SMM C/P 1988 DOY304 115 +/- 5 degrees

SMM C/P   1988 DOY304   115 +/-   5 degrees

angle= initial angle + angular velocity*time   # data points =   10

Top of Outer Front   [First Loop]
radial velocity =   66. [km/sec]
S=SMM   M=MK3   P=PMON

SMM & MK3 - CORRECTED TIMES

position angle [degrees]

121
120
119
118
117
116
115

8:00   9:00   10:00   11:00   12:00   13:00   14:00
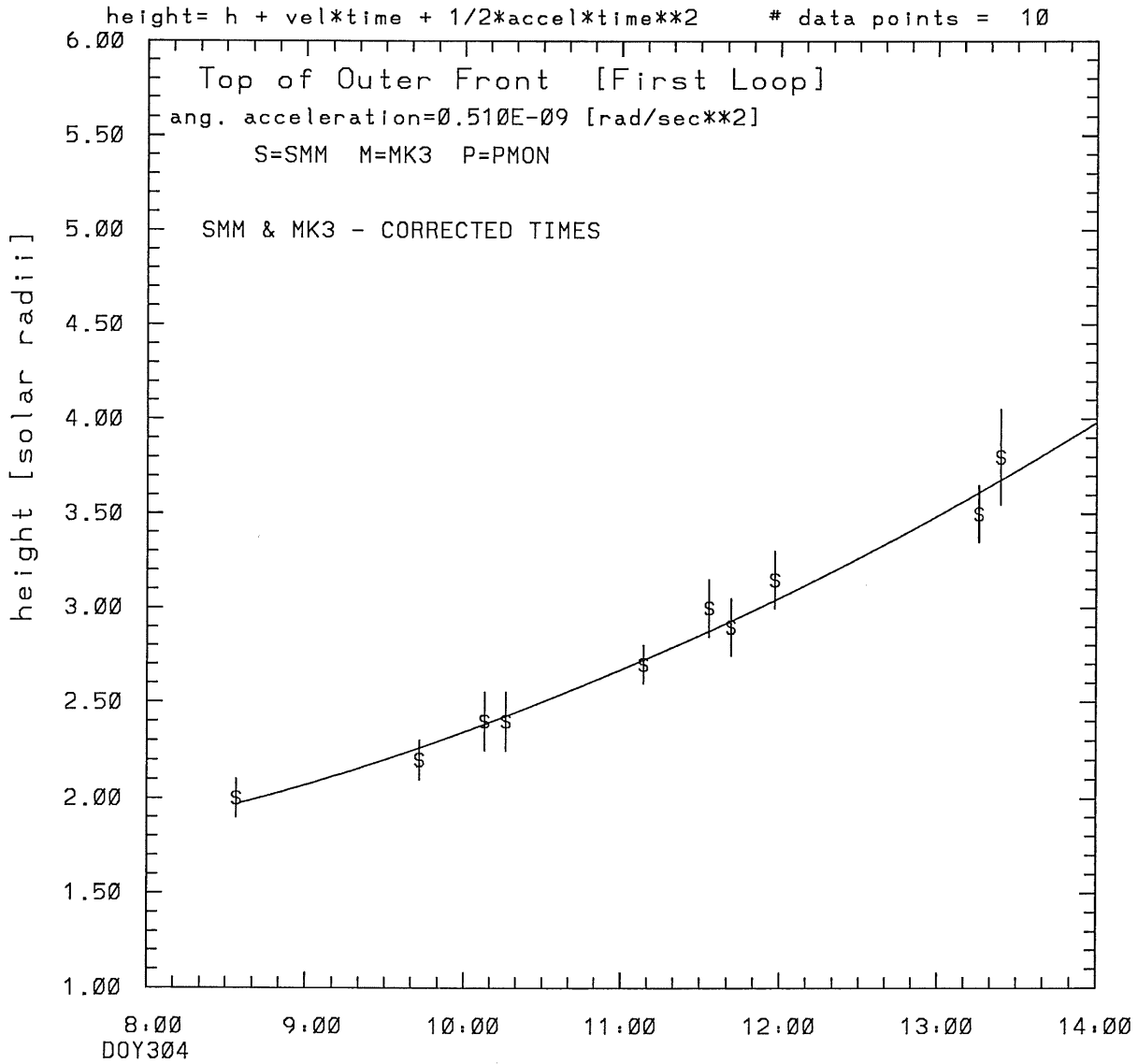DOY304

