE 10-1121 TKG  
 SPACECRAFT ATTITUDE ON DAY 178 JUN 27,1981 1400 GMT

06/27/81

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ELLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.9945 RCSPHAK = 219.0780

SPACECRAFT-EARTH DIRECTION: CLAT = -3.0317 CLON = 244.1065

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -4.0174 CLON = 244.2389

PN 10 PASS 3413 PR23 #070 S/W SM,0 DSS 14P RCVR AGC =123.9 FILE 10-1121 TKG  
 SPACECRAFT ATTITUDE ON DAY 178 JUN 27,1981 1400 GMT  
 SPIN PERIOD = 12.957270 SEC RTLT = 7 HR 6 MIN 28.01 SEC

06/29/81

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -4.0174 | 244.2389 |                |            |
| SUN             | 1.6133   | 146.9890 | -3.1374 | 242.8841 | 0.370659690 10 | 24.7767172 |
| EARTH           | 0.9945   | 97.6413  | -3.0317 | 244.1065 | 0.383554630 10 | 25.6386785 |
| JUPITER         | 64.3068  | 178.0636 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)       | 123.2687 | 234.1271 |         |          |                |            |
| BETELGEUSE(R)   | 148.8124 | 220.5880 |         |          |                |            |
| CANOPUS(B)      | 96.7866  | 260.8114 |         |          |                |            |
| ARCTURUS(R)     | 51.8794  | 135.0330 |         |          |                |            |
| RIGIL KENTAURUS | 38.8343  | 264.0249 |         |          |                |            |
| ANTARES(R)      | 2.1749   | 353.7193 |         |          |                |            |
| CAPELLA(R)      | 150.8256 | 129.9829 |         |          |                |            |
| VEGA(B)         | 72.7602  | 71.1306  |         |          |                |            |
| ALDEBARAN(R)    | 160.1910 | 241.3236 |         |          |                |            |
| RIGEL(B)        | 142.9719 | 252.4793 |         |          |                |            |
| GAMMA CRUCIS(R) | 49.9089  | 245.7874 |         |          |                |            |
| SPICA(B)        | 40.7463  | 178.4809 |         |          |                |            |
| ACHERNAR(B)     | 91.9527  | 300.0542 |         |          |                |            |
| DENEK(B)        | 93.8419  | 59.8353  |         |          |                |            |
| PROCYON(B)      | 125.5656 | 202.9674 |         |          |                |            |

STAR DELAY: 2.6702 SEC 683,5784 PULSES DECIMAL = 10, COARSE + 44, FINE  
 74.1886 DEC 12 54 PULSES OCTAL CKAH SUB C = 139,0189 EPSILON= 7.9701 SCN=10



PN 10 PASS 419 PR23 #0/0 S/W SK,0-DSS 14A RCVR AGC -130.2 FILE 10-1122 TS  
 SPACECRAFT ATTITUDE ON DAY 184 JUL 3, 1981 1300 GMT

07/07/81

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.9943 RCSPHAK = 206.4700

SPACECRAFT-EARTH DIRECTION: CLAT = -3.0385 CLON = 244.5255

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -4.0243 CLON = 244.1955

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PN 10 PASS 3419 PR23 #0/0 S/W SK,0 DSS 14A RCVR AGC -130.2 FILE 10-1122 TS  
 SPACECRAFT ATTITUDE ON DAY 184 JUL 3, 1981 1300 GMT  
 SPIN PERIOD = 12.958250 SEC RTLT = 7 HR 6 MIN 18.28 SEC

07/07/81

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -4.0243 | 244.1955 |                |            |
| SUN             | 1.5519   | 145.1870 | -3.1374 | 242.9195 | 0.371349130 10 | 24.8228028 |
| EARTH           | 0.9943   | 82.5004  | -3.0385 | 244.5255 | 0.383408800 10 | 25.6289305 |
| JUPITER         | 64.2638  | 178.0565 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)       | 127.2377 | 234.1038 |         |          |                |            |
| BETELGEUSE(R)   | 148.7751 | 220.5472 |         |          |                |            |
| CANOPUS(B)      | 96.7729  | 260.8034 |         |          |                |            |
| ARCTURUS(R)     | 51.8537  | 135.0022 |         |          |                |            |
| RIGIL KENTAURUS | 38.8230  | 264.0744 |         |          |                |            |
| ANTARES(R)      | 2.2172   | 353.8430 |         |          |                |            |
| CAPPELLA(R)     | 154.8031 | 130.0593 |         |          |                |            |
| VEGA(B)         | 72.7807  | 71.1155  |         |          |                |            |
| ALDEBARAN(R)    | 169.1641 | 241.1396 |         |          |                |            |
| RIGEL(B)        | 142.9523 | 252.4243 |         |          |                |            |
| GAMMA CRUCIS(R) | 40.8849  | 245.0152 |         |          |                |            |
| SFICA(B)        | 40.7032  | 178.4688 |         |          |                |            |
| ACHERNAH(B)     | 91.9684  | 300.0498 |         |          |                |            |
| DENEK(B)        | 93.8696  | 59.8348  |         |          |                |            |
| PROCYON(B)      | 125.5231 | 202.9568 |         |          |                |            |

STAR DELAY: 2.6707 SEC 683.7037 PULSES DECIMAL = 10, COARSE + 44, FINE  
 74.1966 DEG 12 54 PULSES OCTAL CKAH SUB C = 137.0523 EPSILON = 8.1347 SCN=10

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N 10 PASS 26 PR23 #0/0 S/W SK.0 DSS 14 RCVR AGC -123.9 FILE 10-1123 TG 07/13/81  
 SPACECRAFT ATTITUDE ON DAY 191 JUL 10, 1981 1330 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC PCLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.8695 RCSPHAK = 193.6440  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.0476 CLUN = 244.5663  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.8943 CLUN = 244.3683

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N 10 PASS 3426 PR23 #0/0 S/W SK.0 DSS 14 RCVR AGC -123.9 FILE 10-1123 TG 07/13/81  
 SPACECRAFT ATTITUDE ON DAY 191 JUL 10, 1981 1330 GMT  
 SPIN PERIOD = 12.959470 SEC RTLT = 7 HR 6 MIN 1.07 SEC

|                 | CNA      | CKA      | CLAT    | CLUN     | R(KM)          | R(AU)    |
|-----------------|----------|----------|---------|----------|----------------|----------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.8943 | 244.3683 | -              | -        |
| SUN             | 1.5955   | 151.7208 | -3.1373 | 242.9612 | 0.372161790 10 | 24.87712 |
| EARTH           | 0.8695   | 76.8572  | -3.0476 | 244.5663 | 0.383150920 10 | 25.61169 |
| JUPITER         | 64.4318  | 178.1336 | 0.0000  | 180.0000 | 0.000000000    | 0.000000 |
| SIRIUS(B)       | 123.4440 | 234.1575 |         |          |                |          |
| BETELGEUSL(R)   | 148.9905 | 220.5813 |         |          |                |          |
| CANOPUS(B)      | 96.9287  | 260.8333 |         |          |                |          |
| ARCTURUS(R)     | 51.8840  | 135.1819 |         |          |                |          |
| RIGIL KENTAUURS | 38.9703  | 263.8908 |         |          |                |          |
| ANTARES(R)      | 5.0619   | 352.1878 |         |          |                |          |
| CAPELLA(R)      | 154.8137 | 129.6129 |         |          |                |          |
| VEGA(B)         | 72.6020  | 71.1652  |         |          |                |          |
| ALDEBARAN(R)    | 169.3608 | 241.6213 |         |          |                |          |
| RIGEL(B)        | 143.1281 | 252.6029 |         |          |                |          |
| GAMMA CRUCIS(R) | 50.0741  | 245.7398 |         |          |                |          |
| SPICA(B)        | 40.8723  | 178.6361 |         |          |                |          |
| ACHERNAR(B)     | 91.9946  | 300.0691 |         |          |                |          |
| DENEK(B)        | 93.6706  | 59.8410  |         |          |                |          |
| PROCYON(B)      | 125.7325 | 202.9312 |         |          |                |          |

STAR DELAY: 2.6699 SEC 683.4927 PULSES DECIMAL = 10. COARSE + 43. FINE  
 74.1667 DEG 12 53 PULSES OCTAL CKAH SUB C = 143.7036 EPSILON= 8.0172 SCN

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PN 10 PASS 3428 PR23 #0/0 S/W SK.0 DSS 43P RCVR AGC -125.6 FILE 10-1124 RS 07/13/81  
 SPACECRAFT ATTITUDE ON DAY 194 JUL 13, 1981 0000 GMT

RCLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC PCLE.

RCLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.0788 RCSPHAK = 189.1370  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.0511 CLON = 244.6451  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -4.0217 CLON = 244.1732

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PN 10 PASS 3428 PR23 #0/0 S/W SK.0 DSS 43P RCVR AGC -125.6 FILE 10-1124 RS 07/13/81  
 SPACECRAFT ATTITUDE ON DAY 194 JUL 13, 1981 0000 GMT  
 SPIN PERIOD = 12.959830 SEC RTLT = 7 HR 5 MIN 47.08 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -4.0217 | 244.1732 | -              | -          |
| SUN             | 1.4869   | 143.5421 | -3.1373 | 242.9756 | 0.372443840 10 | 24.8959786 |
| EARTH           | 1.0788   | 64.0978  | -3.0511 | 244.6451 | 0.382941100 10 | 25.5976671 |
| JUPITER         | 64.2414  | 178.0559 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)       | 123.2268 | 234.0894 |         |          |                |            |
| BETELGEUSE(R)   | 148.7598 | 220.5184 |         |          |                |            |
| CANOPUS(B)      | 96.7720  | 260.7991 |         |          |                |            |
| ARCTURUS(R)     | 51.8360  | 134.9897 |         |          |                |            |
| RIGIL KENTAURUS | 38.8233  | 264.1008 |         |          |                |            |
| ANTARES(R)      | 5.2396   | 353.8391 |         |          |                |            |
| CAPELLA(R)      | 154.7867 | 130.0904 |         |          |                |            |
| VEGA(B)         | 72.7855  | 71.1072  |         |          |                |            |
| ALDEBARAN(R)    | 169.1557 | 241.0294 |         |          |                |            |
| RIGEL(B)        | 142.9481 | 252.3936 |         |          |                |            |
| GAMMA CRUCIS(R) | 49.8782  | 245.8316 |         |          |                |            |
| SPICA(B)        | 40.6809  | 178.4693 |         |          |                |            |
| ACHERNAR(B)     | 91.9819  | 300.0476 |         |          |                |            |
| DENEK(B)        | 93.8785  | 59.8344  |         |          |                |            |
| PROCYON(B)      | 125.5036 | 202.9473 |         |          |                |            |

STAR DELAY: 2.6712 SEC 683.8261 PULSES DECIMAL = 10. COARSE + 44. FINE  
 74.2009 DEG 12 54 PULSES OCTAL CKAH SUB C = 135.2279 EPSILON= 8.3142 SCN=

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FIMMEL

PN 10 PASS 3431 PR23 40/0 S/W SA.0 USS 14 RCVP GC =125.6 FILE 10-1126 TG 7/15/81  
SPACECRAFT ATTITUDE ON DAY 196 JUL 15, 1981 1200 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSFAK IS TOWARD SOUTH ELLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRKS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.5375 RCSFAK = 175.8670

SPACECRAFT-EARTH DIRECTION: CLAT = -3.0548 CLON = 244.7231

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3856 CLON = 244.0565

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PN 10 PASS 3431 PR23 40/0 S/W SA.0 USS 14 RCVP GC =125.6 FILE 10-1126 TG 07/15/81  
SPACECRAFT ATTITUDE ON DAY 196 JUL 15, 1981 1200 GMT  
SPIN PERIOD = 12.950590 SEC RTLT = 7 HR 5 MIN 35.83 SEC

|                 | ORA      | ORA      | CLAT    | CLON     | R(KM)          | R(AL)     |
|-----------------|----------|----------|---------|----------|----------------|-----------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3856 | 244.0565 | -              | -         |
| SUN             | 1.0219   | 171.5560 | -3.1373 | 242.4903 | 0.372733090 10 | 24.915313 |
| EARTH           | 0.3375   | 78.0419  | -3.0548 | 244.7231 | 0.382772570 10 | 25.586401 |
| JUPITER         | 64.7038  | 178.3978 | 0.0000  | 180.0000 | 0.00000000     | 0.000000  |
| SIRIUS(B)       | 124.2248 | 234.1325 |         |          |                |           |
| BETELGEUSE(R)   | 149.5393 | 220.2619 |         |          |                |           |
| CARCUS(B)       | 97.4767  | 260.0772 |         |          |                |           |
| ARCTURUS(R)     | 51.7317  | 135.0440 |         |          |                |           |
| HIGIL KENTALHUS | 39.5072  | 263.0207 |         |          |                |           |
| ANTARES(R)      | 6.8763   | 345.0285 |         |          |                |           |
| CAPELLA(R)      | 154.5998 | 128.4004 |         |          |                |           |
| VEGA(B)         | 72.0278  | 71.2100  |         |          |                |           |
| ALDEBARAN(R)    | 169.9450 | 241.7034 |         |          |                |           |
| HIGEL(B)        | 143.6993 | 252.7872 |         |          |                |           |
| GAMMA CRUCIS(R) | 50.6561  | 245.7142 |         |          |                |           |
| SPICA(B)        | 41.1504  | 179.2454 |         |          |                |           |
| ACHERNAR(B)     | 92.2906  | 300.1002 |         |          |                |           |
| DENEH(B)        | 93.0263  | 59.6597  |         |          |                |           |
| PROCYON(B)      | 126.1948 | 202.6901 |         |          |                |           |

STAR DELAY: 2.6683 SEC 683.0934 PULSES DECIMAL = 10, COARSE + 43, FINE  
74.1228 DEG 12 53 PULSES OCTAL CKAH SUB C = 163.7651 EPSILON = 7.7916 SCN =

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FIMMEL

PN 10 PASS 3433 FR23 #070 S/W SN.0 DSS 43P RCVR AGC -123 FILE 10-1127 RS 07/20/81  
SPACECRAFT ATTITUDE ON DAY 198 JUL 17, 1981 2145 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRHS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.3554 RCSPHAK = 162.8490

SPACECRAFT-EARTH DIRECTION: CLAT = -3.0585 CLON = 244.7954

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3817 CLON = 244.6474

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PN 10 PASS 3433 FR23 #070 S/W SN.0 DSS 43P RCVR AGC -123 FILE 10-1127 RS 07/20/81  
SPACECRAFT ATTITUDE ON DAY 198 JUL 17, 1981 2145 GMT  
SPIN PERIOD = 12.950950 SEC KILT = 7 HR 5 MIN 23.96 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R (KM)         | R (AU)     |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3817 | 244.6474 | -              | -          |
| SUN             | 1.6554   | 171.5705 | -3.1373 | 243.0045 | 0.37501146D 10 | 24.9339211 |
| EARTH           | 0.3554   | 65.4312  | -3.0585 | 244.7954 | 0.38259465D 10 | 25.5745087 |
| JUPITER         | 64.6907  | 178.3990 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 124.0227 | 234.1255 |         |          |                |            |
| BETELGEUSE(R)   | 149.5349 | 220.2463 |         |          |                |            |
| CANOPUS(B)      | 97.4791  | 260.8754 |         |          |                |            |
| ARCTURUS(R)     | 51.7225  | 135.6407 |         |          |                |            |
| RIGIL KENTAURUS | 39.5101  | 263.6376 |         |          |                |            |
| ANTARES(R)      | 0.8860   | 345.8094 |         |          |                |            |
| CAPELLA(R)      | 154.5911 | 128.4896 |         |          |                |            |
| VEGA(B)         | 72.0270  | 71.2143  |         |          |                |            |
| ALDEBARAN(R)    | 169.9442 | 241.6475 |         |          |                |            |
| RIGEL(B)        | 143.7004 | 252.7733 |         |          |                |            |
| GAMMA CRUCIS(R) | 50.6554  | 245.7218 |         |          |                |            |
| SPICA(B)        | 41.1413  | 179.2492 |         |          |                |            |
| ACHERNAB(B)     | 92.2989  | 300.1055 |         |          |                |            |
| DENEK(B)        | 93.0875  | 59.6597  |         |          |                |            |
| PROCYON(B)      | 126.1880 | 262.6844 |         |          |                |            |

STAR DELAY: 2.6685 SEC 683.1293 PULSES DECIMAL = 10. COARSE + 43, FINE  
74.1246 DEG 12 53 PULSES OCTAL CKAH SUB C = 163,7182 EPSILON = 7.8521 SCN=10

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PN 10 PASS 3440 PR23 #070 S/W SK.0 DSS 14P RCVR AGC -123.9 FILE 10-1128 TG 07/24/81  
 SPACECRAFT ATTITUDE ON DAY 205 JUL 24, 1981 1130 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPEAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRHS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.4481 RCSPHAK = 134.3200

SPACECRAFT-EARTH DIRECTION: CLAT = -3.0692 CLON = 244.9787

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3414 CLON = 244.6222

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 PN 10 PASS 3440 PR23 #070 S/W SK.0 DSS 14P RCVR AGC -123.9 FILE 10-1128 TG 07/24/81  
 SPACECRAFT ATTITUDE ON DAY 205 JUL 24, 1981 1130 GMT  
 SPIN PERIOD = 12.961050 SEC RFLT = 7 HR 4 MIN 46.40 SEC

|                  | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|------------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS      | 0.0000   | 0.0000   | -3.3414 | 244.6222 | -              | -          |
| SUN              | 1.5828   | 172.0639 | -3.1372 | 243.0431 | 0.373771810 10 | 24.9847467 |
| EARTH            | 0.4481   | 37.4049  | -3.0692 | 244.9787 | 0.382031590 10 | 25.5368710 |
| JUPITER          | 62.6084  | 178.4163 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)        | 124.0405 | 234.0942 |         |          |                |            |
| BETELGEUSE (R)   | 140.5417 | 220.1644 |         |          |                |            |
| CANOPUS (F)      | 97.5149  | 260.8698 |         |          |                |            |
| ARCTURUS (B)     | 51.0763  | 135.6481 |         |          |                |            |
| RIGIL KENTAURUS  | 30.5474  | 263.0719 |         |          |                |            |
| ANTARES (R)      | 6.9204   | 345.4260 |         |          |                |            |
| CAPELLA (R)      | 154.5439 | 128.4769 |         |          |                |            |
| VEGA (B)         | 71.9970  | 71.2009  |         |          |                |            |
| ALDEBARAN (R)    | 169.9676 | 241.4125 |         |          |                |            |
| RIGEL (B)        | 143.7314 | 252.7228 |         |          |                |            |
| GAMMA CRUCIS (R) | 50.0023  | 245.7527 |         |          |                |            |
| SPICA (B)        | 47.1156  | 179.2935 |         |          |                |            |
| ACHERNAB (B)     | 92.3400  | 300.1039 |         |          |                |            |
| DENEB (B)        | 93.0653  | 59.8605  |         |          |                |            |
| PROCYON (B)      | 126.1803 | 202.6486 |         |          |                |            |

STAR DELAY: 2.6689 SEC 683.2389 PULSES DECIMAL = 10, COARSE + 43, FINE  
 74.1302 DEG 12 53 PULSES OCIAL CKAH SUB C = 164.6314 EPSILON = 8.0326 SCN = 10  
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N 10 MASS 3448 PR23 4070 S/W SK.0 DSS 14P RCVR ACC -125.6 FILE 10-1129 TG  
 SPACECRAFT ATTITUDE ON DAY 213 AUG 1, 1981 1000 GMT

08/01/81

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPEAK IS TOWARD SOUTH ELLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRHS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.6390 RCSPEAK = 125.4740  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.0832 CLON = 245.1699  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3636 CLON = 244.5948