angular velocity=0.168E-05 +/- 0.111E-05 [rad/sec]

SMM C/P 1988 DOY304 115 +/- 5 degrees

height= h + vel*time + 1/2*accel*time**2   # data points = 10

Top of Outer Front [First Loop]
ang. acceleration=0.510E-09 [rad/sec**2]
     S=SMM M=MK3 P=PMON

SMM & MK3 - CORRECTED TIMES

height [solar radii]

6.00
5.50
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00

8:00   9:00   10:00   11:00   12:00   13:00   14:00
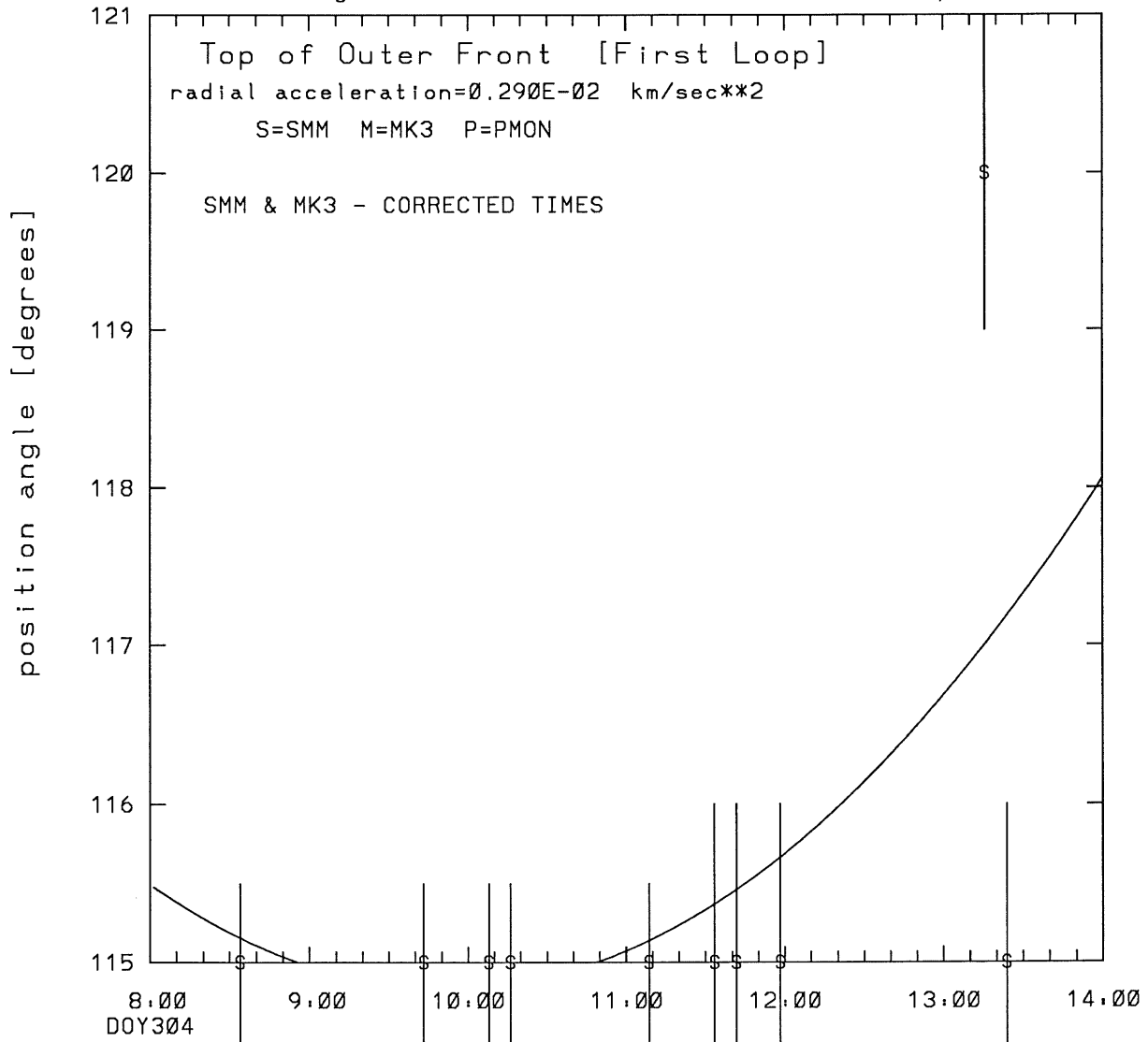DOY304