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10 MASS 3448 PR23 4070 S/W SK.0 DSS 14P RCVR ACC -125.6 FILE 10-1129 TG  
 SPACECRAFT ATTITUDE ON DAY 213 AUG 1, 1981 1000 GMT  
 SPIN PERIOD = 12.852400 SEC RTLT = 7 HR 3 MIN 52.19 SEC

08/01/81

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3636 | 244.5948 |                |            |
| SUN             | 1.5199   | 171.4721 | -3.1371 | 245.0895 | 0.374689540 10 | 25.0461123 |
| EARTH           | 0.6390   | 26.0128  | -3.0832 | 245.1699 | 0.381218950 10 | 25.4825508 |
| JUPITER         | 64.6417  | 178.4038 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)       | 124.0065 | 234.0865 |         |          |                |            |
| BETELGEUSE(R)   | 149.5065 | 220.1621 |         |          |                |            |
| CANOPUS(B)      | 97.4886  | 260.0652 |         |          |                |            |
| ARCTURUS(R)     | 51.6723  | 135.6166 |         |          |                |            |
| RIGIL KENTAUUS  | 39.5223  | 263.7002 |         |          |                |            |
| ANTARES(R)      | 4.9413   | 345.7525 |         |          |                |            |
| CAPELLA(R)      | 154.5443 | 128.5492 |         |          |                |            |
| VEGA(B)         | 72.0268  | 71.1932  |         |          |                |            |
| ALDEBARAN(R)    | 169.9350 | 241.3356 |         |          |                |            |
| RIGEL(B)        | 143.7120 | 252.6947 |         |          |                |            |
| GAMMA CRUCIS(R) | 50.6508  | 245.7640 |         |          |                |            |
| SPICA(B)        | 41.0886  | 179.2660 |         |          |                |            |
| ACHERNAH(B)     | 92.3005  | 300.1009 |         |          |                |            |
| DENEK(B)        | 93.0982  | 59.8595  |         |          |                |            |
| PROCYON(B)      | 126.1465 | 202.6545 |         |          |                |            |

STAR DELAY: 2.6693 SEC 085.3533 PULSES DECIMAL = 10, COARSE + 43, FINE  
 74.1348 DEG 12 53 PULSES OCTAL CKAH SUB C = 165.2497 EPSILON = 8.2224 SCN=10

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PN 10 PASS 3453 PR23 40% S/W SK,0 DSS 14P RCVR AGC =122.2 FILE 10-1130 TG 08/06/81  
 SPACECRAFT ATTITUDE ON DAY 218 AUG 6,1981 1030 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ELLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.7444 RCSPHAK = 119.5730

SPACECRAFT-EARTH DIRECTION: CLAT = -3.0927 CLON = 245.2726

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3669 CLON = 244.5795

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 PN 10 PASS 3453 PR23 40% S/W SK,0 DSS 14P RCVR AGC =122.2 FILE 10-1130 TG 08/06/81  
 SPACECRAFT ATTITUDE ON DAY 218 AUG 6,1981 1030 GMT  
 SPIN PERIOD = 12.963270 SEC RILT = 7 HR 3 MIN 13.70 SEC

|                 | CMA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3669 | 244.5795 |                |            |
| SUN             | 1.4764   | 171.0871 | -3.1371 | 243.1187 | 0.375270430 10 | 25.0849218 |
| EARTH           | 0.7444   | 21.5980  | -3.0927 | 245.2726 | 0.380642040 10 | 25.4439866 |
| JUPITER         | 64.6265  | 178.4011 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 123.9949 | 234.0785 |         |          |                |            |
| BETELGEUSE(R)   | 149.4927 | 220.1487 |         |          |                |            |
| CANOPUS(B)      | 97.4830  | 260.8623 |         |          |                |            |
| ARCTURUS(R)     | 51.6636  | 135.0076 |         |          |                |            |
| RIGIL KENTAURUS | 39.5174  | 263.7174 |         |          |                |            |
| ANTARES(R)      | 4.9554   | 345.8313 |         |          |                |            |
| CAPELLA(R)      | 150.5372 | 128.5777 |         |          |                |            |
| VEGA(B)         | 75.0348  | 71.1879  |         |          |                |            |
| ALDEBARAN(R)    | 189.9248 | 241.2678 |         |          |                |            |
| RIGEL(B)        | 143.0944 | 252.6752 |         |          |                |            |
| GAMMA CRUCIS(R) | 50.6416  | 245.7735 |         |          |                |            |
| SPICA(B)        | 41.0733  | 179.2612 |         |          |                |            |
| ACHERNAR(B)     | 99.3453  | 300.0994 |         |          |                |            |
| DENEBO(B)       | 93.1087  | 59.0593  |         |          |                |            |
| PROCYON(B)      | 126.1311 | 202.0513 |         |          |                |            |

STAR DELAY: 2.0696 SEC 083.4304 PULSES DECIMAL = 10. COARSE + 43. FINE  
 74.1377 DFG 12 53 PULSES OCIAL CKAH SUB C = 162.7435 EPSILON = 8.3436 SCN=10



PN 11 PASS 3163 PRI4 #070 S/W SK.0 OSS 61A RCVR AGC +138.1 FILE 11-1355 CJ  
 SPACECRAFT ATTITUDE ON DAY 328 NOV 24, 1981 1100 GMT

11/24/81

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

*Broomhall*

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,2328 RCSPHAK = 336,2140  
 SPACECRAFT-EARTH DIRECTION: CLAT = +12,1461 CLON = 33,2757  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = +11,9134 CLON = 33,2692

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PN 11 PASS 3163 PRI4 #070 S/W SK.0 OSS 61A RCVR AGC +138.1 FILE 11-1355 CJ 11/24/81  
 SPACECRAFT ATTITUDE ON DAY 328 NOV 24, 1981 1100 GMT  
 SPIN PERIOD = 7,509886 SEC RFLT = 3 HR 18 MIN 16,94 SEC

|                  | ENA      | CKA      | CLAT     | CLON     | H (KM)         | H (AU)     |
|------------------|----------|----------|----------|----------|----------------|------------|
| S/C +Z AXIS      | 0,0000   | 0,0000   | +11,9134 | 33,2692  |                |            |
| SUN              | 2,6908   | 205,9462 | +13,0796 | 30,7853  | 0,16579836D 10 | 11,0827781 |
| EARTH            | 0,2328   | 271,5483 | +12,1461 | 33,2757  | 0,17833063D 10 | 11,9204967 |
| JUPITER          | 144,8943 | 342,5347 | 0,0000   | 180,0000 | 0,00000000     | 0,0000000  |
| SIRIUS (B)       | 63,4297  | 321,8451 |          |          |                |            |
| BETELGEUSE (R)   | 57,5042  | 348,7560 |          |          |                |            |
| CANOPUS (B)      | 73,9290  | 283,9689 |          |          |                |            |
| ARCTURUS (R)     | 150,2497 | 66,6657  |          |          |                |            |
| RIGIL KENTAURUS  | 120,5597 | 248,0840 |          |          |                |            |
| ANTARES (R)      | 140,4745 | 202,5544 |          |          |                |            |
| CAPPELLA (R)     | 58,6388  | 36,4145  |          |          |                |            |
| VEGA (B)         | 100,1142 | 118,4111 |          |          |                |            |
| ALDEBARAN (R)    | 26,2837  | 7,0525   |          |          |                |            |
| RIGEL (B)        | 44,1661  | 327,2454 |          |          |                |            |
| GAMMA CRUCIS (R) | 120,1950 | 267,5863 |          |          |                |            |
| SPICA (B)        | 162,9788 | 305,4901 |          |          |                |            |
| ACKERAK (B)      | 50,4012  | 243,7653 |          |          |                |            |
| DENEK (B)        | 85,4577  | 115,3365 |          |          |                |            |
| PROCYON (B)      | 79,3225  | 345,6912 |          |          |                |            |

STAR DELAY: 1,0645 SEC 272,5247 PULSES DECIMAL = 4, COARSE + 17, FINE  
 51,0311 DEG 04 21 PULSES DIGITAL CKAH SUB C = 205,9462 EPSILON = 0,0000 SCN = 11

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1354

11 PASS 4070 S/W 54.0 OSS 63A RCVR 134.9 FILE 11-1352 TS  
SPACECRAFT ATTITUDE ON DAY 321 NOV 17, 1981 1300 GMT

11/1

ROLL REFERENCE BODY IS SUN. SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPNAK IS TOWARD SOUTH ELLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRKS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RLSBANGAK = 0.8186 RCSPNAK = 254.2910

SPACECRAFT-EARTH DIRECTION: CLAT = -12.0424 CLON = 32.4667

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -11.9456 CLON = 33.2977

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11 PASS 4156 PRIO 4070 S/W 54.0 OSS 63A RCVR AGC = 134.9 FILE 11-1352 TS 11/17/81  
SPACECRAFT ATTITUDE ON DAY 321 NOV 17, 1981 1300 GMT  
SPIN PERIOD = 7.569886 SEC RILT = 3 HR 18 MIN 36.41 SEC

|                  | CMA      | LRA      | CLAT     | CLON     | R (KM)         | R (AU)     |
|------------------|----------|----------|----------|----------|----------------|------------|
| S/C +Z AXIS      | 0.0000   | 0.0000   | -11.9456 | 33.2977  | -              | -          |
| SUN              | 2.9554   | 201.7207 | -13.0250 | 30.4798  | 0.165350350 10 | 11.0528309 |
| EARTH            | 0.8186   | 186.8720 | -12.0424 | 32.4667  | 0.178622520 10 | 11.9400080 |
| JUPITER          | 146.8581 | 342.5088 | 0.0000   | 180.0000 | 0.000000000    | 0.0000000  |
| SATURN (R)       | 69.3878  | 321.8544 |          |          |                |            |
| BETELGEUSE (R)   | 54.4708  | 308.7812 |          |          |                |            |
| CANCER (R)       | 73.8910  | 283.9692 |          |          |                |            |
| ARCTURUS (R)     | 156.2682 | 66.5703  |          |          |                |            |
| RIGIL KENTAURUS  | 120.5402 | 248.1122 |          |          |                |            |
| ANIAKES (R)      | 140.4879 | 202.8093 |          |          |                |            |
| CAPRELLA (R)     | 58.8355  | 38.4483  |          |          |                |            |
| VEGA (R)         | 109.1550 | 110.4130 |          |          |                |            |
| ALDEBARAN (R)    | 36.2600  | 7.1006   |          |          |                |            |
| RIGEL (R)        | 48.1253  | 327.2637 |          |          |                |            |
| GAMMA CRUCIS (R) | 133.1640 | 267.6091 |          |          |                |            |
| SPICA (R)        | 163.9364 | 305.5089 |          |          |                |            |
| ACHERNAB (R)     | 78.3846  | 243.7480 |          |          |                |            |
| UENEB (R)        | 65.4987  | 113.3433 |          |          |                |            |
| PROCYON (R)      | 79.2875  | 345.7017 |          |          |                |            |

STAR DELAY: 1.0645 SEC 272.5224 PULSES DECIMAL = 4, COARSE + 17, FINE  
51.0308 DEG 04 21 PULSES OCTAL CMAH SUB C = 201.7207 EPSILON = 0.0000 SCN = 11

PN 11 PASS 3153 PR14 #2/8 S/W SK.0 DSS 63A PCVR AGC -139.7 FILE 11-1353 TS 11/16/81  
 SPACECRAFT ATTITUDE ON DAY 319 NOV 15, 1981 0700 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR PCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.0696 RCSPHAK = 254.5350

SPACECRAFT-EARTH DIRECTION: CLAT = -12.0110 CLON = 32.1982

NEW ATTITUDE  
POST-PRECESSION

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -11.8706 CLON = 33.2820

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PN 11 PASS 3153 PR14 #2/8 S/W SK.0 DSS 63A PCVR AGC -139.7 FILE 11-1353 TS 11/16/81  
 SPACECRAFT ATTITUDE ON DAY 319 NOV 15, 1981 0700 GMT  
 SPIN PERIOD = 7.509764 SEC RTLT = 3 HR 18 MIN 40.43 SEC

|                 | CMA      | CKA      | CLAT     | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|----------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -11.8706 | 33.2820  | -              | -          |
| SUN             | 3.0531   | 202.1608 | -13.0071 | 30.3801  | 0.165205250 10 | 11.0431317 |
| EARTH           | 1.0696   | 187.6549 | -12.0110 | 32.1982  | 0.178682750 10 | 11.9440341 |
| JUPITER         | 144.8953 | 342.6007 | 0.0000   | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)       | 67.4463  | 321.8306 |          |          |                |            |
| BETFLGEUSE(R)   | 53.5003  | 348.7257 |          |          |                |            |
| CANOPUS(B)      | 73.9675  | 283.0651 |          |          |                |            |
| ARCTURUS(R)     | 159.2055 | 66.6829  |          |          |                |            |
| PIGIL KENTAURUS | 120.6040 | 248.0840 |          |          |                |            |
| ANTARES(R)      | 140.5024 | 202.5148 |          |          |                |            |
| CAPEILA(R)      | 58.6034  | 36.4006  |          |          |                |            |
| VEGA(B)         | 109.0825 | 118.4029 |          |          |                |            |
| ALDEBARAN(R)    | 26.2661  | 6.9993   |          |          |                |            |
| RIGEL(B)        | 44.1789  | 327.2041 |          |          |                |            |
| GAMMA CRUCIS(R) | 120.2383 | 267.5951 |          |          |                |            |
| SPICA(B)        | 163.0064 | 305.6072 |          |          |                |            |
| ACHERNAR(B)     | 59.4451  | 243.7725 |          |          |                |            |
| DFNEB(B)        | 85.4243  | 115.3414 |          |          |                |            |
| PROCYON(B)      | 79.3210  | 345.6855 |          |          |                |            |

STAR DELAY: 1.0646 SEC 272.5407 PULSES DECIMAL = 4. COARSE + 17. FINE  
 51.0249 DEC 04 21 PULSES OCTAL CKAH SUB C = 202.1608 EPSILON= 0.0000 SCN=11

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PN 11 PASS 3153 PR14 #0/0 S/W SK.0 DSS 42A RCVR AGC -139.7 FILE 11-1352 TG 11/17/81

SPACECRAFT ATTITUDE ON DAY 319 NOV 15, 1981 0000 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRSS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.0234 RCSPHAK = 319.9600

SPACECRAFT-EARTH DIRECTION: CLAT = -12.0071 CLON = 32.1634

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -11.0024 CLON = 31.9644

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PN 11 PASS 3153 PR14 #0/0 S/W SK.0 DSS 42A RCVR AGC -139.7 FILE 11-1352 TG 11/17/81

SPACECRAFT ATTITUDE ON DAY 319 NOV 15, 1981 0000 GMT

SPIN PERIOD = 7.514403 SEC RTLT = 3 HR 18 MIN 40.89 SEC

|                 | CNA      | CKA      | CLAT     | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|----------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -11.0024 | 31.9644  | -              | -          |
| SUN             | 2.5396   | 232.2019 | -13.0048 | 30.2672  | 0.165186750 10 | 11.0418951 |
| EARTH           | 1.0234   | 230.9692 | -12.0071 | 32.1634  | 0.178689600 10 | 11.9444920 |
| JUPITER         | 146.3858 | 342.9938 | 0.0000   | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 68.9979  | 321.6166 |          |          |                |            |
| BETELGEUSE(R)   | 54.9402  | 343.0390 |          |          |                |            |
| CANCORUS(B)     | 75.1219  | 293.9923 |          |          |                |            |
| ARCTURUS(R)     | 152.8699 | 70.3391  |          |          |                |            |
| RIGIL KENTAURUS | 120.9119 | 246.9140 |          |          |                |            |
| ANTARES(R)      | 129.6215 | 200.7212 |          |          |                |            |
| CAPELLA(R)      | 59.1423  | 35.2577  |          |          |                |            |
| VEGA(B)         | 107.7046 | 113.3821 |          |          |                |            |
| ALDEBARAN(R)    | 37.4563  | 5.4007   |          |          |                |            |
| RIGEL(B)        | 45.7348  | 326.9164 |          |          |                |            |
| GAMMA CRUCIS(R) | 121.0394 | 266.5435 |          |          |                |            |
| SPICA(B)        | 164.4535 | 303.2823 |          |          |                |            |
| ACHERNAR(B)     | 59.6518  | 244.4171 |          |          |                |            |
| DENEK(B)        | 84.0892  | 115.0068 |          |          |                |            |
| PROCYON(B)      | 80.7886  | 345.3335 |          |          |                |            |

STAR DELAY: 1.0647 SEC 272.5634 PULSES DECIMAL = 4. COARSE + 17. FINE

51.0077 DEG 04 21 PULSES OCTAL CKAH SUB C = 232.2019 EPSILON= 0.0000 SCN=11

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11 PASS 3149 PRI4 4070 S/W SK.0 OSS 63A RCVR AGC = 138.1 FILE 11-1351 TS  
 SPACECRAFT ATTITUDE ON DAY 314 NOV 10, 1981 1300 GMT

11/10/81

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR ROSEPHAK IS TOWARD SOUTH ELLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 KCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: KCSANGAK = 1.0336 KCSPHAK = 291.5820  
 SPACECRAFT-EARTH DIRECTION: CLAT = -11.9488 CLON = 31.0239  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -10.9916 CLON = 32.0216

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 11 PASS 3149 PRI4 4070 S/W SK.0 OSS 63A RCVR AGC = 138.1 FILE 11-1351 TS 11/10/81  
 SPACECRAFT ATTITUDE ON DAY 314 NOV 10, 1981 1300 GMT  
 SPIN PERIOD = 7.510403 SEC RTLT = 3 HR 18 MIN 45.09 SEC

|                 | CNA      | CKA      | CLAT     | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|----------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -10.9916 | 32.0216  | -              | -          |
| SUN             | 270.0222 | 227.6874 | -12.9691 | 30.1691  | 0.16490003D 10 | 11.0227293 |
| EARTH           | 1.0336   | 247.8862 | -11.9488 | 31.0239  | 0.17875265D 10 | 11.9487000 |
| JUPITER         | 146.3352 | 343.0451 | 0.0000   | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 62.9807  | 321.6109 |          |          |                |            |
| BETELGEUSE(R)   | 52.8875  | 348.0343 |          |          |                |            |
| CANCRUS(B)      | 75.1189  | 283.9860 |          |          |                |            |
| ARCTURUS(R)     | 158.8407 | 70.2727  |          |          |                |            |
| RIGIL KENTAURUS | 120.9439 | 246.9542 |          |          |                |            |
| ANTARES(R)      | 139.6779 | 200.7435 |          |          |                |            |
| CAPELLA(R)      | 56.0901  | 35.2827  |          |          |                |            |
| VEGA(B)         | 107.7218 | 118.3756 |          |          |                |            |
| ALDEBARAN(R)    | 37.3994  | 5.4044   |          |          |                |            |
| RIGEL(B)        | 45.6936  | 326.8885 |          |          |                |            |
| GAMMA CRUCIS(R) | 121.0538 | 260.5878 |          |          |                |            |
| SPICA(B)        | 164.4316 | 303.5841 |          |          |                |            |
| ACHERNAB(B)     | 56.6959  | 244.4011 |          |          |                |            |
| DENEK(B)        | 84.1031  | 115.0235 |          |          |                |            |
| PROCYON(B)      | 87.7370  | 345.3404 |          |          |                |            |

STAR DELAY: 7.0648 SEC 272.5862 PULSES DECIMAL = 4. COARSE + 17. FINE  
 51.0120 DEC 04 21 PULSES OCTAL CNAH SUB C = 227.6874 EPSILON= 0.0000 SEN=11.