tstart=DOY304 4:27   from derivative=0
Event begins at   1.51 Solar Radii
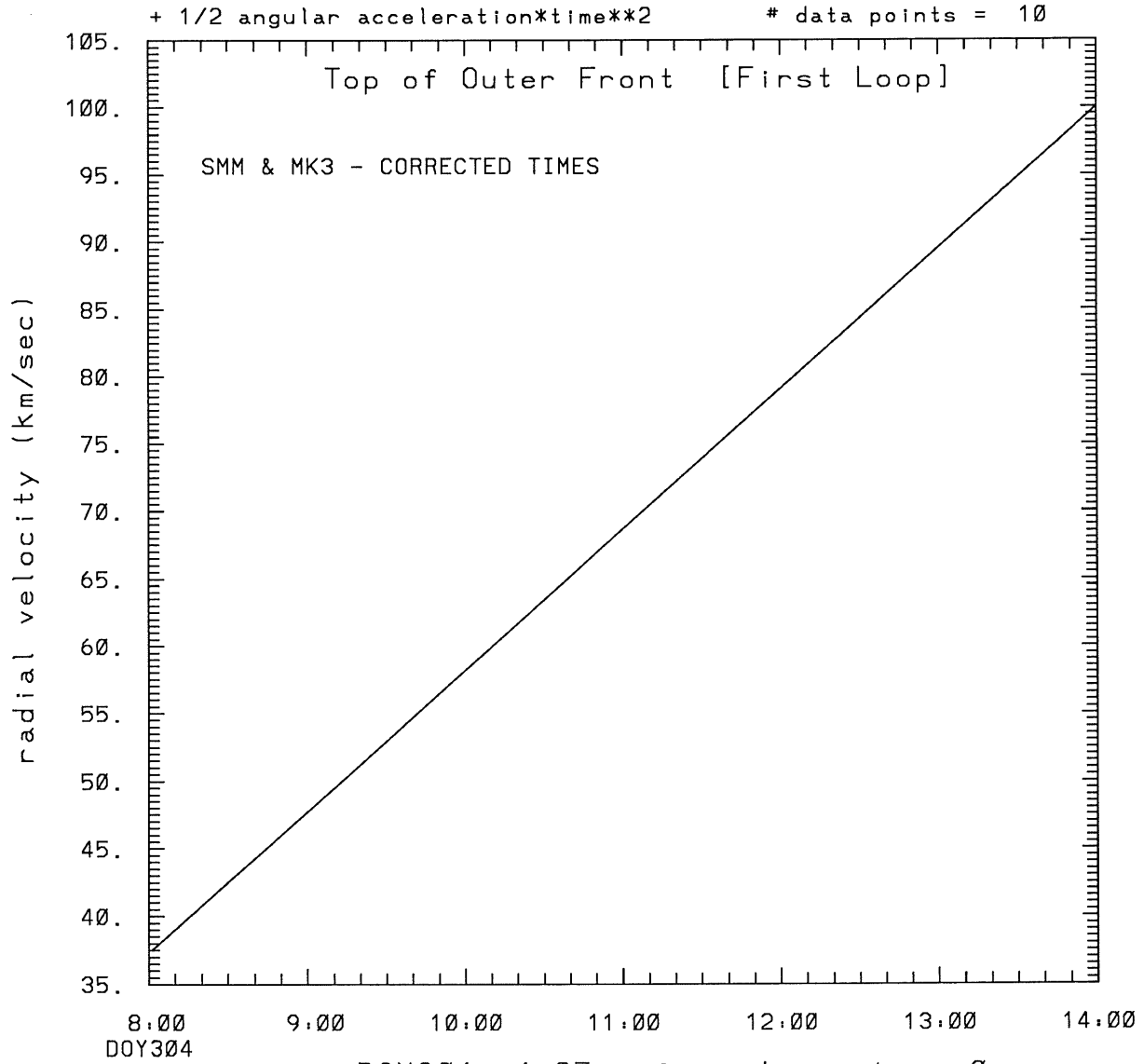radial acceleration= 0.0029 +/- 0.0012 [km/sec**2]

SMM C/P 1988 DOY304 115 +/- 5 degrees
angle= initial angle + angular velocity*time
+ 1/2 angular acceleration*time**2   # data points = 10

Top of Outer Front [First Loop]
radial acceleration=0.290E-02 km/sec**2
S=SMM   M=MK3   P=PMON

SMM & MK3 - CORRECTED TIMES

position angle [degrees]

121
120
119
118
117
116
115

8:00   9:00   10:00   11:00   12:00   13:00   14:00
DOY304

Event begins at 1.51 Solar Radii
angular acceleration=0.510E-09 +/-0.343E-09 [rad/sec**2]

SMM C/P 1988 DOY304 115 +/- 5 degrees

+ 1/2 angular acceleration*time**2   # data points = 10

Top of Outer Front [First Loop]

SMM & MK3 - CORRECTED TIMES

radial velocity (km/sec)

105.
100.
95.
90.
85.
80.
75.
70.
65.
60.
55.
50.
45.
40.
35.

8:00   9:00   10:00   11:00   12:00   13:00   14:00
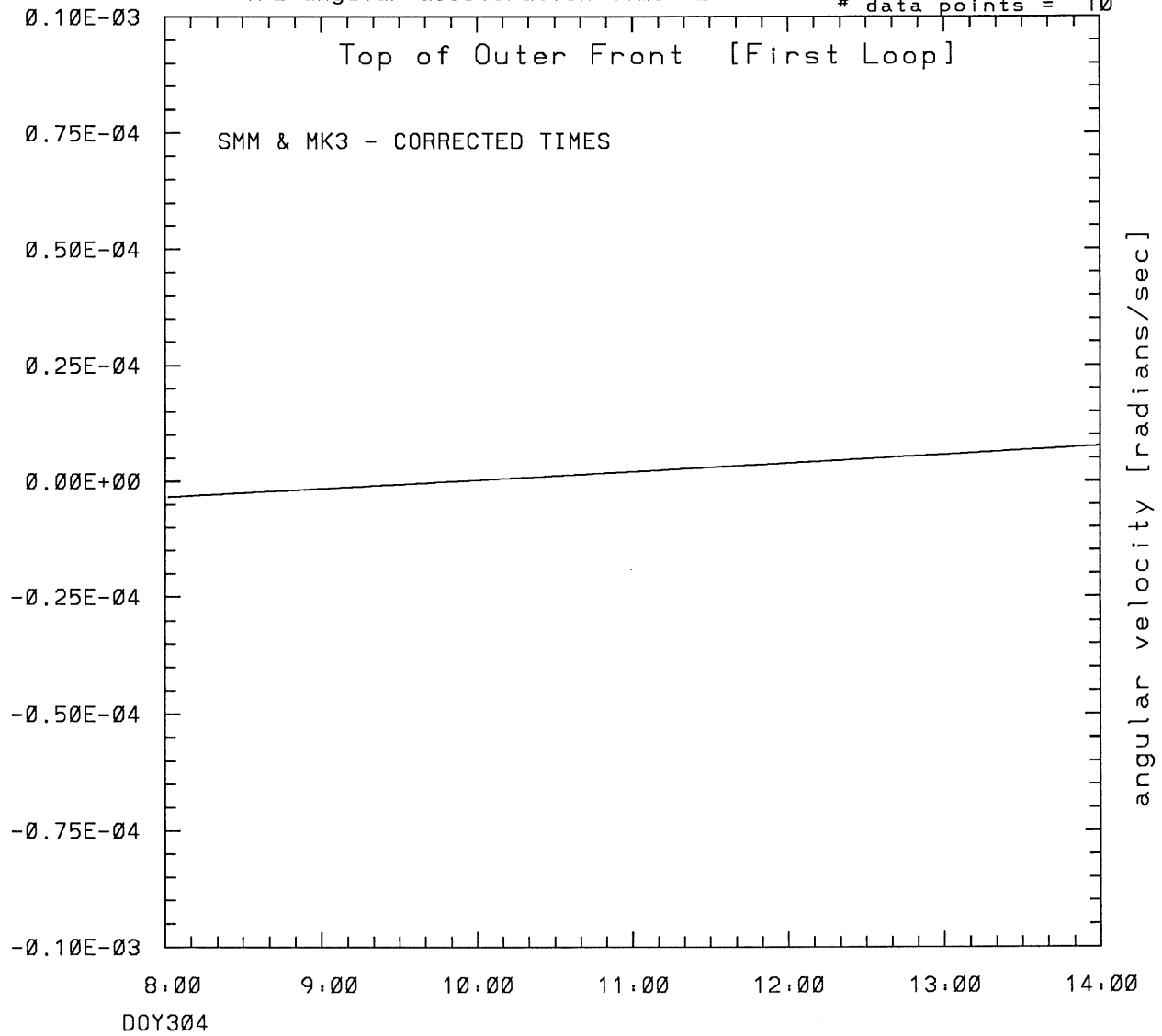DOY304

tstart=DOY304 4:27   from derivative=0
Event begins at   1.51 Solar Radii
radial acceleration=0.290E-02 km/sec**2

SMM C/P 1988 DOY304 115 +/- 5 degrees

angle= initial angle + angular velocity*time +
1/2 angular acceleration*time**2

data points = 10

Top of Outer Front [First Loop]

SMM & MK3 - CORRECTED TIMES

0.10E-03 —

0.75E-04 —

0.50E-04 —

0.25E-04 —

0.00E+00 —

-0.25E-04 —

-0.50E-04 —

-0.75E-04 —

-0.10E-03 —

8:00   9:00   10:00   11:00   12:00   13:00   14:00

DOY304

angular velocity [radians/sec]