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NEW ATTITUDE  
POST-PRECESSION

NOTE: PRE-PRECESSION - NO SOLUTION  
DUE TO SUN NOT E OR RIGHT S/C ON LEFT

PN 11 PASS 3144 FR14 4070 S/W SA 0 DSS 42A RCVR AGC -141.1 FILE 11-1350 TG 11/05/81  
SPACECRAFT ATTITUDE ON DAY 310 NOV 6, 1981 0000 GMT 1148 or 1149

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPEAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 160 RCSTPOS = 180  
AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.3074 RCSPHAK = 272.0300  
SPACECRAFT-EARTH DIRECTION: CLAT = -11.8943 CLON = 31.0666  
SPACECRAFT +Z AXIS ATTITUDE: CLAT = -10.9393 CLON = 31.9776

PN 11 PASS 3144 FR14 4070 S/W SA 0 DSS 42A RCVR AGC -141.1 FILE 11-1350 TG 11/05/81  
SPACECRAFT ATTITUDE ON DAY 310 NOV 6, 1981 0000 GMT  
SPIN PERIOD = 7.514281 SEC KTLT = 3 HR 18 MIN 44.70 SEC

|                 | CNA      | CKA      | CLAT     | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|----------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -10.9393 | 31.9776  | -              | -          |
| SUN             | 225.5755 | 225.5755 | -12.9325 | 29.9667  | 0.16460944E+10 | 11.6053048 |
| EARTH           | 1.3074   | 227.0111 | -11.8943 | 31.0666  | 0.17874672E+10 | 11.4465102 |
| JUPITER         | 146.3917 | 343.0929 | 0.0000   | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 66.0269  | 321.5971 |          |          |                |            |
| BETELGEUSE(R)   | 54.9406  | 347.9963 |          |          |                |            |
| CANOPUS(B)      | 75.1801  | 283.9674 |          |          |                |            |
| ARCTURUS(R)     | 152.8000 | 70.4146  |          |          |                |            |
| RIGIL KENTAURUS | 120.9751 | 240.9097 |          |          |                |            |
| ANTARES(R)      | 136.6560 | 200.6596 |          |          |                |            |
| CAPELLA(R)      | 30.0952  | 35.2339  |          |          |                |            |
| VEGA(B)         | 107.6553 | 118.3714 |          |          |                |            |
| ALDEBARAN(R)    | 37.4375  | 5.3227   |          |          |                |            |
| RIGEL(B)        | 46.7583  | 326.8605 |          |          |                |            |
| GAMMA CRUCIS(R) | 127.1032 | 266.5510 |          |          |                |            |
| SPICA(B)        | 164.4990 | 303.5503 |          |          |                |            |
| ACHERNAB(B)     | 56.7244  | 244.4287 |          |          |                |            |
| DENEK(B)        | 84.0375  | 115.0133 |          |          |                |            |
| PROCYON(B)      | 88.7920  | 345.3255 |          |          |                |            |

STAR DELAY: 7.0648 SEC 272.5850 PULSES DECIMAL = 4, COARSE + 17, FINE  
51.0126 DEG 04 21 PULSES OCTAL CNAH SUB C = 225.5755 EPSILON = 0.0000 SEN = 11

PN 11 PASS 3136 PR14 4070 S/W SP.0 USS 810 RCVR AGC -138.1 FILE 11-1347 CJ  
 SPACECRAFT ATTITUDE ON DAY 301 OCT 28, 1981 1300 GMT

10/28/81

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR SCROLL IS TOWARD SOUTH ELLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 KCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.8083 KCSPHAK = 295.9080  
 SPACECRAFT-EARTH DIRECTION: CLAT = -11.8057 CLON = 30.0123  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -11.0482 CLON = 29.7246

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 PN 11 PASS 3136 PR14 4070 S/W SP.0 USS 810 RCVR AGC -138.1 FILE 11-1347 CJ 10/28/81  
 SPACECRAFT ATTITUDE ON DAY 301 OCT 28, 1981 1300 GMT  
 SPIN PERIOD = 7.526975 SEC RTLT = 5 HR 18 MIN 30.85 SEC

|                 | RMA      | RKA      | CLAT     | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|----------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -11.0482 | 29.7246  | -              | -          |
| SUN             | 1.8203   | 265.7997 | -12.8635 | 29.5878  | 0.164071540 10 | 10.9673489 |
| EARTH           | 0.8083   | 290.3982 | -11.8057 | 30.0123  | 0.178539170 10 | 11.9344355 |
| JUPITER         | 142.4654 | 341.4454 | 0.0000   | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)       | 78.6940  | 321.7020 |          |          |                |            |
| BETELGEUSE(R)   | 57.0810  | 347.9491 |          |          |                |            |
| CANCORUS(B)     | 75.6117  | 284.1237 |          |          |                |            |
| ARCIURUS(R)     | 159.5599 | 75.8690  |          |          |                |            |
| RIGIL KENTAUHUS | 119.9795 | 245.3157 |          |          |                |            |
| ANTARES(R)      | 137.5412 | 199.4840 |          |          |                |            |
| CAPELLA(B)      | 68.9700  | 34.1301  |          |          |                |            |
| VEGA(B)         | 106.6467 | 116.5580 |          |          |                |            |
| ALDEBARAN(R)    | 30.6501  | 4.7840   |          |          |                |            |
| RIGEL(B)        | 47.5598  | 327.6463 |          |          |                |            |
| GAMMA CRUCIS(R) | 120.8279 | 264.8033 |          |          |                |            |
| SPICA(B)        | 185.5000 | 295.7400 |          |          |                |            |
| ACHERNAR(B)     | 52.6839  | 245.1642 |          |          |                |            |
| DENEK(B)        | 81.2127  | 114.3540 |          |          |                |            |
| PROCYON(B)      | 82.9021  | 344.4921 |          |          |                |            |

STAR DELAY: 7.0629 SEC 272.0990 PULSES DECIMAL = 4, COARSE + 16, FINE  
 50.8763 DFC 04 20 PULSES OCTAL CKAH SUB C = 265.7997 EPSILON = 0.0000 SCN=11  
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PN 11 PASS 3130 PRI4 #0/0 S/W SK.0 DSS 63P RCVR AGC -136.6 FILE 11-1346 ~~11-1365~~ RS 10/26/81  
 SPACECRAFT ATTITUDE ON DAY 295 OCT 22, 1981 1415 GMT

POLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGPRS = 180 RCSTPDS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.8132 RCSPHAK = 252.6300  
 SPACECRAFT-EARTH DIRECTION: CLAT = -11.7534 CLDN = 29.2631  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -11.0167 CLDN = 29.5142

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 PN 11 PASS 3130 PRI4 #0/0 S/W SK.0 DSS 63P RCVR AGC -136.6 FILE 11-1365 RS 10/26/81  
 SPACECRAFT ATTITUDE ON DAY 295 OCT 22, 1981 1415 GMT  
 SPIN PERIOD = 7.520100 SEC PRLT = 3 HR 18 MIN 10.85 SEC

|                 | CNA      | CKA      | CLAT     | CLDN     | R(KM)          | R(AU)      |
|-----------------|----------|----------|----------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -11.0167 | 29.5142  | -              | -          |
| SUN             | 1.8206   | 260.9360 | -12.8144 | 29.3202  | 0.16369603D 10 | 10.9422480 |
| EARTH           | 0.8132   | 244.9907 | -11.7534 | 29.2631  | 0.17823936D 10 | 11.9143957 |
| JUPITER         | 149.5780 | 341.4178 | 0.0000   | 180.0000 | 0.00000000     | 0.0000000  |
| SIPIUS(B)       | 70.7985  | 321.6957 |          |          |                |            |
| BETELGEUSE(R)   | 57.1935  | 347.9228 |          |          |                |            |
| CANOPUS(B)      | 75.6686  | 284.1275 |          |          |                |            |
| ARCTURUS(R)     | 159.5563 | 75.7461  |          |          |                |            |
| RIGIL KENTAURUS | 119.9631 | 245.2302 |          |          |                |            |
| ANTARES(R)      | 137.4496 | 199.3920 |          |          |                |            |
| CAPELLA(R)      | 61.0480  | 34.0609  |          |          |                |            |
| VEGA(B)         | 106.6173 | 118.5616 |          |          |                |            |
| ALDEBARAN(R)    | 39.7555  | 4.7148   |          |          |                |            |
| RIGEL(B)        | 47.6682  | 327.6538 |          |          |                |            |
| GAMMA CRUCIS(R) | 120.8494 | 264.7160 |          |          |                |            |
| SPICA(B)        | 165.5757 | 295.3929 |          |          |                |            |
| ACHEPNAR(B)     | 58.6671  | 245.2110 |          |          |                |            |
| DENEK(B)        | 83.1394  | 114.3226 |          |          |                |            |
| PROCYON(B)      | 83.0148  | 344.9707 |          |          |                |            |

STAR DELAY: 1.0627 SEC 272.0471 PULSES DECIMAL = 4. COARSE + 16. FINE  
 50.8725 DEG 04 20 PULSES OCTAL CKAH SJB C = 260.9360 EPSILON = 0.0000 SCN=1



1 PASS 3125 PR14 47711 S/W SA,0 DSS 43A RCVR AGC 130.6 FILE 11-1345 CJ  
 SPACECRAFT ATTITUDE ON DAY 291 UCI 18,1981 0700 GMT

10/19/81

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

NEW ATTITUDE  
 POST-PRECESSION

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ELLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1,1113 RCSPHAK = 220,9460  
 SPACECRAFT +EARTH DIRECTION: CLAT = -11,7207 CLON = 28,7201  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -11,4131 CLON = 29,8101

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1 PASS 3125 PR14 47711 S/W SA,0 DSS 43A RCVR AGC 130.6 FILE 11-1345 CJ 10/19/81  
 SPACECRAFT ATTITUDE ON DAY 291 UCI 18,1981 0700 GMT  
 SPIN PERIOD = 7.526950 SEC RTLI = 3 HR 17 MIN 51.10 SEC

|                 | CNA      | CKA      | CLAT     | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|----------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -11,4131 | 29,8101  | -              | -          |
| SUN             | 1,5206   | 243,9675 | -12,7786 | 29,1258  | 0,163423750 10 | 10,9241611 |
| EARTH           | 1,1113   | 196,1614 | -11,7207 | 28,7201  | 0,177943270 10 | 11,8946036 |
| JUPITER         | 148,2684 | 340,9462 | 0,0000   | 180,0000 | 0,000000000    | 0,00000000 |
| SIRIUS(R)       | 76,4022  | 321,8015 |          |          |                |            |
| BETELGEUSE(R)   | 56,9236  | 348,1864 |          |          |                |            |
| CANOPUS(R)      | 75,2373  | 284,1424 |          |          |                |            |
| ARCTURUS(R)     | 159,8914 | 75,0103  |          |          |                |            |
| RIGIL KENTAURUS | 119,6830 | 245,4632 |          |          |                |            |
| ANTARES(R)      | 137,4972 | 199,9075 |          |          |                |            |
| CAPELLA(R)      | 61,1120  | 34,3348  |          |          |                |            |
| VEGA(B)         | 107,0573 | 116,6061 |          |          |                |            |
| ALDEBARAN(R)    | 39,5985  | 5,2491   |          |          |                |            |
| RIGEL(B)        | 47,2943  | 327,9055 |          |          |                |            |
| GAMMA CRUCIS(R) | 120,4720 | 264,8888 |          |          |                |            |
| SPICA(B)        | 166,1352 | 295,4437 |          |          |                |            |
| ACHEERAK(B)     | 58,3822  | 245,0403 |          |          |                |            |
| DENEK(B)        | 87,5797  | 114,3620 |          |          |                |            |
| PROCYON(B)      | 82,7268  | 345,0504 |          |          |                |            |

STAR DELAY: 1,0625 SEC 271,9983 PULSES DECIMAL = 4, COARSE + 16, FINE  
 50,8576 DEG 04 20 PULSES OCTAL CKAN SUB C = 243,9675 EPSILON= 0,0000 SCN=11

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PASS 3125 PR14 4070 S/W SK.0 USS 43A RCVR AGC -133.2 FILE 11-1344 TG  
 SPACECRAFT ATTITUDE ON DAY 291 OCT 18, 1981 0300 GMT

10/19/81

LL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C,

REFERENCE FOR RCS PHAK IS TOWARD SOUTH ECLIPTIC POLE.

PRE-PRECESSION

LL REFERENCE PARAMETERS: ASPSGRKS = 0 RCSTPOS = 180  
 PLITUDE AND PHASE ANGLE: RCSANGAK = 1.2084 RCSPHAK = 103.9400  
 SPACECRAFT-EARTH DIRECTION: CLAT = -11.7195 CLON = 20.6991  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -10.9015 CLON = 27.7920

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PASS 3125 PR14 4070 S/W SK.0 USS 43A RCVR AGC -133.2 FILE 11-1344 TG 10/19/81  
 SPACECRAFT ATTITUDE ON DAY 291 OCT 18, 1981 0300 GMT  
 PULS PERIOD = 7.526976 SEC RTLT = 2 HR 11 MIN 7.49 SEC

|                | CNA      | CKA      | CLAT     | CLON     | R(KM)          | R(AU)      |
|----------------|----------|----------|----------|----------|----------------|------------|
| RC +Z AXIS     | 0.0000   | 0.0000   | -10.9015 | 27.7920  |                |            |
| JN             | 2.2E10   | 304.5504 | -12.7772 | 29.1183  | 0.165415310 10 | 10.9234833 |
| EARTH          | 1.2084   | 317.3055 | -11.7195 | 28.6991  | 0.117930650 10 | 7.8830648  |
| JUPITER        | 158.3058 | 340.2610 | 0.0000   | 180.0000 | 0.00000000     | 0.0000000  |
| IRIUS(B)       | 72.2737  | 321.6694 |          |          |                |            |
| ETELGEUSE(R)   | 58.9666  | 347.7411 |          |          |                |            |
| ANCPOS(B)      | 76.2182  | 284.2083 |          |          |                |            |
| RTURUS(K)      | 159.8168 | 80.1929  |          |          |                |            |
| IGIL KENTAURUS | 119.2992 | 243.9385 |          |          |                |            |
| NTAKES(R)      | 135.7938 | 198.3183 |          |          |                |            |
| PELLA(R)       | 62.4745  | 33.1313  |          |          |                |            |
| EGA(B)         | 105.6595 | 118.6537 |          |          |                |            |
| LEBARAN(R)     | 41.5304  | 4.0749   |          |          |                |            |
| IGEL(B)        | 49.2443  | 328.0643 |          |          |                |            |
| AMMA CRUCIS(R) | 120.7771 | 263.3011 |          |          |                |            |
| PICA(B)        | 166.3535 | 288.5789 |          |          |                |            |
| CHERAN(B)      | 58.0315  | 245.8979 |          |          |                |            |
| ENE(B)         | 82.3051  | 113.7735 |          |          |                |            |
| ROCYON(R)      | 84.7715  | 344.6625 |          |          |                |            |

STAR DELAY: 1.0620 SEC 271.8632 PULSES DECIMAL = 4, COARSE + 10, FINE  
 50.7917 DEC 04 20 PULSES OCTAL CKAH SUB C = 304.5504 EPSILON = 0.0000 SCN=11  
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11 PASS 3122 PR14 #070 S/W SN.0 USS 63A RCVR AGC -130.6 FILE 11-1343 CJ  
 SPACECRAFT ATTITUDE ON DAY 287 SEP 14, 1981 0900 GMT

10/14/81

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.8514 RCSPHAK = 89.7870

SPACECRAFT-EARTH DIRECTION: CLAT = -11.6946 CLON = 28.2257

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -10.9806 CLON = 27.7528

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11 PASS 3122 ER14 #070 S/W SN.0 USS 63A RCVR AGC -130.6 FILE 11-1343 CJ  
 SPACECRAFT ATTITUDE ON DAY 287 SEP 14, 1981 0900 GMT  
 SPIN PERIOD = 7.522854 SEC RTLT = 3 HR 17 MIN 29.30 SEC

10/14/81

|                 | CNA      | CKA      | CLAT     | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|----------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -10.9806 | 27.7528  | -              | -          |
| SUN             | 2.1177   | 303.4170 | -12.7457 | 28.7484  | 0.165180710 10 | 10.9078015 |
| EARTH           | 2.8514   | 302.9519 | -11.6946 | 28.2257  | 0.177616500 10 | 11.8727607 |
| JUPITER         | 150.3152 | 340.1001 | 0.0000   | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 72.2950  | 321.7094 |          |          |                |            |
| BETELGEUSE(R)   | 58.9875  | 347.7850 |          |          |                |            |
| CANOPUS(B)      | 76.1510  | 284.2148 |          |          |                |            |
| ARCTURUS(R)     | 159.9012 | 80.2523  |          |          |                |            |
| RIGIL KENTAURUS | 110.2113 | 243.9291 |          |          |                |            |
| ANTARES(R)      | 135.7323 | 196.3755 |          |          |                |            |
| CAPELLA(R)      | 65.5500  | 33.1473  |          |          |                |            |
| VEGA(B)         | 102.7105 | 118.6664 |          |          |                |            |
| ALDEBARAN(R)    | 41.5744  | 4.1533   |          |          |                |            |
| RIGEL(B)        | 48.2352  | 328.1523 |          |          |                |            |
| GAMMA CRUCIS(R) | 120.6941 | 263.2764 |          |          |                |            |
| SPICA(B)        | 161.2907 | 288.3186 |          |          |                |            |
| ACHERNAB(B)     | 57.9036  | 245.8922 |          |          |                |            |
| DENEH(B)        | 65.3620  | 113.7570 |          |          |                |            |
| PROCCYON(B)     | 81.7877  | 344.6624 |          |          |                |            |

STAR DELAY: 1.0618 SEC 271.8240 PULSES DECIMAL = 4. COARSE + 16. FINE  
 50.7852 DEG 04 20 PULSES OCTAL CKAH SUB C = 303.4170 EPSILON = 0.0000 SCN = 11.