angular acceleration=0.510E-09 +/-
0.343E-09 [rad/sec**2]

```
**********************
 This is a 1 order run
**********************

*******
 INPUT:
*******

                                error in      error in
year doy     time    radii   radius    angle    angle    datatype
1988 304   8:33:54   2.00 +/- 0.10   115.0 +/-  0.5       SMM
1988 304   9:43: 4   2.20 +/- 0.10   115.0 +/-  0.5       SMM
1988 304  10: 7:52   2.40 +/- 0.15   115.0 +/-  0.5       SMM
1988 304  10:16: 6   2.40 +/- 0.15   115.0 +/-  0.5       SMM
1988 304  11: 8:39   2.70 +/- 0.10   115.0 +/-  0.5       SMM
1988 304  11:33:25   3.00 +/- 0.15   115.0 +/-  1.0       SMM
1988 304  11:41:38   2.90 +/- 0.15   115.0 +/-  1.0       SMM
1988 304  11:58:10   3.15 +/- 0.15   115.0 +/-  1.0       SMM
1988 304  13:15:36   3.50 +/- 0.15   120.0 +/-  1.0       SMM
1988 304  13:23:50   3.80 +/- 0.25   115.0 +/-  1.0       SMM


******************************************
 Structure being measured:
Top of Outer Front [First Loop]
******************************************

********
 OUTPUT:
********

START TIME:

 Event began at t = 0 + -0.122E+03 +/-  0.124E+01 [minutes]
 In more convenient units:
 Event began at DOY 304  6:00 +/-  0.124E+01 [minutes]

 Event began at DOY 304  6: 0 +/-  0.124E+01 [minutes]

 Origin defined at DOY304  8: 0

RADIAL INFORMATION:

RADIAL VELOCITY =    66. +/-      4. km/sec

The computed RADIAL coefficients and errors FROM NLLST2 are:

 c(1) =     0.170E+01 +/-     0.641E-01 [solar radii]
 c(2) =     0.572E-02 +/-     0.354E-03 [radii/min]
 c(2) =     0.663E+02 +/-     0.410E+01 [km/sec]
 c(3) =     0.000E+00 +/-     0.000E+00 [radii/min**2]
 c(3) =     0.000E+00 +/-     0.000E+00 [km/sec**2]

 The computed ERRORS in coefficients [BEVINGTON] are:

                 error in c(1)=  0.90766E-01 [radii] see Bevington pg. 114
                 error in c(2)=  0.43365E-03 [radii/min] see Bevington pg. 114
ANGULAR INFORMATION:

ANGULAR VELOCITY =  0.1684E-05 +/-    0.1110E-05[radians/sec]

The computed ANGULAR coefficients and errors FROM NLLST2 are:

 a(1) = 114. +/-    1. [degrees]
 a(2) =     0.579E-02 +/-     0.382E-02 [degrees/min]
 a(2) =     0.168E-05 +/-     0.111E-05 [rad/sec]
 a(3) =     0.000E+00 +/-     0.000E+00 [degrees/min**2]
```

a(3) =   0.000E+00 +/-   0.000E+00 [rad/sec**2]

The RADIAL velocity at 8:33 =   66. km/sec

The RADIAL velocity at 9:43 =   66. km/sec

The RADIAL velocity at 10: 7 =   66. km/sec

The RADIAL velocity at 10:16 =   66. km/sec

The RADIAL velocity at 11: 8 =   66. km/sec

The RADIAL velocity at 11:33 =   66. km/sec

The RADIAL velocity at 11:41 =   66. km/sec

The RADIAL velocity at 11:58 =   66. km/sec

The RADIAL velocity at 13:15 =   66. km/sec

The RADIAL velocity at 13:23 =   66. km/sec

****
 The following info is for estimating goodness of the fit
****

 Fit is ok [ier=1]

 Standard Deviation in the height = 0.58
 Standard Deviation in start time measurement =   0.873E+02
 Error in time =   0.59224E+02 using best fit method
 See Taylor Error Analysis [Univ of Colorado] pg.78

 Value of reduced Chi Squared returned from nllst2 = 0.889E-02
 Reduced Chi Squared = 0.107E+00
 Chi Squared = 0.857E+00
 The probability for exceeding chi square = 0.100E+01