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PN 11 PASS 3116 PRIU 40% S/W SH,0 DSS 44B RCVR AGC -142,5 FILE 11-1342 BD 10/10/81  
SPACECRAFT ATTITUDE ON DAY 282 OCT 9, 1981 0400 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C,

REFERENCE FOR RCS PHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,7431 RCSPHAK = 49,1380

SPACECRAFT-EARTH DIRECTION: CLAT = -11,6004 CLON = 27,4448

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -10,9245 CLON = 27,5504

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PN 11 PASS 3116 PRIU 40% S/W SH,0 DSS 44B RCVR AGC -142,5 FILE 11-1342 BD 10/10/81  
SPACECRAFT ATTITUDE ON DAY 282 OCT 9, 1981 0400 GMT

SPIN PERIOD = 7,526976 SEC RTLT = 3 HR 16 MIN 47,42 SEC

| S/C +Z AXIS     | CNA      | CKA      | CLAT     | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|----------|----------|----------------|------------|
| SUN             | 0,0000   | 0,0000   | -10,9245 | 27,5504  |                |            |
| EARTH           | 0,7431   | 262,0000 | -12,6932 | 28,6661  | 0,162794280 10 | 10,8819706 |
| JUPITER         | 150,5211 | 340,0351 | -11,6004 | 27,4448  | 0,170988850 10 | 11,8308055 |
| SIRIUS(B)       | 75,4450  | 321,8902 | 0,0000   | 180,0000 | 0,00000000     | 0,0000000  |
| BETELGEUSE(R)   | 59,1936  | 347,7350 |          |          |                |            |
| CANOPUS(B)      | 76,2542  | 284,2203 |          |          |                |            |
| ARCTURUS(R)     | 159,8787 | 80,7745  |          |          |                |            |
| RIGIL KENTAURUS | 110,1740 | 243,7772 |          |          |                |            |
| ANTARES(R)      | 135,5612 | 198,2188 |          |          |                |            |
| CAPELLA(R)      | 67,6259  | 33,0283  |          |          |                |            |
| VEGA(B)         | 105,5659 | 118,6693 |          |          |                |            |
| ALDEBARAN(R)    | 41,7887  | 4,0361   |          |          |                |            |
| RIGEL(B)        | 49,4330  | 328,1431 |          |          |                |            |
| GAMMA CRUCIS(R) | 120,7262 | 263,1168 |          |          |                |            |
| SPICA(B)        | 166,4053 | 287,5728 |          |          |                |            |
| ACHERNAR(B)     | 57,9137  | 245,9818 |          |          |                |            |
| DENEB(B)        | 82,2307  | 113,6970 |          |          |                |            |
| PROCYON(B)      | 84,9542  | 344,6243 |          |          |                |            |

STAR DELAY: 1,0617 SEC 271,7991 PULSES DECIMAL = 4, COARSE + 16, FINE  
50,7797 DEG 04 20 PULSES OCTAL CKAH SUB C = 301,5814 EPSILON = 0,0000 SCN = 11  
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1 PASS 3111 PR14 4973 S/W SK,0 DSS 14 RCVR A 2 FILE 11-1341 PD  
 SPACECRAFT ATTITUDE ON DAY 276 CCI- 3,1981 1000 GMT

10/

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C,

NEW ATTITUDE  
 POST-PRECESSION

REFERENCE FOR RCS PHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1,0326 RCSPHAK = 14,1960

SPACECRAFT-EARTH DIRECTION: CLAT = -11,6412 CLON = 26,8930

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -10,9906 CLON = 27,7108

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1 PASS 3111 PR14 4973 S/W SK,0 DSS 14 RCVR AGC = 133,2 FILE 11-1341 PD

10/05/81

SPACECRAFT ATTITUDE ON DAY 276 OCT 3,1981 1800 GMT

SPIN PERIOD = 7,528894 SEC KILT = 3 HR 16 MIN 12,22 SEC

|                 | CNA      | CKA      | CLAT     | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|----------|----------|----------------|------------|
| S/C +Z AXIS     | 0,0000   | 0,0000   | -10,9906 | 27,7108  | -              | -          |
| SUN             | 1,8210   | 293,8230 | -12,6555 | 28,4645  | 0,162520890 10 | 10,8636959 |
| EARTH           | 1,0326   | 219,1345 | -11,6412 | 26,8930  | 0,176461090 10 | 11,7955274 |
| JUPITER         | 150,3505 | 340,0508 | 0,0000   | 180,0000 | 0,00000000     | 0,0000000  |
| SIRIUS(B)       | 72,2811  | 321,7121 |          |          |                |            |
| BETELGEUSE(R)   | 59,0256  | 347,7882 |          |          |                |            |
| CANCPUS(B)      | 76,1514  | 284,2173 |          |          |                |            |
| ARCTURUS(R)     | 159,9181 | 80,3508  |          |          |                |            |
| RIGIL KENTAURUS | 119,1841 | 243,9029 |          |          |                |            |
| ANTARES(R)      | 132,6900 | 198,3639 |          |          |                |            |
| CAPELLA(R)      | 62,5900  | 33,1320  |          |          |                |            |
| VEGA(B)         | 106,6995 | 118,6700 |          |          |                |            |
| ALDEBARAN(R)    | 41,6103  | 4,1533   |          |          |                |            |
| RIGEL(B)        | 40,2649  | 328,1504 |          |          |                |            |
| GAMMA CRUCIS(R) | 120,6793 | 283,2448 |          |          |                |            |
| SPICA(B)        | 166,2940 | 288,1371 |          |          |                |            |
| ACHERNAM(B)     | 57,9176  | 245,9052 |          |          |                |            |
| DENEK(B)        | 82,3546  | 113,7434 |          |          |                |            |
| PROCYON(B)      | 84,8248  | 344,6568 |          |          |                |            |

STAR DELAY: 1,0618 SEC 271,8108 PULSES DECIMAL = 4, COARSE + 16, FINE  
 50,7827 DEG 04 20 PULSES OCTAL CKAH SUB C = 293,8230 EPSILON = 0,0000 SCN = 11

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PASS 3111 PR14 #070 S/W SN,0 DSS 63A RCVR AGC -134.9 FILE 11-1340 RS  
 ACECRAFT ATTITUDE ON DAY 270 OCT 3,1981 1215 GMT

10/05/81

LL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ELLIPTIC POLE.

LL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180 PRE-PRECESSION

PLITUDE AND PHASE ANGLE: RCSANGAK = 0.7909 RCSPHAK = 95.2834

ACECRAFT-EARTH DIRECTION: CLAT = -11.6403 CLON = 28.8632

ACERAFT +Z AXIS ATTITUDE: CLAT = -11.2376 CLON = 28.1687

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PASS 3111 PR14 #070 S/W SN,0 DSS 63A RCVR AGC -134.9 FILE 11-1340 RS

10/05/81

ACECRAFT ATTITUDE ON DAY 270 OCT 3,1981 1215 GMT

PERIOD = 7.551370 SEC RTLT = 5 HR 16 MIN 10.17 SEC

|                 | GNA      | GKA      | CLAT     | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|----------|----------|----------------|------------|
| AC +Z AXIS      | 0.0000   | 0.0000   | -11.2376 | 28.1687  |                |            |
| ALFA            | 327.4185 | 327.4185 | -12.6535 | 28.4536  | 0.182506060 10 | 10.8827045 |
| BETA            | 329.3229 | 329.3229 | -11.6403 | 28.8632  | 0.178430400 10 | 11.7934759 |
| GAMMA           | 338.3671 | 338.3671 | 0.0000   | 180.0000 | 0.000000000    | 0.0000000  |
| DELTA (B)       | 321.7650 | 321.7650 |          |          |                |            |
| EPIGEUSE (R)    | 347.8183 | 347.8183 |          |          |                |            |
| ANCPUS (B)      | 284.2947 | 284.2947 |          |          |                |            |
| ACTURUS (R)     | 84.1138  | 84.1138  |          |          |                |            |
| IGIL KENTAURUS  | 242.9242 | 242.9242 |          |          |                |            |
| STARES (R)      | 197.8319 | 197.8319 |          |          |                |            |
| PELLA (R)       | 32.5263  | 32.5263  |          |          |                |            |
| GA (B)          | 118.7721 | 118.7721 |          |          |                |            |
| DEBARAN (R)     | 4.0080   | 4.0080   |          |          |                |            |
| GEL (B)         | 328.6942 | 328.6942 |          |          |                |            |
| ALMA CRUCIS (R) | 262.0834 | 262.0834 |          |          |                |            |
| PICA (B)        | 281.5436 | 281.5436 |          |          |                |            |
| CHERNAN (B)     | 246.4283 | 246.4283 |          |          |                |            |
| ENE (B)         | 113.2416 | 113.2416 |          |          |                |            |
| ROCYON (B)      | 344.4098 | 344.4098 |          |          |                |            |

TAR DELAY: 1.0608 SEC 271.5593 PULSES DECIMAL = 4. COARSE + 16. FINE  
 50.7053 DEC 04 20 PULSES OCTAL CKAH SUB C = 327.4185 EPSILON = 0.0000 SCN=11

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11 PASS 3105 PR14 #0/0 S/W SK.0 DSS 63A PCVR AGC -133.2 FILE 11-1339 CJ  
SPACECRAFT ATTITUDE ON DAY 270 SEP 27, 1981 1400 GMT

09/28/81

POLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.3857 RCSPHAK = 29.6048

SPACECRAFT-EARTH DIRECTION: CLAT = -11.6216 CLON = 26.1309

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -11.2367 CLON = 26.1566

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11 PASS 3105 PR14 #0/0 S/W SK.0 DSS 63A PCVR AGC -133.2 FILE 11-1339 CJ

09/28/81

SPACECRAFT ATTITUDE ON DAY 270 SEP 27, 1981 1400 GMT

SPIN PERIOD = 7.521271 SEC RTLT = 2 HR 15 MIN 15.68 SEC

|                 | CMA      | CKA      | CLAT     | CLON     | R (KM)         | R (AU)     |
|-----------------|----------|----------|----------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -11.2367 | 26.1566  | -              | -          |
| SUN             | 2.4068   | 325.2231 | -12.6024 | 28.1821  | 0.162141220 10 | 10.3293175 |
| EARTH           | 0.3857   | 266.2676 | -11.6216 | 26.1309  | 0.175613630 10 | 11.7398790 |
| JUPITER         | 151.6890 | 328.3582 | 0.0000   | 180.0000 | 0.00000000     | 6.0000000  |
| SIRIUS(B)       | 73.3262  | 321.7646 |          |          |                |            |
| BETELGEUSE(R)   | 60.4643  | 347.9168 |          |          |                |            |
| CANOPUS(B)      | 76.2885  | 284.2951 |          |          |                |            |
| ARCTURUS(F)     | 160.3680 | 84.1447  |          |          |                |            |
| BIG B KENTAURUS | 118.2814 | 242.9160 |          |          |                |            |
| ANTARES(F)      | 124.1635 | 197.8252 |          |          |                |            |
| CAPELLA(R)      | 64.0050  | 32.5205  |          |          |                |            |
| VEGA(B)         | 105.1824 | 118.7725 |          |          |                |            |
| ALDEBARAN(R)    | 43.1550  | 4.0038   |          |          |                |            |
| RIGEL(B)        | 50.4355  | 328.7014 |          |          |                |            |
| GAMMA CRUCIS(R) | 120.2403 | 267.0741 |          |          |                |            |
| SPIGA(B)        | 166.4464 | 281.4938 |          |          |                |            |
| ACHERNAB(B)     | 57.0762  | 246.4312 |          |          |                |            |
| DENEK(B)        | 81.9724  | 113.2378 |          |          |                |            |
| PROCYON(B)      | 86.2291  | 344.4076 |          |          |                |            |

STAR DELAY: 1.0608 SEC 271.5573 PULSES DECIMAL = 4. COARSE + 16. FINE

50.7049 DEG 04 20 PULSES OCTAL CKAN SUB C = 325.2231 EPSILON = 0.0000 SCH=11

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PN 11 PASS 3098 PR14 #9/9 S/W SKO DSS 63A ROVR AGC -123.2 FILE 11-1339 RC 09/20/81

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR POSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

Post  
Precession

ROLL REFERENCE PARAMETERS: ASPPCRPS = 0 ROSTPOS = 180

AMPLITUDE AND PHASE ANGLE: POSANGAK = 0.9302 POSPHAK = 327.6400

SPACECRAFT-EARTH DIRECTION: CLAT = -11.6090 CLON = 25.2625

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -11.7769 CLON = 25.1490

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PN 11 PASS 3098 PR14 #9/9 S/W SKO DSS 63A ROVR AGC -123.2 FILE 11-1339 RC 09/20/81  
 SPACECRAFT ATTITUDE ON DAY 263 SEP 20, 1981 1000 GMT  
 SPIN PERIOD = 7.531049 SEC PULS = 2 HR 13 MIN 59.00 SEC

|                  | CLAT     | CLON     | R (RM)         | R (RM)    |
|------------------|----------|----------|----------------|-----------|
| SUN              | -11.6090 | 25.2625  | 0.161708140 10 | 0.0000000 |
| EARTH            | -11.6090 | 25.2625  | 0.174472590 10 | 0.0000000 |
| JUPITER          | 0.0000   | 180.0000 | 0.0000000      | 0.0000000 |
| SATURN (S)       | 0.0000   | 180.0000 | 0.0000000      | 0.0000000 |
| BETELGEUSE (R)   | 0.0000   | 180.0000 | 0.0000000      | 0.0000000 |
| CANCORUS (R)     | 0.0000   | 180.0000 | 0.0000000      | 0.0000000 |
| ARCTURUS (R)     | 0.0000   | 180.0000 | 0.0000000      | 0.0000000 |
| BIG B KENTHAUS   | 0.0000   | 180.0000 | 0.0000000      | 0.0000000 |
| ALTAHUS (R)      | 0.0000   | 180.0000 | 0.0000000      | 0.0000000 |
| CARRELLA (R)     | 0.0000   | 180.0000 | 0.0000000      | 0.0000000 |
| VEGA (R)         | 0.0000   | 180.0000 | 0.0000000      | 0.0000000 |
| ALDEBARAN (R)    | 0.0000   | 180.0000 | 0.0000000      | 0.0000000 |
| RIGEL (R)        | 0.0000   | 180.0000 | 0.0000000      | 0.0000000 |
| GAMMA CRUCIS (R) | 0.0000   | 180.0000 | 0.0000000      | 0.0000000 |
| SPICA (R)        | 0.0000   | 180.0000 | 0.0000000      | 0.0000000 |
| ACHERNAR (R)     | 0.0000   | 180.0000 | 0.0000000      | 0.0000000 |
| DENEK (R)        | 0.0000   | 180.0000 | 0.0000000      | 0.0000000 |
| PROCYON (R)      | 0.0000   | 180.0000 | 0.0000000      | 0.0000000 |

STAR DELAY: 1.0607 SEC 271.5384 PULSES DECIMAL = 4. COARSE + 16. FINE  
 50.7022 DEG 04 20 PULSES OCTAL GRAH SUB C = 222.6996 EPSILON = 0.0000 SCN = 11

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PN 11 PASS 2097 PR14 #0/0 S/W SKO OSS 43A RCVR AGC -133.2 FILE 11-1337 RC  
 SPACECRAFT ATTITUDE ON DAY 263 SEP 20, 1981 0800 GMT

09/22/81

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPIAK IS TOWARD SOUTH ECLIPTIC POLE.

Pre-  
Precession

ROLL REFERENCE PARAMETERS: ASPSCRPS = 0 RCSTPOS = 130

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.2699 RCSPIAK = 90.2799

SPACECRAFT-EARTH DIRECTION: CLAT = -11.6089 CLON = 25.2525

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -11.1599 CLON = 24.0409

PN 11 PASS 2097 PR14 #0/0 S/W SKO OSS 43A RCVR AGC -133.2 FILE 11-1337 RC  
 SPACECRAFT ATTITUDE ON DAY 263 SEP 20, 1981 0800 GMT  
 SPIN PERIOD = 7.526498 SEC RTLT = 2 HR 13 MIN 59.02 SEC

09/22/81

|                  | CNA      | CKA      | CLAT     | CLON     | R (RM)         | C (A)      |
|------------------|----------|----------|----------|----------|----------------|------------|
| S/C +Z AXIS      | 0.0000   | 0.0000   | -11.1599 | 24.0409  | -              | -          |
| SUN              | 3.0721   | 339.3199 | -12.6381 | 27.3485  | 0.161649070 10 | 10.8036845 |
| EARTH            | 1.2699   | 339.1773 | -11.6089 | 25.2525  | 0.174454500 10 | 11.6016644 |
| JUPITER          | 152.6385 | 237.5447 | 0.0000   | 130.0000 | 0.00000000     | 0.0000000  |
| SIRIUS (R)       | 75.0034  | 221.7112 |          |          |                |            |
| ARCTURUS (R)     | 62.5396  | 347.6251 |          |          |                |            |
| CANCRUS (R)      | 76.8765  | 284.2594 |          |          |                |            |
| ARCTURUS (P)     | 160.4052 | 89.5643  |          |          |                |            |
| RIGIL KENTAURUS  | 117.3817 | 241.5156 |          |          |                |            |
| ANTARES (R)      | 132.2050 | 196.7662 |          |          |                |            |
| CAPELLA (R)      | 68.7036  | 31.5622  |          |          |                |            |
| VEGA (R)         | 104.1151 | 118.8273 |          |          |                |            |
| ALDEBARAN (R)    | 45.2213  | 3.3765   |          |          |                |            |
| RIGEL (R)        | 52.2524  | 329.0955 |          |          |                |            |
| GAMMA CRUCIS (R) | 120.0012 | 260.4661 |          |          |                |            |
| SPICA (R)        | 166.7756 | 272.4581 |          |          |                |            |
| ACHERNAR (R)     | 56.3312  | 247.2627 |          |          |                |            |
| DENES (R)        | 81.0942  | 112.5467 |          |          |                |            |
| PROCYON (R)      | 88.2472  | 344.0202 |          |          |                |            |

STAR DELAY: 1.0601 SEC 271.3975 PULSES DECIMAL = 4. COARSE + 15. FINE  
 50.6406 DEG 04 17 PULSES OCTAL CKAN SUB C = 339.3199 EPSILON = 0.0000 SQN = 11

N 11 PASS 2094 PR14 #0/0 S/W SK.0 DSS 44P RCVR AGC -142.5 FILE 11-1336 BD  
SPACECRAFT ATTITUDE CN DAY 260 SEP 17, 1981 0530 GMT

09/17/81

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSCRSS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.0356 RCSPHAK = 84.5320

SPACECRAFT-EARTH DIRECTION: CLAT = -11.6067 CLON = 24.8837

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -11.1766 CLON = 23.9227

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N 11 PASS 2094 PR14 #0/0 S/W SK.0 DSS 44P RCVR AGC -142.5 FILE 11-1336 BD  
SPACECRAFT ATTITUDE CN DAY 260 SEP 17, 1981 0530 GMT  
SPIN PERIOD = 7.526275 SEC RTLT = 3 HR 13 MIN 22.28 SEC

09/17/81

|                 | CNA      | CAK      | CLAT     | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|----------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -11.1766 | 23.9227  | -              | -          |
| SUN             | 3.9354   | 339.7821 | -12.5121 | 27.7052  | 0.161509370 10 | 10.7960809 |
| EARTH           | 1.0356   | 335.3665 | -11.6067 | 24.8837  | 0.173913930 10 | 11.6257560 |
| JUPITER         | 153.7351 | 226.3974 | 0.0000   | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 75.0840  | 321.7010 |          |          |                |            |
| BETELGEUSE(R)   | 67.6187  | 347.6036 |          |          |                |            |
| CANOPUS(B)      | 76.3891  | 284.3636 |          |          |                |            |
| ARCTURUS(R)     | 160.4225 | 39.8669  |          |          |                |            |
| RIGIL KENTAURUS | 117.3117 | 241.4452 |          |          |                |            |
| ANTARES(R)      | 122.0892 | 196.7276 |          |          |                |            |
| CAPELLA(R)      | 65.9311  | 31.5186  |          |          |                |            |
| VEGA(B)         | 104.0739 | 118.8320 |          |          |                |            |
| ALDEBARAN(R)    | 45.2380  | 3.7634   |          |          |                |            |
| RIGEL(B)        | 52.7432  | 329.1297 |          |          |                |            |
| GAMMA CRUCIS(R) | 119.9654 | 260.3789 |          |          |                |            |
| SPICA(B)        | 166.7674 | 271.9299 |          |          |                |            |
| ACHERNAR(B)     | 56.2711  | 247.3379 |          |          |                |            |
| DENEK(B)        | 81.0652  | 112.5060 |          |          |                |            |
| PRCCYON(B)      | 88.3540  | 243.9988 |          |          |                |            |

STAR DELAY: 1.0600 SEC 271.3703 PULSES DECIMAL = 4. COARSE + 15. FINE  
50.6364 DEG 04 17 PULSES OCTAL CAK SUB C = 339.7821 EPSILON = 0.0000 SCN = 11

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11 PASS 3087 PR14 #0/0 S/W SK.0 DSS 44P RCVR AGC -142.5 FILE 11-1335 CJ  
SPACECRAFT ATTITUDE ON DAY 0 SEPT 0, 0 0000 GMT

09/17/81

253

0800

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTIPUS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.5104 RCSPHAK = 28.9244

SPACECRAFT-EARTH DIRECTION: CLAT = -11.6098 CLON = 23.9689

SPACECRAFT +Z AXIS ALTITUDE: CLAT = -11.1045 CLON = 23.8954

11 PASS 3087 PR14 #0/0 S/W SK.0 DSS 44P RCVR AGC -142.5 FILE 11-1335 CJ

09/17/81

SPACECRAFT ATTITUDE ON DAY 0 SEPT 0, 0 0000 GMT

SPIN PERIOD = 7.526275 SEC PULS = 3 HR 11 MIN 41.33 SEC

|                 | CNA      | CKA      | CLAT     | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|----------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -11.1045 | 23.8954  | -              | -          |
| SUN             | 3.6269   | 338.0138 | -12.4421 | 27.3392  | 0.161032240 10 | 10.7641872 |
| EARTH           | 0.5104   | 278.1079 | -11.6098 | 23.9689  | 0.172400630 10 | 11.5241063 |
| JUPITER         | 153.7884 | 336.5045 | 0.0000   | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 75.1497  | 221.6851 |          |          |                |            |
| BETELGEUSE(R)   | 62.6593  | 247.5649 |          |          |                |            |
| CANOPUS(B)      | 76.9656  | 294.3602 |          |          |                |            |
| ARCTURUS(R)     | 160.3504 | 89.9371  |          |          |                |            |
| RIGIL KENTAURUS | 117.3623 | 241.4100 |          |          |                |            |
| ANTARES(R)      | 122.0843 | 196.6530 |          |          |                |            |
| CAPPELLA(R)     | 65.3163  | 31.4794  |          |          |                |            |
| VEGA(B)         | 103.9978 | 118.8279 |          |          |                |            |
| ALDEBARAN(R)    | 45.2605  | 3.2855   |          |          |                |            |
| RIGEL(B)        | 52.4032  | 329.0373 |          |          |                |            |
| GAMMA CRUCIS(R) | 120.0320 | 260.3514 |          |          |                |            |
| SPICA(B)        | 166.8364 | 271.8308 |          |          |                |            |
| ACHERNAR(B)     | 56.3272  | 247.3676 |          |          |                |            |
| DFNEB(B)        | 80.9884  | 112.5012 |          |          |                |            |
| PRCCYON(B)      | 88.2996  | 243.9913 |          |          |                |            |

STAR DELAY: 1.0601 SEC 271.3986 PULSES DECIMAL = 4. COARSE + 15. FINE  
50.6398 DEG 04 17 PULSES OCTAL CKAH SUB L = 338.0138 EPSILON = 0.0000 SCN=11

N 11 PASS 30P2 PRI4 48/10 S/W SK.0 DSS 63P RCVR AGC -133.2 FILE 11-1334 RS 09/08/91  
 SPACECRAFT ATTITUDE ON DAY 248 SEP 5, 1991 1600 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCS PHAS IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSCRRS = 0 RCSTPUS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.6721 RCSPHAK = 338.1350

SPACECRAFT-EARTH DIRECTION: CLAT = -11.6152 CLON = 23.5570

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -11.1341 CLON = 24.0358

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N 11 PASS 30P2 PRI4 48/10 S/W SK.0 DSS 63P RCVR AGC -133.2 FILE 11-1334 RS 09/08/91  
 SPACECRAFT ATTITUDE ON DAY 248 SEP 5, 1991 1600 GMT  
 SPIN PERIOD = 7.526375 SEC PTLT = 3 HR 10 MIN 50.49 SEC

|                  | CNA      | CKA      | CLAT     | CLON     | R (KM)         | R (AU)     |
|------------------|----------|----------|----------|----------|----------------|------------|
| S/C +Z AXIS      | 0.0000   | 0.0000   | -11.1341 | 24.0358  | -              | -          |
| SUN              | 3.2213   | 337.1091 | -12.4093 | 27.1685  | 0.160812080 10 | 10.7494706 |
| EARTH            | 0.6721   | 225.7539 | -11.6152 | 23.5570  | 0.171638530 10 | 11.4731628 |
| JUPITER          | 153.6502 | 336.5275 | 0.0000   | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS (R)       | 75.0232  | 321.6956 |          |          |                |            |
| PETELGEUSE (R)   | 62.5190  | 247.5916 |          |          |                |            |
| CANOPUS (R)      | 76.9027  | 284.3581 |          |          |                |            |
| ARCTURUS (R)     | 160.3795 | 39.5778  |          |          |                |            |
| RIGIL KENTAURUS  | 117.4020 | 241.5070 |          |          |                |            |
| ANTARES (R)      | 122.2077 | 196.7415 |          |          |                |            |
| CAPELLA (R)      | 65.7112  | 31.5502  |          |          |                |            |
| VEGA (R)         | 104.0902 | 118.8242 |          |          |                |            |
| ALDEBARAN (R)    | 45.2247  | 3.2459   |          |          |                |            |
| RIGEL (R)        | 52.2698  | 329.0794 |          |          |                |            |
| GAMMA CRUCIS (R) | 120.0258 | 260.4598 |          |          |                |            |
| SPICA (R)        | 166.8016 | 272.4408 |          |          |                |            |
| ACHERNAR (R)     | 56.3530  | 247.2024 |          |          |                |            |
| DENER (R)        | 81.0695  | 112.5465 |          |          |                |            |
| PROCCYON (R)     | 88.2590  | 344.0186 |          |          |                |            |

STAR DELAY: 1.0602 SEC 271.4003 PULSES DECIMAL = 4. COARSE + 15. FINE  
 50.6419 DEG 04 17 PULSES OCTAL CKAH SUB C = 337.1091 EPSILON= 0.0000 SCN=11

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11 PASS 3083 FRI 4 #164 S/W SKO DSS 63 RCVR AGC -133.2 FILE 11-1333 PD  
 SPACECRAFT ATTITUDE ON DAY 248 SEP 5, 1981 1330 GMT

09/08/81

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RO SPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSCRS = 0 RCSTPLS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.3571 RO SPHAK = 114.0610  
 SPACECRAFT-EARTH DIRECTION: CLAT = -11.6154 CLON = 23.5445  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -12.0353 CLON = 22.2260

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11 PASS 3083 FRI 4 #164 S/W SKO DSS 63 RCVR AGC -133.2 FILE 11-1333 PD 09/08/81  
 SPACECRAFT ATTITUDE ON DAY 248 SEP 5, 1981 1330 GMT  
 SPIN PERIOD = 7.541969 SEC RTLT = 3 HR 10 MIN 48.89 SEC

|                  | CNA      | CKA      | CLAT     | CLON     | R (KM)         | R (AU)     |
|------------------|----------|----------|----------|----------|----------------|------------|
| S/C +Z AXIS      | 0.0000   | 0.0000   | -12.0353 | 22.2260  | -              | -          |
| SUN              | 41.8397  | 355.0596 | -12.4083 | 27.1633  | 0.160905330 10 | 10.7490164 |
| EARTH            | 1.3571   | 17.8865  | -11.6154 | 23.5445  | 0.171614500 10 | 11.4715575 |
| JUPITER          | 154.8706 | 332.0654 | 0.0000   | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS (R)       | 75.8577  | 321.8011 |          |          |                |            |
| BETELGEUSE (R)   | 64.0599  | 347.8609 |          |          |                |            |
| CANOPUS (R)      | 76.4710  | 294.4540 |          |          |                |            |
| ARCTURUS (R)     | 175.2195 | 34.3941  |          |          |                |            |
| RIGIL KENTAURUS  | 115.7597 | 240.5856 |          |          |                |            |
| ANTARES (R)      | 130.2506 | 196.6976 |          |          |                |            |
| CAPPELLA (R)     | 67.6972  | 31.1212  |          |          |                |            |
| VEGA (R)         | 104.0225 | 119.9585 |          |          |                |            |
| ALDEBARAN (R)    | 47.0500  | 3.7457   |          |          |                |            |
| RIGEL (R)        | 53.2412  | 229.0974 |          |          |                |            |
| CANNA CRUCIS (R) | 118.8257 | 259.2017 |          |          |                |            |
| SPICA (R)        | 165.8577 | 264.9719 |          |          |                |            |
| ACHERNAR (R)     | 54.0428  | 247.8257 |          |          |                |            |
| DFNER (R)        | 81.2326  | 111.0744 |          |          |                |            |
| PROCYON (R)      | 89.7114  | 242.6757 |          |          |                |            |

STAR DELAY: 1.0589 SEC 271.0935 PULSES DECIMAL = 4. COARSE + 15. FINE  
 50.5460 DEG 04 17 PULSES OCTAL CKAH SUB C = 355.0596 EPSILON = 0.0000 SCM = 17

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11 PASS 3078 PRI4 #0/0 S/W SKO DSS 442 RCVR AGC -143.8 FILE 11-1332 TG 09/03/81  
 SPACECRAFT ATTITUDE CN DAY 244 SEP 1, 1981 0630 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGPRS = 0 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: PCSANGAK = 1.0161 PCSPHAK = 123.4130  
 SPACECRAFT-EARTH DIRECTION: CLAT = -11.6250 CLON = 23.0755  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -12.1202 CLON = 22.1689

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 \*1 PASS 3078 PRI4 #0/0 S/W SKO DSS 442 RCVR AGC -143.8 FILE 11-1332 TG 09/03/81  
 SPACECRAFT ATTITUDE CN DAY 244 SEP 1, 1981 0630 GMT  
 SPIN PERIOD = 7.541869 SEC RTLT = 2 HR 2 MIN 24.80 SEC

|                 | CMA      | CKA      | CLAT     | CLON     | R(KM)          | P(AU)      |
|-----------------|----------|----------|----------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -12.1202 | 22.1689  | -              | -          |
| SUN             | 4.6919   | 356.4452 | -12.3697 | 26.9634  | 0.160549270 10 | 10.7319031 |
| EARTH           | 1.0161   | 29.0772  | -11.6250 | 23.0755  | 0.170354140 10 | 11.2873082 |
| JUPITER         | 154.8216 | 232.7380 | 0.0000   | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)       | 75.8490  | 321.8147 |          |          |                |            |
| RETELGEUSE(B)   | 64.0966  | 347.8950 |          |          |                |            |
| CANOPUS(B)      | 76.4027  | 284.4602 |          |          |                |            |
| ARCTURUS(B)     | 161.2999 | 94.5657  |          |          |                |            |
| RIGIL KENTAURUS | 115.6539 | 340.5704 |          |          |                |            |
| ANTARES(B)      | 130.1727 | 196.7309 |          |          |                |            |
| CAPELLA(B)      | 67.7889  | 31.1272  |          |          |                |            |
| VEGA(B)         | 104.0698 | 118.2691 |          |          |                |            |
| ALDEBARAN(B)    | 47.1113  | 3.8087   |          |          |                |            |
| RIGEL(B)        | 57.3471  | 330.0512 |          |          |                |            |
| GAMMA CRUCIS(B) | 118.7318 | 259.1684 |          |          |                |            |
| SPICA(B)        | 165.7676 | 264.6706 |          |          |                |            |
| ACHERNAR(B)     | 54.7437  | 247.8276 |          |          |                |            |
| DENER(B)        | 81.2906  | 111.8497 |          |          |                |            |
| PRCCYON(B)      | 89.7410  | 343.6677 |          |          |                |            |

STAR DELAY: 1.0588 SEC 271.0502 PULSES DECIMAL = 4. COARSE + 15. FINE  
 50.5398 DEG 04 17 PULSES OCTAL CMAH SUB C = 356.4452 EPSILON= 0.0000 SCN=11  
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PN 11 PASS 3074 PR14 #0/0 S/W SKO DSS 44B PCVR AGC -142.5 FILE 11-1331 TG 08/28/81  
 SPACECRAFT ATTITUDE ON DAY 240 AUG 28, 1981 0730 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSCRRS = 0 RCSTIPUS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.7002 RCSPHAK = 141.6530

SPACECRAFT-EARTH DIRECTION: CLAT = -11.6367 CLON = 22.6544

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -12.1565 CLON = 22.1751

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PN 11 PASS 3074 PR14 #0/0 S/W SKO DSS 44B PCVR AGC -142.5 FILE 11-1331 TG 08/28/81  
 SPACECRAFT ATTITUDE ON DAY 240 AUG 28, 1981 0730 GMT  
 SPIN PERIOD = 7.541869 SEC RILT = 3 HR 8 MIN 45.90 SEC

|                 | CNA      | CKA      | CLAT     | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|----------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -12.1565 | 22.1751  |                |            |
| SUN             | 4.5017   | 357.2557 | -12.3338 | 26.7781  | 0.160313670 10 | 10.7161544 |
| EARTH           | 0.7002   | 47.8860  | -11.6367 | 22.6544  | 0.169770930 10 | 11.3493242 |
| JUPITER         | 154.8596 | 332.6764 | 0.0000   | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 75.8219  | 321.8222 |          |          |                |            |
| BETELGEUSE(R)   | 64.0831  | 347.9129 |          |          |                |            |
| CANOPUS(R)      | 76.3661  | 284.4623 |          |          |                |            |
| ARCTURUS(R)     | 161.3365 | 94.5579  |          |          |                |            |
| RIGIL KENTAURUS | 115.6252 | 240.5827 |          |          |                |            |
| ANTARES(R)      | 120.1680 | 196.7629 |          |          |                |            |
| CAPELLA(R)      | 67.8026  | 31.1425  |          |          |                |            |
| VEGA(B)         | 104.1044 | 118.9735 |          |          |                |            |
| ALDERARAN(R)    | 47.1078  | 3.8440   |          |          |                |            |
| RIGEL(B)        | 53.3238  | 330.0737 |          |          |                |            |
| GAMMA CRUCIS(R) | 119.6973 | 259.1766 |          |          |                |            |
| SPICA(B)        | 165.7320 | 264.7086 |          |          |                |            |
| ACHERNAR(B)     | 54.7124  | 247.8153 |          |          |                |            |
| DENEB(B)        | 81.3265  | 111.8497 |          |          |                |            |
| REGULON(B)      | 89.7251  | 243.6602 |          |          |                |            |

STAR DELAY: 1.0587 SEC 271.0391 PULSES DECIMAL = 4. COARSE + 15. FINE  
 50.5377 DEG 04-17 PULSES OCTAL CKAH SUB C = 357.2557 EPSILON = 0.0000 SCN = 11

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11 PASS 3067 FRI 0070 S/W SMO USS 448 RCVR AL 0.5 FILE 11-1330 TG  
 SPACECRAFT ATTITUDE ON DAY 253 AUG 21, 1981 0700 GMT

08/21/81

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSRPAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRMS = 0 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSJANGA = 0.5685 RCSPHAK = 218.5730  
 SPACECRAFT-EARTH DIRECTION: CLAT = -11.6639 CLON = -21.9407  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -12.1306 CLON = 22.2724

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11 PASS 3067 FRI 0070 S/W SMO USS 448 RCVR AL 0.5 FILE 11-1330 TG 08/21/81  
 SPACECRAFT ATTITUDE ON DAY 253 AUG 21, 1981 0700 GMT  
 SPIN PERIOD = 7.541569 SEC FLT = 5 HR 0 MIN 52.79 SEC

|                 | CNA      | CKA      | CLAT     | CLON     | R (KM)         | R (AU)     |
|-----------------|----------|----------|----------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -12.1306 | 22.2724  | -              | -          |
| SUN             | 0.0000   | 357.6092 | -12.2696 | 26.4485  | 0.159898730 10 | 10.0884178 |
| EARTH           | 0.5685   | 124.6465 | -11.6639 | 21.9407  | 0.166075580 10 | 11.2349987 |
| JUPITER         | 151.7269 | 332.8564 | 0.0000   | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)       | 75.7831  | 321.6226 |          |          |                |            |
| DEILOC-USE(R)   | 67.9555  | 347.9114 |          |          |                |            |
| CANCRUS(B)      | 76.3574  | 284.4589 |          |          |                |            |
| ARCTICUS(B)     | 161.3120 | 94.2916  |          |          |                |            |
| RIGIL KENTAURUS | 116.6944 | 240.6309 |          |          |                |            |
| ANTARES(R)      | 130.2860 | 196.7856 |          |          |                |            |
| CAPPELLA(R)     | 67.7878  | 31.1740  |          |          |                |            |
| VEGA(B)         | 106.1279 | 116.9679 |          |          |                |            |
| ALDEBARAN(R)    | 47.0111  | 3.6464   |          |          |                |            |
| RIGEL(B)        | 52.2543  | 330.0420 |          |          |                |            |
| GAMMA CRUCIS(R) | 112.7405 | 259.2457 |          |          |                |            |
| SPICA(B)        | 162.7666 | 265.0931 |          |          |                |            |
| ACHENNAH(B)     | 54.7723  | 247.7884 |          |          |                |            |
| DENEK(B)        | 81.3379  | 111.8851 |          |          |                |            |
| PRUCYON(B)      | 69.6111  | 343.6844 |          |          |                |            |

STAR DELAY: 1.0548 SEC 271.0575 PULSES DECIMAL = 4. CHANGE + 15. FINE  
 50.5411 DEG 04 17 PULSES CICAL CNAH SUB C = 357.6092 EPSILON= 0.0000 SCN=11

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11 PASS 3065 PR14 46/9 S/W SNO DSS 12A RCVR AGC 142.5 FILE 11-1329 RC 08/18/81  
 SPACECRAFT ATTITUDE ON DAY 231 AUG 18, 1981 0300 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCS PHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180

NEW ATTITUDE  
POST-PRECESSION

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.6774 RCSPHAK = 233.2700

SPACECRAFT-EARTH DIRECTION: CLAT = -11.6739 CLON = 21.7294

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -12.1092 CLON = 22.2598

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 11 PASS 3065 PR14 46/9 S/W SNO DSS 12A RCVR AGC 142.5 FILE 11-1329 RC 08/18/81  
 SPACECRAFT ATTITUDE ON DAY 231 AUG 18, 1981 0300 GMT  
 SPIN PERIOD = 7.541747 SEC RTLT = 3 HR 0 MIN 16.50 SEC

|                 | CNA      | CKA      | CLAT     | CLON     | R (KM)         | R (AU)     |
|-----------------|----------|----------|----------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -12.1092 | 22.2598  |                |            |
| SUN             | 3.9971   | 357.5557 | -12.2497 | 26.3484  | 0.159771290 10 | 10.6798991 |
| EARTH           | 0.6774   | 140.0662 | -11.6739 | 21.7294  | 0.167531500 10 | 11.1986297 |
| JUPITER         | 150.8076 | 332.8644 | 0.0000   | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)       | 76.7861  | 321.8177 |          |          |                |            |
| BETELGEUSE(R)   | 64.0121  | 347.8998 |          |          |                |            |
| CANOPUS(B)      | 76.3912  | 284.4578 |          |          |                |            |
| ARCTURUS(R)     | 161.2957 | 94.3207  |          |          |                |            |
| RIGIL KENTAURUS | 116.7071 | 240.6240 |          |          |                |            |
| ANTARES(R)      | 130.2609 | 196.7626 |          |          |                |            |
| CAPELLA(R)      | 67.7072  | 31.1012  |          |          |                |            |
| VEGA(B)         | 104.1032 | 118.9673 |          |          |                |            |
| ALDEBARAN(R)    | 47.0220  | 3.8230   |          |          |                |            |
| RIGEL(B)        | 53.2757  | 330.0301 |          |          |                |            |
| GAMMA CRUCIS(R) | 118.7593 | 259.2342 |          |          |                |            |
| SPICA(B)        | 164.7865 | 265.0347 |          |          |                |            |
| ACHERNAB(B)     | 50.7875  | 247.7915 |          |          |                |            |
| DENEB(B)        | 81.3134  | 111.8820 |          |          |                |            |
| PROCYON(B)      | 89.6589  | 343.6860 |          |          |                |            |

STAR DELAY: 1.0588 SEC 271.0588 PULSES DECIMAL = 4, COARSE + 15, FINE  
 50.5422 DEG 04 17 PULSES OCIAL CKAN SUB C = 357.5557 EPSILON = 0.0000 SCN = 11

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PN 11 R14 #070 S/W SMO DSS 11A RCVR 42.5 FILE 11-1328 RC 0 21  
 SPACECRAFT ATTITUDE ON DAY 230 - AUG 18, 1981 2200 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

PRE-PRECESSION

REFERENCE FOR RCSBANK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 0 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.1302 RCSPMAK = 91.4130  
 SPACECRAFT-EARTH DIRECTION: CLAT = -11.6748 CLON = 21.7093  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -11.5443 CLON = 20.5632

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PN 11 PASS 3065 FRID 4070 S/W SMO DSS 11A RCVR AGC -142.5 FILE 11-1328 RC 08/18/81  
 SPACECRAFT ATTITUDE ON DAY 230 AUG 18, 1981 2200 GMT  
 SPIN PERIOD = 7.548751 SEC RTLT = 3 HR 6 MIN 12.98 SEC

|                 | CNA      | CKA      | CLAT     | CLON     | R (KM)         | R (AU)     |
|-----------------|----------|----------|----------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -11.5443 | 20.5632  |                |            |
| SUN             | 5.6929   | 352.3126 | -12.2477 | 26.3386  | 0.154759062 10 | 10.6740616 |
| EARTH           | 1.1302   | 353.2504 | -11.6748 | 21.7093  | 0.167478740 10 | 11.1451029 |
| JUPITER         | 156.5404 | 331.4216 | 0.0000   | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)       | 77.4395  | 321.6093 |          |          |                |            |
| BETELGEUSE(R)   | 65.7550  | 347.4594 |          |          |                |            |
| CANOPUS(B)      | 77.3526  | 284.4522 |          |          |                |            |
| ARCTURUS(B)     | 100.5475 | 98.5623  |          |          |                |            |
| RIGIL KENTAUROS | 115.3871 | 239.4541 |          |          |                |            |
| ATTAPES(R)      | 128.8233 | 195.5650 |          |          |                |            |
| CAPELLA(B)      | 68.8462  | 30.2820  |          |          |                |            |
| VEGA(B)         | 102.8053 | 118.9014 |          |          |                |            |
| ALDEBARAN(R)    | 48.6467  | 2.0767   |          |          |                |            |
| FIGEL(B)        | 54.9961  | 329.4244 |          |          |                |            |
| GAMMA CRUCIS(R) | 116.9242 | 257.4272 |          |          |                |            |
| SPICA(B)        | 168.0977 | 257.7680 |          |          |                |            |
| ACHERNAR(B)     | 50.6964  | 240.0822 |          |          |                |            |
| DENEBO(B)       | 80.1769  | 111.3165 |          |          |                |            |
| PROCYON(B)      | 91.4116  | 343.3355 |          |          |                |            |

STAR DELAY: 1.0598 SEC 271.2606 PULSES DECIMAL = 4, COARSE + 15, FINE  
 50.5478 DEG 04 17 PULSES CITAL CKAH SUB C = 352.3126 EPSILON = 0.0000 SCN = 11

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MC STAN 81

PN 11 ~~FR14 4070~~ S/W SN.0 DSS 118 RCVR ~~42.5~~ FILE 11-1327 TG ~~0000~~ GMT

ROLL REFERENCE BODY IS SUN SUN IS ON LEFT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ELLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRHS = 0 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.6371 RCSPHAK = 74.9880

SPACECRAFT-EARTH DIRECTION: CLAT = -11.7047 CLON = 21.1718

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -11.5206 CLON = 20.5492

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~~PN 11 PASS 3054 FR14 4070 S/W SN.0 DSS 118 RCVR AGC -142.5 FILE 11-1327 TG 08/13/81~~

~~SPACECRAFT ATTITUDE ON DAY 225 AUG 13, 1981 0400 GMT  
SPIN PERIOD = 7.546751 SEC RTLT = 3 HR 4 MIN 33.06 SEC~~

|                  | CNA      | LKA      | CLAT     | CLON     | R (KM)         | R (AU)     |
|------------------|----------|----------|----------|----------|----------------|------------|
| S/C +Z AXIS      | 0.0000   | 0.0000   | -11.5206 | 20.5492  |                |            |
| SUN              | 5.4398   | 352.3229 | -12.1944 | 26.0649  | 0.159422550 10 | 10.6565876 |
| EARTH            | 0.6371   | 343.1344 | -11.7047 | 21.1718  | 0.165990020 10 | 11.0959896 |
| JUPITER          | 156.5642 | 331.9522 | 0.0000   | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS (B)       | 77.4850  | 321.6042 |          |          |                |            |
| BETELGEUSE (R)   | 65.7735  | 347.4475 |          |          |                |            |
| CANOPUS (B)      | 77.3792  | 284.4511 |          |          |                |            |
| ARCTURUS (R)     | 160.5220 | 98.5879  |          |          |                |            |
| RIGIL KENTAURUS  | 115.3806 | 239.4399 |          |          |                |            |
| ANTARES (R)      | 120.6165 | 195.5609 |          |          |                |            |
| CAPELLA (R)      | 68.8461  | 30.2688  |          |          |                |            |
| VEGA (B)         | 102.7779 | 118.6992 |          |          |                |            |
| ALDEBARAN (R)    | 46.6592  | 2.8524   |          |          |                |            |
| RIGEL (B)        | 55.0199  | 329.9170 |          |          |                |            |
| GAMMA CRUCIS (R) | 119.0006 | 257.9142 |          |          |                |            |
| SPICA (B)        | 166.1180 | 257.7107 |          |          |                |            |
| ACHERNAH (B)     | 54.7135  | 240.6946 |          |          |                |            |
| DENEBO (B)       | 80.1498  | 111.3130 |          |          |                |            |
| PROCYON (B)      | 91.4315  | 343.3372 |          |          |                |            |

STAR DELAY: 1.0597 SEC 271.2747 PULSES DECIMAL = 4. COARSE + 15. FINE  
00.5489 SEC 04 17 PULSES OCTAL CNAH SUB C 3 352.3229 EPSILON = 0.0000 SCN = 1

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PN 10 PASS 3562 PR23 #0/0 S/W SK.0 DSS 63P RCVR ACC -123.9 FILE 10-1143 PS 11/24/81

SPACECRAFT ATTITUDE ON DAY 227 NOV 23, 1981 2230 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCS PHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRDS = 180 RCSTPCS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.6262 RCSPHAK = 279.2210

SPACECRAFT-EARTH DIRECTION: CLAT = -3.2599 CLON = 243.8381

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.2499 CLON = 244.4657

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PN 10 PASS 3563 PR23 #0/0 S/W SK.0 DSS 63P RCVR ACC -123.9 FILE 10-1148 RS 11/24/81

SPACECRAFT ATTITUDE ON DAY 227 NOV 23, 1981 2230 GMT

SPIN PERIOD = 12.980950 SEC PTLT = 6 HR 54 MIN 56.09 SEC

|                  | CNA      | CKA      | CLAT    | CLON     | R (KM)         | R (AU)    |
|------------------|----------|----------|---------|----------|----------------|-----------|
| S/C +Z AXIS      | 0.0000   | 0.0000   | -3.3699 | 244.4657 | -              | -         |
| SUN              | 0.7667   | 162.2404 | -3.1358 | 243.7345 | 0.387913540 10 | 25.930049 |
| EARTH            | 0.6262   | 170.0555 | -3.2599 | 243.8381 | 0.373182080 10 | 24.945393 |
| JUPITER          | 64.5131  | 179.3915 | 0.0000  | 180.0000 | 0.00000000     | 0.000000  |
| SIRIUS (R)       | 123.0253 | 224.0111 |         |          |                |           |
| BETELGEUSE (R)   | 149.4039 | 220.0221 |         |          |                |           |
| CANOPUS (R)      | 97.4619  | 260.8410 |         |          |                |           |
| ARCTURUS (R)     | 51.5847  | 135.5363 |         |          |                |           |
| PIGIL KENTAURUS  | 39.5021  | 263.8472 |         |          |                |           |
| ANTARES (R)      | 5.0548   | 246.1717 |         |          |                |           |
| CAPELLA (R)      | 154.4687 | 128.7609 |         |          |                |           |
| VEGA (R)         | 72.0743  | 71.1467  |         |          |                |           |
| ALDEBARAN (R)    | 169.8671 | 240.7122 |         |          |                |           |
| RIGEL (R)        | 143.6575 | 252.5224 |         |          |                |           |
| GAMMA CRUCIS (R) | 50.5923  | 245.8503 |         |          |                |           |
| SPICA (R)        | 40.9593  | 179.2493 |         |          |                |           |
| ACHERNAR (R)     | 92.3996  | 200.0026 |         |          |                |           |
| DENEBS (R)       | 93.1682  | 59.8573  |         |          |                |           |
| PROCYON (R)      | 126.0252 | 202.6148 |         |          |                |           |

STAR DELAY: 2.6740 SEC 694.5541 PULSES DECIMAL = 10. COARSE + 45. FINE

74.1500 DEG 12.55 PULSES TOTAL GRAN SUB C = 151.5364 EPSILON=10.7041 SCN=

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PN 10 PASS 3558 PR23 40% S/W SK.0 DSS 63A RCVR A 25.6 FILE 10-1147  
 SPACECRAFT ATTITUDE ON DAY 323 - NOV 19, 1981 0200 GMT

11

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

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REFERENCE FOR RCSPHAK IS TOWARD SOUTH ELLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRKS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.5540 RCSPHAK = 259.0300  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.2592 CLON = 244.0049  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.6748 CLON = 244.5719

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 PN 10 PASS 3558 PR23 40% S/W SK.0 DSS 63A RCVR AGC = 125.6 FILE 10-1147 11/18/81  
 SPACECRAFT ATTITUDE ON DAY 323 NOV 19, 1981 0200 GMT  
 SPIN PERIOD = 12.980100 SEC RTLT = 6 HR 54 MIN 25.50 SEC

|                 | DNA      | CKA      | CLAT    | CLON     | R (KM)         | R (AU)     |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.6748 | 244.5719 | -              | -          |
| SUN             | 0.8543   | 140.6905 | -3.1557 | 243.7081 | 0.387353840 10 | 25.8926364 |
| EARTH           | 0.5540   | 131.4061 | -3.2592 | 244.0049 | 0.372724550 10 | 24.9147426 |
| JUPITER         | 64.4284  | 178.2329 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)       | 123.6240 | 234.0744 |         |          |                |            |
| BEJELGEUSE(R)   | 149.1356 | 220.3066 |         |          |                |            |
| CANOPUS(B)      | 97.1460  | 260.8296 |         |          |                |            |
| ARCTURUS(R)     | 51.7320  | 135.3067 |         |          |                |            |
| RIGIL KENTAURUS | 30.1889  | 263.9154 |         |          |                |            |
| ANTARES(R)      | 5.0928   | 349.7417 |         |          |                |            |
| CAPELLA(R)      | 154.6465 | 129.3118 |         |          |                |            |
| VEGA(B)         | 72.3931  | 71.1441  |         |          |                |            |
| ALDEBARAN(R)    | 169.5551 | 241.0726 |         |          |                |            |
| RIGEL(B)        | 143.3386 | 252.5196 |         |          |                |            |
| GAMMA CRUCIS(R) | 50.2758  | 245.8125 |         |          |                |            |
| SPICA(B)        | 40.8711  | 178.8900 |         |          |                |            |
| ACHERNAM(B)     | 97.1828  | 300.0735 |         |          |                |            |
| DENEK(B)        | 93.4791  | 59.0479  |         |          |                |            |
| PROCYON(B)      | 125.0211 | 202.7866 |         |          |                |            |

STAR DELAY: 3.6743 SEC 684.6144 PULSES DECIMAL = 10. COARSE + 45. FINE  
 70.1704 DEC 12 55 PULSES OCTAL CKAH SUB C = 130.5200 EPSILON=10.3705 SCN=10

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PN 10 PASS 3554 PR23 #2/6 S/W SK.0 DSS 63 RCVR AGC -125.6 FILE 10-1146 PD  
 SPACECRAFT ATTITUDE ON DAY 318 NOV 14, 1981 2000 GMT

11/16/81

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180  
 AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.5706 RCSPHAK = 241.4700  
 SPACECRAFT-EARTH DIRECTION: CLAT = -3.2579 CLON = 244.1492  
 SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.8098 CLON = 244.2945

NEW ATTITUDE  
 POST-PRECESSION

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PN 10 PASS 3554 PR23 #2/6 S/W SK.0 DSS 63 RCVR AGC -125.6 FILE 10-1146 PD  
 SPACECRAFT ATTITUDE ON DAY 318 NOV 14, 1981 2000 GMT  
 SPIN PERIOD = 12.979360 SEC RTLT = 6 HR 54 MIN 4.68 SEC

11/16/81

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.8098 | 244.2945 | -              | -          |
| SUN             | 0.9080   | 132.1056 | -3.1359 | 243.6848 | 0.386863740 10 | 25.8598757 |
| EARTH           | 0.5706   | 104.7194 | -3.2579 | 244.1493 | 0.372412370 10 | 24.8939750 |
| JUPITER         | 64.3555  | 178.1680 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 122.4694 | 234.0804 |         |          |                |            |
| BETELGEUSE(R)   | 148.9894 | 220.3898 |         |          |                |            |
| CANOPUS(B)      | 97.0005  | 260.8178 |         |          |                |            |
| ARCTURUS(R)     | 51.7721  | 135.1833 |         |          |                |            |
| PIGIL KENTAURUS | 29.0466  | 263.9872 |         |          |                |            |
| ANTARES(R)      | 5.1468   | 351.3636 |         |          |                |            |
| CAPELLA(R)      | 154.7016 | 120.6139 |         |          |                |            |
| VEGA(B)         | 72.5458  | 71.1298  |         |          |                |            |
| ALDEBARAN(R)    | 169.3997 | 241.0553 |         |          |                |            |
| PIGFL(B)        | 143.1867 | 252.4703 |         |          |                |            |
| GAMMA CRUCIS(R) | 50.1211  | 245.8201 |         |          |                |            |
| SPICA(B)        | 40.7967  | 178.7270 |         |          |                |            |
| ACHEPNAE(B)     | 92.1047  | 300.0634 |         |          |                |            |
| DENEK(B)        | 93.6345  | 59.8428  |         |          |                |            |
| PROCYON(B)      | 125.6976 | 202.8496 |         |          |                |            |

STAR DELAY: 2.6745 SEC 684.6846 PULSES DECIMAL = 10. COARSE + 45. FINE  
 74.1822 DEG 12 55 PULSES OCTAL GRAH SUB C = 121.9333 EPSILON=10.1722 SCN=10

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PN 10 PASS 3552 PR23 #070 S/W SM.0 DSS 43A RCVR AGC -126.7 FILE 10-1145 TS  
 SPACECRAFT ATTITUDE ON DAY 317 NOV 13, 1981 1300 GMT

11/13/81

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C,

PRE-PRECESSION

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.5628 RCSPHAK = 281.8130

SPACECRAFT-EARTH DIRECTION: CLAT = -3.2573 CLON = 244.1928

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.1734 CLON = 244.7502

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PN 10 PASS 3552 PR23 #070 S/W SM.0 DSS 43A RCVR AGC -126.7 FILE 10-1145 TS  
 SPACECRAFT ATTITUDE ON DAY 317 NOV 13, 1981 1300 GMT  
 SPIN PERIOD = 12.966220 SEC RTLT = 6 HR 53 MIN 59.44 SEC

11/13/81

|                 | CNA      | CKA      | CLAT    | CLON     | R (KM)         | R (AU)     |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.1734 | 244.7502 |                |            |
| SUN             | 1.0715   | 178.0267 | -3.1359 | 243.6778 | 0.38671459D 10 | 25.8499057 |
| EARTH           | 0.5628   | 188.5918 | -3.2573 | 244.1928 | 0.37233383D 10 | 24.8886250 |
| JUPITER         | 24.7917  | 178.5045 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| STRIUS(B)       | 124.2516 | 234.1049 |         |          |                |            |
| BETELGEUSE(R)   | 149.7477 | 220.0934 |         |          |                |            |
| CANOPUS(H)      | 97.7011  | 260.8904 |         |          |                |            |
| ARCTURUS(H)     | 51.6506  | 135.8211 |         |          |                |            |
| RIGIL KENTAURUS | 39.7286  | 263.5484 |         |          |                |            |
| ANTARES(R)      | 8.8429   | 343.1336 |         |          |                |            |
| CAPELLA(R)      | 154.4911 | 128.0552 |         |          |                |            |
| VEGA(H)         | 71.7967  | 71.2300  |         |          |                |            |
| ALDEBARAN(H)    | 170.1763 | 241.6036 |         |          |                |            |
| RIGEL(B)        | 143.9297 | 252.8290 |         |          |                |            |
| GAMMA CRUCIS(R) | 56.8880  | 245.7212 |         |          |                |            |
| SPIKA(B)        | 41.2417  | 179.4944 |         |          |                |            |
| ACHERRAN(B)     | 93.4272  | 300.1193 |         |          |                |            |
| VEREB(B)        | 92.8558  | 59.8664  |         |          |                |            |
| PROCYON(B)      | 124.3629 | 202.5781 |         |          |                |            |

STAR DELAY: 3.6721 SEC 684.0595 PULSES DECIMAL = 10, COARSE + 44, FINE  
 74.1096 DEG 12 54 PULSES CICAL CKAH SUB C = 168.4296 EPSILON = 9.5971 SCN=10

10 PASS 3551 PR23 4070 S/W SK.0 DSS 63A RCVR AGC -123.9 FILE 10-1144 RS  
 SPACECRAFT ATTITUDE ON DAY 315 NOV 11, 1981 2200 GMT

11/12/81

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C,

REFERENCE FOR RCS PHAK IS TOWARD SOUTH ELLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.4573 RCSPHAK = 282.1450

SPACECRAFT-EARTH DIRECTION: CLAT = -3.2565 CLON = 244.2471

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.1977 CLON = 244.7013

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10 PASS 3551 PR23 4070 S/W SK.0 DSS 63A RCVR AGC -123.9 FILE 10-1144 RS  
 SPACECRAFT ATTITUDE ON DAY 315 NOV 11, 1981 2200 GMT  
 SPIN PERIOD = 12.976820 SEC RTLT = 6 HR 53 MIN 53.52 SEC

11/12/81

|                 | GNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.1977 | 244.7013 | -              | -          |
| SUN             | 1.0327   | 176.0004 | -3.1360 | 243.6689 | 0.380527360 10 | 25.8373904 |
| EARTH           | 0.4573   | 187.4032 | -3.2565 | 244.2471 | 0.372245160 10 | 24.8626979 |
| JUPITER         | 64.7434  | 178.4897 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)       | 124.2033 | 234.0850 |         |          |                |            |
| BETELGEUSE(R)   | 149.6947 | 220.0667 |         |          |                |            |
| CANOPUS(B)      | 97.6693  | 260.8817 |         |          |                |            |
| ARCTURUS(R)     | 51.6325  | 135.7776 |         |          |                |            |
| RIGIL KENTAURUS | 39.6990  | 263.6009 |         |          |                |            |
| ANTARES(R)      | 4.8827   | 343.5694 |         |          |                |            |
| CAPELLA(B)      | 154.4801 | 126.1645 |         |          |                |            |
| VEGA(B)         | 77.8355  | 71.2147  |         |          |                |            |
| ALDEBARAN(R)    | 176.1316 | 241.4203 |         |          |                |            |
| RISEL(B)        | 144.8920 | 252.7721 |         |          |                |            |
| GAMMA CRUCIS(R) | 58.8456  | 245.7466 |         |          |                |            |
| SPICA(B)        | 41.1930  | 179.4634 |         |          |                |            |
| ACHERNAB(B)     | 92.4307  | 300.1143 |         |          |                |            |
| DENEK(B)        | 92.9013  | 59.8652  |         |          |                |            |
| PRICYON(B)      | 126.3084 | 202.5781 |         |          |                |            |

STAR DELAY: 2.6723 SEC 684.1204 PULSES DECIMAL = 10, COARSE + 44, FINE  
 78.1183 DEC 12 54 PULSES OCIAL CKAH SUB C = 166.8706 EPSILON = 9.7298 SUN=10

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10 PASS 3542 PR23 4070 S/W SP.0 DSS 63P RCVR AGC -125.6 FILE 10-1143 BD  
 SPACECRAFT ATTITUDE ON DAY 308 NOV 4, 1981 0300 GMT

170  
 11/0  
 11/03/81

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCS PHASE IS TOWARD SCALAR ELLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.1923 RCSPHAK = 260.5200

SPACECRAFT-EARTH DIRECTION: CLAT = -3.2513 CLON = 244.5001

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.2814 CLON = 244.0904

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10 PASS 3542 PR23 4070 S/W SP.0 DSS 63P RCVR AGC -125.6 FILE 10-1143 BD 11/03/81  
 SPACECRAFT ATTITUDE ON DAY 308 NOV 4, 1981 0300 GMT  
 SPIN PERIOD = 12.978510 SEC RTLT = 6 HR 53 MIN 36.02 SEC

|                  | CMA      | CKA      | CLAT    | CLON     | R (KM)         | R (AU)     |
|------------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS      | 0.0000   | 0.0000   | -3.2814 | 244.0904 | -              | -          |
| SUN              | 1.0725   | 172.2434 | -3.1301 | 243.6201 | 0.305028640 10 | 25.1773155 |
| EARTH            | 0.1923   | 171.0213 | -3.2513 | 244.5001 | 0.371982790 10 | 24.8051598 |
| JUPITER          | 64.7308  | 178.4495 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS (R)       | 124.1291 | 234.1117 |         |          |                |            |
| BETELGEUSE (R)   | 140.6325 | 220.1654 |         |          |                |            |
| CANOPUS (R)      | 97.5850  | 260.0814 |         |          |                |            |
| ARCTURUS (R)     | 71.0431  | 135.7238 |         |          |                |            |
| RIGIL KENTAURUS  | 36.6146  | 263.0021 |         |          |                |            |
| ANTARES (R)      | 4.8702   | 344.5467 |         |          |                |            |
| CABELLA (R)      | 154.5391 | 128.2904 |         |          |                |            |
| VEGA (B)         | 71.9182  | 71.2195  |         |          |                |            |
| ALDEBARAN (R)    | 170.0529 | 241.5934 |         |          |                |            |
| RIGEL (R)        | 142.8089 | 252.7912 |         |          |                |            |
| GAMMA CRUCIS (R) | 50.7650  | 245.7200 |         |          |                |            |
| SPICA (B)        | 47.1830  | 179.3671 |         |          |                |            |
| ACHERON (R)      | 93.3638  | 300.1115 |         |          |                |            |
| DENEUB (B)       | 92.9791  | 59.8024  |         |          |                |            |
| PROCYON (B)      | 126.2002 | 202.6311 |         |          |                |            |

STAR DELAY: 2.6721 SEC 684.0524 PULSES DECIMAL = 10, COARSE + 44. FINE  
 74.1180 DEC 12 54 PULSES OCIAL CKAN SUB L = 162.6498 EPSILON = 9.5936 SUN=10

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PN 10 PASS 2522 PR23 #0/0 S/W SK.0 DSS 43P RCVP AGC -127.8 FILE 10-1142 RS  
 SPACECRAFT ATTITUDE ON DAY 299 OCT 26,1981 1530 GMT

10/26/81

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

POLL REFERENCE PARAMETERS: ASPSGRPS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.1936 RCSPHAK = 132.6460

SPACECRAFT-EARTH DIRECTION: CLAT = -3.2431 CLON = 244.7568

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3443 CLON = 244.5915

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PN 10 PASS 3533 PR23 #0/0 S/W SK.0 DSS 43P RCVR AGC -127.8 FILE 10-1142 RS  
 SPACECRAFT ATTITUDE ON DAY 299 OCT 26,1981 1530 GMT  
 SPIN PERIOD = 12.977170 SEC RTLT = 6 HR 53 MIN 36.43 SEC

10/26/81

| S/C +Z AXIS     | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| SUN             | 0.0000   | 0.0000   | -3.3443 | 244.5915 | -              | -          |
| EARTH           | 1.0318   | 168.3896 | -3.1362 | 243.5793 | 0.384650430 10 | 25.7119271 |
| JUPITER         | 0.1936   | 31.5124  | -3.2431 | 244.7568 | 0.371988950 10 | 24.8655715 |
| SIRIUS(B)       | 64.6378  | 178.4127 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| BETELGEUSE(R)   | 124.0202 | 234.0768 |         |          |                |            |
| CANOPUS(B)      | 149.5164 | 220.1332 |         |          |                |            |
| ARCTURUS(R)     | 97.5072  | 260.8641 |         |          |                |            |
| RIGIL KENTAURUS | 51.6564  | 135.6277 |         |          |                |            |
| ANTARES(R)      | 39.5411  | 263.7066 |         |          |                |            |
| CAPELLA(R)      | 4.9494   | 345.5456 |         |          |                |            |
| VEGA(B)         | 154.5271 | 128.5293 |         |          |                |            |
| ALDERAPAN(R)    | 72.0096  | 71.1899  |         |          |                |            |
| RIGEL(B)        | 169.9503 | 241.2666 |         |          |                |            |
| GAMMA CRUCIS(R) | 143.7195 | 252.6823 |         |          |                |            |
| SPICA(B)        | 50.6671  | 245.7729 |         |          |                |            |
| ACHERNAR(B)     | 41.0850  | 179.2879 |         |          |                |            |
| DENER(B)        | 92.3589  | 300.1010 |         |          |                |            |
| PROCYON(B)      | 93.0832  | 59.8600  |         |          |                |            |
|                 | 126.1509 | 202.6401 |         |          |                |            |

STAR DELAY: 2.6724 SEC 684.1415 PULSES DECIMAL = 10. COARSE + 44. FINE  
 74.1359 DEG 12 54 PULSES OCTAL CKAH SJ3 C = 158.6567 EPSILON= 9.7329 SCN=1

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PH 10 PASS 2520 0023 #070 S/W SK.0 DSS 430 PCVP AGC -125.6 FILE 10-1141 RS 10/23/81  
 SPACECRAFT ATTITUDE ON DAY 295 OCT 22, 1981 2100 GMT

POLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR PCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

POLL REFERENCE PARAMETERS: ASROGPRS = 180 PCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: PC SANGAK = 0.2091 PCSPHAK = 121.4570

SPACECRAFT-EARTH DIRECTION: CLAT = -3.2287 CLON = 244.8628

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.2495 CLON = 244.5728

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PH 10 PASS 2520 0023 #070 S/W SK.0 DSS 430 PCVP AGC -125.6 FILE 10-1141 RS 10/23/81  
 SPACECRAFT ATTITUDE ON DAY 295 OCT 22, 1981 2100 GMT  
 SPIN PERIOD = 12.276560 SEC PULS = 4 HR 53 MIN 42.70 SEC

|                  | GMA      | GKA      | CLAT    | CLON     | R (KM)         | R (AU)    |
|------------------|----------|----------|---------|----------|----------------|-----------|
| S/C +Z AXIS      | 0.0000   | 0.0000   | -3.2495 | 244.5728 | -              | -         |
| SUN              | 1.0760   | 168.1465 | -3.1262 | 243.5584 | 0.384215290 10 | 25.682840 |
| EARTH            | 0.2091   | 21.0091  | -3.2287 | 244.8628 | 0.372082920 10 | 24.971852 |
| JUPITER          | 64.6202  | 178.4202 | 0.0000  | 180.0000 | 0.000000000    | 0.000000  |
| SIRIUS (R)       | 124.2056 | 234.0632 |         |          |                |           |
| DETELGEUSE (R)   | 149.4096 | 220.1196 |         |          |                |           |
| CANOPUS (R)      | 97.4992  | 240.9628 |         |          |                |           |
| ARCTURUS (R)     | 51.6474  | 125.6140 |         |          |                |           |
| RIGIL KENTAURUS  | 39.5240  | 263.7262 |         |          |                |           |
| ANTARES (R)      | 4.9652   | 245.6522 |         |          |                |           |
| CAPPELLA (R)     | 154.5201 | 123.5640 |         |          |                |           |
| VEGA (R)         | 72.0202  | 71.1340  |         |          |                |           |
| ALDEBARAN (R)    | 163.9272 | 241.1224 |         |          |                |           |
| RIGEL (R)        | 143.7023 | 252.6604 |         |          |                |           |
| GAMMA CRUCIS (R) | 50.6551  | 245.7822 |         |          |                |           |
| SPICA (R)        | 41.0174  | 175.2802 |         |          |                |           |
| ACHERNAR (R)     | 92.3632  | 200.0922 |         |          |                |           |
| DELER (R)        | 93.0965  | 59.8597  |         |          |                |           |
| PROCYON (R)      | 126.1226 | 202.6376 |         |          |                |           |

STAR DELAY: 2.6724 SEC 684.1250 PULSES DECIMAL = 10. COARSE + 44. FINE  
 74.1291 DEC 12.54 PULSES OCTAL GRAH SUB C = 152.4280 EPSILON = 0.7185 SCN

PN 10 PASS 3523 PR23 #070 S/W SK,0 DSS 43 KCVR AGC -130.2 FILE 10-1140 PD  
 SPACECRAFT ATTITUDE ON DAY 288 OCT 15, 1981 1500 GMT

10/15/81

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCS PHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 KCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.5446 RCSPHAK = 115.9800

SPACECRAFT-EARTH DIRECTION: CLAT = -3.2288 CLON = 245.0496

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3658 CLON = 244.5216

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PN 10 PASS 3523 PR23 #070 S/W SK,0 DSS 43 KCVR AGC -130.2 FILE 10-1140 PD 10/15/81  
 SPACECRAFT ATTITUDE ON DAY 288 OCT 15, 1981 1500 GMT  
 SPIN PERIOD = 12.975210 SEC KILT = 6 HR 54 MIN 4.45 SEC

| S/C +Z AXIS      | CNA      | CKA      | CLAT    | CLON     | R (KM)         | R (AU)    |
|------------------|----------|----------|---------|----------|----------------|-----------|
| SUN              | 0.0000   | 0.0000   | -3.3658 | 244.5216 |                |           |
| EARTH            | 1.0278   | 167.1272 | -3.1563 | 243.5181 | 0.383378620 10 | 25.626913 |
| JUPITER          | 0.5446   | 14.5485  | -3.2288 | 245.0496 | 0.372409020 10 | 24.893651 |
| SIRIUS (B)       | 64.5687  | 178.3975 | 0.0000  | 180.0000 | 0.000000000    | 0.000000  |
| BETELGEUSE (R)   | 123.9619 | 234.0431 |         |          |                |           |
| CANOPUS (B)      | 140.4492 | 220.0407 |         |          |                |           |
| ARCTURUS (R)     | 97.4709  | 260.8514 |         |          |                |           |
| RIGIL KENTAURUS  | 57.6216  | 135.5728 |         |          |                |           |
| ANTARES (R)      | 30.5122  | 263.7837 |         |          |                |           |
| CAPELLA (R)      | 5.0117   | 345.9771 |         |          |                |           |
| VEGA (B)         | 155.5003 | 128.0670 |         |          |                |           |
| ALDEBARAN (R)    | 72.0524  | 71.1667  |         |          |                |           |
| RIGEL (B)        | 160.8979 | 240.9771 |         |          |                |           |
| GAMMA CRUCIS (R) | 143.6782 | 252.5903 |         |          |                |           |
| SPICA (B)        | 50.0189  | 245.8137 |         |          |                |           |
| ACHERAN (B)      | 41.0155  | 179.2502 |         |          |                |           |
| DENEK (B)        | 92.3753  | 300.0940 |         |          |                |           |
| PROCYON (B)      | 93.1368  | 59.8586  |         |          |                |           |
|                  | 126.0782 | 202.6309 |         |          |                |           |

STAR DELAY: 5.6725 SEC 684.1553 PULSES DECIMAL = 10, COARSE + 44, FINE  
 74.1486 DEC 12 54 PULSES OCTAL CKAH SUB C = 157.3805 EPSILON = 9.7466 SCN =

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PN 10 PASS 3517 PR23 #0/0 S/W SK.0 DSS 43 RCVR AGC -121.6 FILE 10-1139 PD  
 SPACECRAFT ATTITUDE ON DAY 282 OCT 9, 1981 1800 GMT

10/09/81

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.6791 RCSPHAK = 114.3300

SPACECRAFT-EARTH DIRECTION: CLAT = -3.2198 CLON = 245.1827

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3674 CLON = 244.5183

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PN 10 PASS 3517 PR23 #0/0 S/W SK.0 DSS 43 RCVR AGC -121.6 FILE 10-1139 PD  
 SPACECRAFT ATTITUDE ON DAY 282 OCT 9, 1981 1800 GMT  
 SPIN PERIOD = 12.974240 SEC RTLT = 6 HR 54 MIN 30.54 SEC

10/09/81

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3674 | 244.5183 | -              | -          |
| SUN             | 1.0573   | 167.4075 | -3.1264 | 243.4853 | 0.382700500 10 | 25.5815842 |
| EARTH           | 0.6791   | 12.5355  | -3.2198 | 245.1827 | 0.372800120 10 | 24.9197941 |
| JUPITER         | 64.5655  | 178.3965 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 123.9539 | 234.0421 |         |          |                |            |
| BETELGEUSE(P)   | 149.4460 | 220.0796 |         |          |                |            |
| CANCORUS(B)     | 97.4728  | 250.8500 |         |          |                |            |
| ARCTURUS(R)     | 51.6207  | 135.5702 |         |          |                |            |
| PIGIL KENTAUPUS | 39.5103  | 262.7869 |         |          |                |            |
| ANTARES(R)      | 5.0140   | 346.0027 |         |          |                |            |
| CAPELLA(R)      | 154.4998 | 128.6742 |         |          |                |            |
| VEGA(B)         | 72.0548  | 71.1658  |         |          |                |            |
| ALDEBARAN(R)    | 169.8951 | 240.9675 |         |          |                |            |
| FIGFL(B)        | 143.6759 | 252.5931 |         |          |                |            |
| GAMMA CRUCIS(R) | 50.6162  | 245.8151 |         |          |                |            |
| SPICA(B)        | 41.0127  | 179.2561 |         |          |                |            |
| ACHERNAR(B)     | 92.3753  | 300.0937 |         |          |                |            |
| DENEK(B)        | 93.1796  | 59.8586  |         |          |                |            |
| PROCYON(B)      | 126.0750 | 202.6310 |         |          |                |            |

STAR DELAY: 2.6722 SEC 684.1087 PULSES DECIMAL = 10. COARSE + 44. FINE  
 74.1491 DEG 12 54 PULSES OCTAL CKAH SUB C = 157.7623 EPSILON= 9.6452 SCM=1

10 PASS 3508 PR23 #070 S/W SA,0 DSS 14B RCVR AGC -128,7 FILE 10-1138 CJ  
 SPACECRAFT ATTITUDE ON DAY 2/3 SEP 30,1981 0830 GMT

09/30/81

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C,

REFERENCE FOR RCS PHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0,8129 RCSPHAK = 112,4230

SPACECRAFT-EARTH DIRECTION: CLAT = -3,2036 CLON = 245,3576

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3,3652 CLON = 244,5595

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10 PASS 3508 PR23 #070 S/W SA,0 DSS 14B RCVR AGC -128,7 FILE 10-1138 CJ  
 SPACECRAFT ATTITUDE ON DAY 2/3 SEP 30,1981 0830 GMT  
 SPIN PERIOD = 12,972650 SEC RTLT = 6 HR 55 MIN 26,00 SEC

09/30/81

|                  | CNA      | CKA      | CLAT    | CLON     | R (KM)          | R (AU)     |
|------------------|----------|----------|---------|----------|-----------------|------------|
| S/C +Z AXIS      | 0,0000   | 0,0000   | -3,3652 | 244,5595 |                 |            |
| SUN              | 1,1481   | 168,5423 | -3,1365 | 243,4327 | 0,381615750 -10 | 25,5090742 |
| EARTH            | 0,8129   | 11,4397  | -3,2036 | 245,3576 | 0,373631340 10  | 24,9753570 |
| JUPITER          | 64,6065  | 178,4005 | 0,0000  | 180,0000 | 0,00000000      | 0,0000000  |
| SIRIUS (R)       | 123,9846 | 234,0658 |         |          |                 |            |
| BETELGEUSE (R)   | 149,4786 | 220,1235 |         |          |                 |            |
| CANOPUS (R)      | 97,4815  | 260,8585 |         |          |                 |            |
| ARCTURUS (R)     | 51,6482  | 135,5964 |         |          |                 |            |
| RIGIL KENTAURUS  | 39,5164  | 263,7404 |         |          |                 |            |
| ANTARES (R)      | 4,9751   | 345,8670 |         |          |                 |            |
| CAPELLA (R)      | 154,5235 | 128,6070 |         |          |                 |            |
| VEGA (R)         | 72,0396  | 71,1804  |         |          |                 |            |
| ALDEBARAN (R)    | 169,9167 | 241,1637 |         |          |                 |            |
| RIGEL (R)        | 143,6901 | 252,6474 |         |          |                 |            |
| GAMMA CRUCIS (R) | 50,6350  | 245,7876 |         |          |                 |            |
| SPICA (R)        | 41,0534  | 179,2617 |         |          |                 |            |
| ACHERNAR (R)     | 93,3568  | 300,0976 |         |          |                 |            |
| DENEK (R)        | 93,1172  | 59,8591  |         |          |                 |            |
| PROCYON (R)      | 126,1134 | 202,6433 |         |          |                 |            |

STAR DELAY: 5,6717 SEC 683,9546 PULSES DECIMAL = 10, COARSE + 44, FINE  
 74,1415 DEG 12 54 PULSES OCTAL CKAH SUB C = 159,2003 EPSILON = 9,3420 SCN = 10

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PN 10 PASS 3501 PR23 4070 S/W SKO DSS 63A RCVR AGC -128.7 FILE 10-1137 RC  
 SPACECRAFT ATTITUDE ON DAY 266 SEP 23, 1981 0000 GMT

09/22/81

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C,

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE,

ROLL REFERENCE PARAMETERS: ASPSGRHS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.0213 RCSPHAK = 112.0300

SPACECRAFT-EARTH DIRECTION: CLAI = -3.1897 CLON = 245.4585

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3774 CLON = 244.4529

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PN 10 PASS 3501 PR23 4070 S/W SKO DSS 63A RCVR AGC -128.7 FILE 10-1137 RC  
 SPACECRAFT ATTITUDE ON DAY 266 SEP 23, 1981 0000 GMT  
 SPIN PERIOD = 12.977430 SEC RTLT = 6 HR 56 MIN 19.13 SEC

09/22/81

|                 | CNA      | CKA      | CLAT    | CLON     | R (KM)         | R (AU)     |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3774 | 244.4529 | -              | -          |
| SUN             | 1.0870   | 167.2309 | -3.1366 | 243.3912 | 0.380766520 10 | 25.4523108 |
| EARTH           | 1.0213   | 10.5583  | -3.1897 | 245.4585 | 0.374427730 10 | 25.0285916 |
| JUPITER         | 64.5005  | 178.3870 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)       | 123.9122 | 234.0063 |         |          |                |            |
| BETELGEUSE(R)   | 149.3893 | 220.0170 |         |          |                |            |
| CANOPUS(U)      | 97.4525  | 260.8388 |         |          |                |            |
| ARCTURUS(R)     | 57.5808  | 135.5242 |         |          |                |            |
| RIGIL KENTAURUS | 39.4933  | 263.6009 |         |          |                |            |
| ANTARES(R)      | 5.0755   | 308.2807 |         |          |                |            |
| CAPELLA(R)      | 154.4665 | 128.7908 |         |          |                |            |
| VEGA(B)         | 72.0855  | 71.1029  |         |          |                |            |
| ALDEBARAN(R)    | 169.8543 | 240.6694 |         |          |                |            |
| RIGEL(B)        | 142.6400 | 252.5081 |         |          |                |            |
| GAMMA CRUCIS(R) | 50.5603  | 245.8571 |         |          |                |            |
| SPICA(B)        | 42.9471  | 179.2348 |         |          |                |            |
| ACHERNAH(B)     | 93.3996  | 300.0876 |         |          |                |            |
| DENEK(B)        | 92.1812  | 59.8575  |         |          |                |            |
| PROCYON(B)      | 126.0105 | 202.6155 |         |          |                |            |

STAR DELAY: 3.6722 SEC 684.0728 PULSES DECIMAL = 10, COARSE + 44, FINE  
 74.1612 DEG 12 54 PULSES OCTAL CKAH SUB C = 157,6861 EPSILON# 9.5448 SCN#10

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PN 10 PASS 3495 PR23 #0/0 S/W SK.0 DSS 43P RCVR -128.7 FILE 10-1136 RS 09/17/81  
 SPACECRAFT ATTITUDE CN DAY 260 SEP 17, 1981 1800 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSCRRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.0914 RCSPHAK = 112.1360

SPACECRAFT-EARTH DIRECTION: CLAT = -3.7193 CLON = 245.5099

SPACECRAFT +Z AXIS ALTITUDE: CLAT = -3.6611 CLON = 244.4177

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PN 10 PASS 3495 PR23 #0/0 S/W SK.0 DSS 43P RCVR AGC -128.7 FILE 10-1136 RS 09/17/81  
 SPACECRAFT ATTITUDE CN DAY 260 SEP 17, 1981 1800 GMT  
 SPIN PERIOD = 12.970572 SEC RTLT = 6 HR 57 MIN 1.12 SEC

|                    | CNA      | CKA      | CLAT    | CLON     | R (KM)         | R (AU)    |
|--------------------|----------|----------|---------|----------|----------------|-----------|
| S/C +Z AXIS        | 0.0000   | 0.0000   | -3.6611 | 244.4177 | -              | -         |
| SUN                | 1.1776   | 153.5816 | -3.1366 | 243.3615 | 0.380160230 10 | 25.411780 |
| EARTH              | 1.0014   | 356.0091 | -3.7193 | 245.5099 | 0.375057180 10 | 25.070667 |
| JUPITER            | 64.4737  | 178.2490 | 0.0000  | 180.0000 | 0.000000000    | 0.000000  |
| SIRIUS (B)         | 123.6619 | 224.0966 |         |          |                |           |
| BETELGEUSE (R)     | 149.3793 | 220.2417 |         |          |                |           |
| CANOPUS (B)        | 97.1668  | 260.9376 |         |          |                |           |
| ARCTURUS (R)       | 51.7549  | 125.2427 |         |          |                |           |
| RIGIL KENTAURUS    | 39.2074  | 262.8643 |         |          |                |           |
| ANTARES (R)        | 5.0502   | 246.5000 |         |          |                |           |
| CAPELLA (R)        | 154.6649 | 129.2217 |         |          |                |           |
| VEGA (B)           | 72.3654  | 71.1594  |         |          |                |           |
| ALDEBARAN (R)      | 169.5892 | 241.2574 |         |          |                |           |
| RIGEL (B)          | 143.2652 | 252.5757 |         |          |                |           |
| GAMMA CIRCUCIS (R) | 50.2070  | 245.7354 |         |          |                |           |
| SPICA (B)          | 40.9166  | 179.9093 |         |          |                |           |
| ACHERNAR (B)       | 92.1717  | 300.0782 |         |          |                |           |
| DENERB (B)         | 92.4442  | 59.2489  |         |          |                |           |
| PRCCYON (B)        | 125.8695 | 202.7922 |         |          |                |           |

STAR DELAY: 7.6720 SEC 684.0350 PULSES DECIMAL = 10. COARSE + 44. FINE  
 74.1621 DEG 12 54 PULSES OCTAL CKAH SUB C = 144.3256 EPSILON = 9.2460 SCN =

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PN 10 PASS 3490 PR23 #070 S/W SP.0 DSS 63A RCVR AGC -123.9 FILE 10-1135 1G  
 SPACECRAFT ATTITUDE ON DAY 255 SEP 12, 1981 0600 GMT

09/18/81

POLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

POLL REFERENCE PARAMETERS: ASPSOPES = 180 RCSTPUS = 180

AMPLITUDE AND PHASE ANGLE: RCBSANGAK = 0.9899 RCSPHAK = 111.7000

SPACECRAFT-EARTH DIRECTION: CLAT = -3.1680 CLON = 245.5452

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3726 CLON = 244.5752

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PN 10 PASS 3490 PR23 #070 S/W SP.0 DSS 63A RCVR AGC -123.9 FILE 10-1135 1G  
 SPACECRAFT ATTITUDE ON DAY 255 SEP 12, 1981 0600 GMT  
 SPIN PERIOD = 12.969000 SEC RT T = 6 HR 57 MIN 48.55 SEC

09/18/81

|                 | CMA      | CKA      | CLAT    | CLON     | R(KM)          | R(AJ)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3726 | 244.5752 | -              | -          |
| SUN             | 1.2655   | 169.2931 | -3.1367 | 243.3299 | 0.379515360 10 | 25.3685731 |
| EARTH           | 0.9899   | 11.9000  | -3.1680 | 245.5452 | 0.375781170 10 | 25.1181931 |
| JUPITER         | 04.8223  | 178.3951 | 0.0000  | 180.0000 | 0.000000000    | 0.0000000  |
| SIRIUS(B)       | 123.9876 | 234.0781 |         |          |                |            |
| BETHELGEOSE(R)  | 149.4857 | 220.1511 |         |          |                |            |
| CANOPUS(B)      | 97.4767  | 260.3618 |         |          |                |            |
| ARCTURUS(F)     | 51.8645  | 135.6013 |         |          |                |            |
| FIGEL PENTAUROS | 59.5113  | 263.7215 |         |          |                |            |
| ANTARES(R)      | 4.9532   | 345.9067 |         |          |                |            |
| CAPELLA(R)      | 154.5390 | 128.5920 |         |          |                |            |
| VEGA(B)         | 72.0416  | 71.1869  |         |          |                |            |
| ALDEBARAN(R)    | 169.9170 | 241.2617 |         |          |                |            |
| FIGEL(B)        | 143.6877 | 252.6716 |         |          |                |            |
| GAMMA CRUCIS(R) | 50.6347  | 245.7745 |         |          |                |            |
| SPICA(B)        | 41.0891  | 179.2543 |         |          |                |            |
| ACHERNAR(B)     | 92.3426  | 300.0989 |         |          |                |            |
| DENER(B)        | 93.1150  | 59.8591  |         |          |                |            |
| PROCYON(B)      | 126.1250 | 202.6536 |         |          |                |            |

STAR DELAY: 2.6710 SEC 683.7652 PULSES DECIMAL = 10. COARSE + 44. FINE  
 76.1386 DEC 12 54 PULSES DIGITAL CMAH SUB C = 100.3255 EPSILON = 8.9676 SCN =

PN 10 PASS 3462 PR23 #0/0 S/W SK.0 DSS 14 RCVR AGC -125.9 FILE 10-1134 TG  
 SPACECRAFT ATTITUDE ON DAY 247 SLP 4,1981 1030 GMT

09/04/81

RCLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCS PHAK IS TOWARD SOUTH ECLIPTIC POLE.

RCLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 1.0049 RCS PHAK = 112.0340

SPACECRAFT-EARTH DIRECTION: CLAT = -3.1501 CLON = 245.5603

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3717 CLON = 244.5786

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PN 10 PASS 3462 PR23 #0/0 S/W SK.0 DSS 14 RCVR AGC -125.9 FILE 10-1134 TG  
 SPACECRAFT ATTITUDE ON DAY 247 SEP 4,1981 1030 GMT  
 SPIN PERIOD = 12.966250 SEC RTLT = 6 HR 59 MIN 5.45 SEC

09/04/81

|                 | CMA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3717 | 244.5786 | -              | -          |
| SUN             | 1.5168   | 169.7610 | -3.1368 | 245.2808 | 0.378521280 10 | 25.3022246 |
| EARTH           | 1.0049   | 12.7119  | -3.1501 | 245.5603 | 0.376920890 10 | 25.1952467 |
| JUPITER         | 64.6257  | 178.3968 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 123.9905 | 234.0798 |         |          |                |            |
| BETELGEUSE(R)   | 149.4839 | 220.1558 |         |          |                |            |
| CANOPUS(B)      | 97.4761  | 260.8625 |         |          |                |            |
| ARCTURUS(R)     | 51.6663  | 135.6043 |         |          |                |            |
| RIGIL KENTAURUS | 39.5125  | 263.7178 |         |          |                |            |
| ANTARES(R)      | 4.9551   | 345.8675 |         |          |                |            |
| CAPPELLA(R)     | 154.5404 | 128.5855 |         |          |                |            |
| VEGA(B)         | 72.0396  | 71.1881  |         |          |                |            |
| ALDEBARAN(R)    | 169.9202 | 241.2761 |         |          |                |            |
| RIGEL(B)        | 143.6695 | 252.6753 |         |          |                |            |
| GAMMA CRUCIS(R) | 50.6559  | 245.7725 |         |          |                |            |
| SPICA(B)        | 41.0724  | 179.2550 |         |          |                |            |
| ACHERNAR(B)     | 92.5417  | 300.0992 |         |          |                |            |
| DENEK(B)        | 93.1133  | 55.8591  |         |          |                |            |
| PROCYON(B)      | 126.1284 | 202.6542 |         |          |                |            |

STAR DELAY: 2.6707 SEC 683.6884 PULSES DECIMAL = 10. COARSE + 44. FINE  
 74.1377 DEL 12 54 PULSES DCTAL GRAH SUB C = 160.9507 EPSILON = 8.8103 SCN=1

PN 10 PASS 3474 PR23 40/0 S/W SK.0 DSS 43 RCVR AGC -123.9 FILE 10-1133 PD 08/28/81  
 SPACECRAFT ATTITUDE ON DAY 239 AUG 27, 1981 1730 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCSPHAK IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRS = 180 RCSTPOS = 130

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.9827 RCSPHAK = 112.1300

SPACECRAFT-EARTH DIRECTION: CLAT = -3.1357 CLON = 245.5370

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3601 CLON = -244.5787

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PN 10 PASS 3474 PR23 40/0 S/W SK.0 DSS 43 RCVR AGC -123.9 FILE 10-1133 PD 08/28/81  
 SPACECRAFT ATTITUDE ON DAY 239 AUG 27, 1981 1730 GMT  
 SPIN PERIOD = 12.967030 SEC RTLT = 7 HR 0 MIN 8.05 SEC

|                 | CNA      | CRA      | CLAT    | CLON     | R(KM)          | R(AU)     |
|-----------------|----------|----------|---------|----------|----------------|-----------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3601 | 244.5787 | -              | -         |
| SUN             | 1.3534   | 170.5420 | -3.1368 | 243.2417 | 0.377731660 10 | 25.249442 |
| EARTH           | 0.9827   | 13.1734  | -3.1357 | 245.5370 | 0.377859290 10 | 25.257973 |
| JUPITER         | 64.0255  | 176.4043 | 0.0000  | 180.0000 | 0.00000000     | 0.000000  |
| SIRIUS(B)       | 123.9999 | 234.0754 |         |          |                |           |
| BETELGEUSE(R)   | 149.4905 | 220.1391 |         |          |                |           |
| CANOPUS(B)      | 97.4895  | 260.8620 |         |          |                |           |
| ARCTURUS(F)     | 51.6584  | 135.6110 |         |          |                |           |
| BIG BETA TAURUS | 39.5240  | 263.7191 |         |          |                |           |
| ANTARES(R)      | 4.9576   | 345.7581 |         |          |                |           |
| CAPELLA(R)      | 154.5515 | 128.5701 |         |          |                |           |
| VEGA(D)         | 72.0287  | 71.1869  |         |          |                |           |
| ALDEBARAN(R)    | 139.9304 | 241.2453 |         |          |                |           |
| RIGEL(B)        | 143.7006 | 252.8714 |         |          |                |           |
| GAMMA CRUCIS(R) | 50.5474  | 245.7763 |         |          |                |           |
| SPICA(B)        | 41.0725  | 179.2689 |         |          |                |           |
| ACHERNAR(U)     | 92.3516  | 300.0995 |         |          |                |           |
| GENERA(R)       | 93.1032  | 59.8594  |         |          |                |           |
| PROCYON(B)      | 126.1330 | 202.6465 |         |          |                |           |

STAR DELAY: 2.6704 SEC 683.6260 PULSES DECIMAL = 10. COARSE + 44. FINE  
 74.1380 DEG 12 54 PULSES OCTAL GRAH SUB C = 161.8419 EPSILON = 8.7001 SEC

PN 10 PASS 3462 PR23 4070 S/W S50 USS 63A RCVR AGC -126.1 FILE 10-1132 RC 08/20/81  
 SPACECRAFT ATTITUDE ON DAY 233 AUG 20, 1981 0230 GMT

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR ECCENTRIC IS ICARDY SOUTH ELLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRHS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSARGAK = 1.0128 RCSPHAK = 114.4200

SPACECRAFT-EARTH DIRECTION: CLAT = -3.1199 CLON = 245.4752

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3802 CLON = 244.4948

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 PN 10 PASS 3462 PR23 4070 S/W S50 USS 63A RCVR AGC -126.1 FILE 10-1132 RC 08/20/81  
 SPACECRAFT ATTITUDE ON DAY 233 AUG 20, 1981 0230 GMT  
 SPIN PERIOD = 12.065910 SEC RTCT = 7 HR 1 MIN 17.34 SEC

|                 | CNA      | CNA      | CLAT    | CLON     | R(KM)          | H(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3802 | 244.4948 | -              | -          |
| SUN             | 1.3176   | 169.3973 | -3.1369 | 243.1978 | 0.37685040D 10 | 25.1905348 |
| EARTH           | 1.0128   | 14.8660  | -3.1199 | 245.4752 | 0.37884778D 10 | 25.3273517 |
| JUPITER         | 64.5424  | 178.3687 | 0.0000  | 180.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 123.9345 | 234.0327 |         |          |                |            |
| BETELGEUSE(R)   | 149.4195 | 220.0687 |         |          |                |            |
| CANOPUS(B)      | 97.4564  | 260.8467 |         |          |                |            |
| ARCTURUS(R)     | 51.0128  | 135.5483 |         |          |                |            |
| RIGIL AENTAUROS | 39.4950  | 263.8125 |         |          |                |            |
| ANTARES(R)      | 5.0342   | 340.2078 |         |          |                |            |
| CAPPELLA(B)     | 124.4949 | 128.7207 |         |          |                |            |
| VEGA(B)         | 72.0747  | 71.1584  |         |          |                |            |
| ALDEBARAN(R)    | 169.8723 | 240.8839 |         |          |                |            |
| RIGEL(B)        | 142.0561 | 252.5659 |         |          |                |            |
| GAMMA CRUCIS(R) | 50.5943  | 245.8273 |         |          |                |            |
| SPICA(B)        | 40.9899  | 179.2396 |         |          |                |            |
| ACHERNAK(B)     | 95.3752  | 300.0911 |         |          |                |            |
| GENEB(B)        | 92.1626  | 59.8574  |         |          |                |            |
| PROCYON(B)      | 126.0480 | 202.6315 |         |          |                |            |

STAR DELAY: 2.0707 SEC 083.7033 PULSES DECIMAL = 10, COARSE + 44, FINE  
 74.1533 DEC 12 54 PULSES OCTAL CKAH SUB C = 160.5894 EPSILON = 8.8079 SCN = 10

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PN 10 PR23 4070 S/W SM.0 USS 43 RCVR -123.9 FILE 10-1131  
 SPACECRAFT ATTITUDE ON DAY 225 AUG 13, 1981 1830 GMT

MC HAN 81

ROLL REFERENCE BODY IS SUN SUN IS ON RIGHT SIDE OF S/C.

REFERENCE FOR RCS PHAS IS TOWARD SOUTH ECLIPTIC POLE.

ROLL REFERENCE PARAMETERS: ASPSGRRS = 180 RCSTPOS = 180

AMPLITUDE AND PHASE ANGLE: RCSANGAK = 0.8520 RCSPHAK = 116.1500

SPACECRAFT-EARTH DIRECTION: CLAT = -3.1070 CLON = 245.3956

SPACECRAFT +Z AXIS ATTITUDE: CLAT = -3.3699 CLON = 244.5839

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PN 10 PASS 3460 PR23 4070 S/W SM.0 USS 43 RCVR AGC -123.9 FILE 10-1131 08/13/81  
 SPACECRAFT ATTITUDE ON DAY 225 AUG 13, 1981 1830 GMT  
 SPIN PERIOD = 12.964590 SEC RLTL = 7 HR 2 MIN 12.97 SEC

|                 | CNA      | CKA      | CLAT    | CLON     | R(KM)          | R(AU)      |
|-----------------|----------|----------|---------|----------|----------------|------------|
| S/C +Z AXIS     | 0.0000   | 0.0000   | -3.3699 | 244.5839 | -              | -          |
| SUN             | 1.4393   | 170.7270 | -3.1370 | 243.1612 | 0.376118190-10 | 25.1415902 |
| EARTH           | 0.8520   | 17.9509  | -3.1070 | 245.3956 | 0.379731750 10 | 25.3831384 |
| JUPITER         | 64.6309  | 178.4000 | 0.0000  | 186.0000 | 0.00000000     | 0.0000000  |
| SIRIUS(B)       | 123.9750 | 234.0824 |         |          |                |            |
| BETELGEUSE(R)   | 149.4971 | 220.1577 |         |          |                |            |
| CANOPUS(H)      | 97.4807  | 260.8832 |         |          |                |            |
| ARCTURUS(R)     | 51.0089  | 135.0000 |         |          |                |            |
| RIGIL KENTAURUS | 39.5105  | 263.7119 |         |          |                |            |
| ANTARES(R)      | 4.9504   | 345.8534 |         |          |                |            |
| CAPELLA(R)      | 150.5424 | 120.5748 |         |          |                |            |
| VEGA(H)         | 72.0363  | 71.1898  |         |          |                |            |
| ALDEBARAN(H)    | 160.9242 | 201.2979 |         |          |                |            |
| RIGEL(B)        | 142.0928 | 252.0824 |         |          |                |            |
| GAMMA CRUCIS(R) | 50.6405  | 245.7644 |         |          |                |            |
| SPICA(B)        | 41.0777  | 179.2580 |         |          |                |            |
| ACHERNAR(B)     | 92.3405  | 300.0440 |         |          |                |            |
| DENEK(B)        | 93.1091  | 59.8592  |         |          |                |            |
| PROCYON(B)      | 125.1340 | 202.8540 |         |          |                |            |

STAR DELAY: 2.6894 SEC 683.4885 PULSES DECIMAL = 10. COARSE + 43, FINE  
 70.1368 DEC 12 53 PULSES OCTAL CKAH SUB C = 162,2779 EPSILON = 8.4491 SCN = 1

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