 The correlation coefficient =   0.984E+00
 The probability that no LINEAR correlation exists between the variables =   0.2762]
 SEE BEVINGTON "Data Reduction and Error Analysis" [1969]

```
***********************
 This is a 2 order run
***********************

*******
 INPUT:
*******

                                  error in        error in
 year doy     time     radii   radius     angle    angle    datatype
 1988 304   8:33:54   2.00 +/- 0.10    115.0 +/-  0.5      SMM
 1988 304   9:43: 4   2.20 +/- 0.10    115.0 +/-  0.5      SMM
 1988 304  10: 7:52   2.40 +/- 0.15    115.0 +/-  0.5      SMM
 1988 304  10:16: 6   2.40 +/- 0.15    115.0 +/-  0.5      SMM
 1988 304  11: 8:39   2.70 +/- 0.10    115.0 +/-  0.5      SMM
 1988 304  11:33:25   3.00 +/- 0.15    115.0 +/-  1.0      SMM
 1988 304  11:41:38   2.90 +/- 0.15    115.0 +/-  1.0      SMM
 1988 304  11:58:10   3.15 +/- 0.15    115.0 +/-  1.0      SMM
 1988 304  13:15:36   3.50 +/- 0.15    120.0 +/-  1.0      SMM
 1988 304  13:23:50   3.80 +/- 0.25    115.0 +/-  1.0      SMM


*******************************************
 Structure being measured:
Top of Outer Front [First Loop]
*******************************************


********
 OUTPUT:
********


START TIME:

 tstart=DOY304  4:27 from derivative = 0
Event begins at    1.51 Solar Radii
 Origin defined at DOY304  8: 0


RADIAL INFORMATION:

RADIAL ACCELERATION =  0.290E-02 +/-  0.115E-02 km/sec**2

The computed RADIAL coefficients and errors FROM NLLST2 are:

 c(1) =     0.185E+01 +/-     0.799E-01 [solar radii]
 c(2) =     0.321E-02 +/-     0.103E-02 [radii/min]
 c(2) =     0.373E+02 +/-     0.120E+02 [km/sec]
 c(3) =     0.751E-05 +/-     0.298E-05 [radii/min**2]
 c(3) =     0.290E-02 +/-     0.115E-02 [km/sec**2]

 The computed ERRORS in coefficients [BEVINGTON] are:

     Approximate error in c(1) =  0.12266E+00 [radii] Bevington pg 154 (8-30)
         Exact error in c(1) =  0.17883E-01 [radii] Bevington pg 154 (8-28)
     Approximate error in c(2) =  0.14017E-02 [radii/min] Bevington pg 154 (8-30)
         Exact error in c(2) =  0.23394E-03 [radii/min] Bevington pg 154 (8-28)
     Approximate error in c(3) =  0.36218E-05 [radii/min**2] Bevington pg 154 (8-30)
         Exact error in c(3) =  0.75764E-06 [radii/min**2] Bevington pg 154 (8-28)

ANGULAR INFORMATION:

ANGULAR ACCELERATION=  0.5095E-09 +/-   0.3432E-09[radians/sec**2]

The computed ANGULAR coefficients and errors FROM NLLST2 are:

 a(1) = 115. +/-   1. [degrees]
 a(2) =   -0.118E-01 +/-    0.124E-01 [degrees/min]
 a(2) =   -0.343E-05 +/-    0.360E-05 [rad/sec]
```

```
  a(3) =     0.525E-04 +/-     0.354E-04 [degrees/min**2]
  a(3) =     0.510E-09 +/-     0.343E-09 [rad/sec**2]
```

The RADIAL velocity at 8:33 =   43. km/sec

The RADIAL velocity at 9:43 =   55. km/sec

The RADIAL velocity at 10: 7 =   60. km/sec

The RADIAL velocity at 10:16 =   61. km/sec

The RADIAL velocity at 11: 8 =   70. km/sec

The RADIAL velocity at 11:33 =   74. km/sec

The RADIAL velocity at 11:41 =   76. km/sec

The RADIAL velocity at 11:58 =   79. km/sec

The RADIAL velocity at 13:15 =   92. km/sec

The RADIAL velocity at 13:23 =   94. km/sec


```
*********************************************************
 The following info is for estimating goodness of the fit
*********************************************************
```
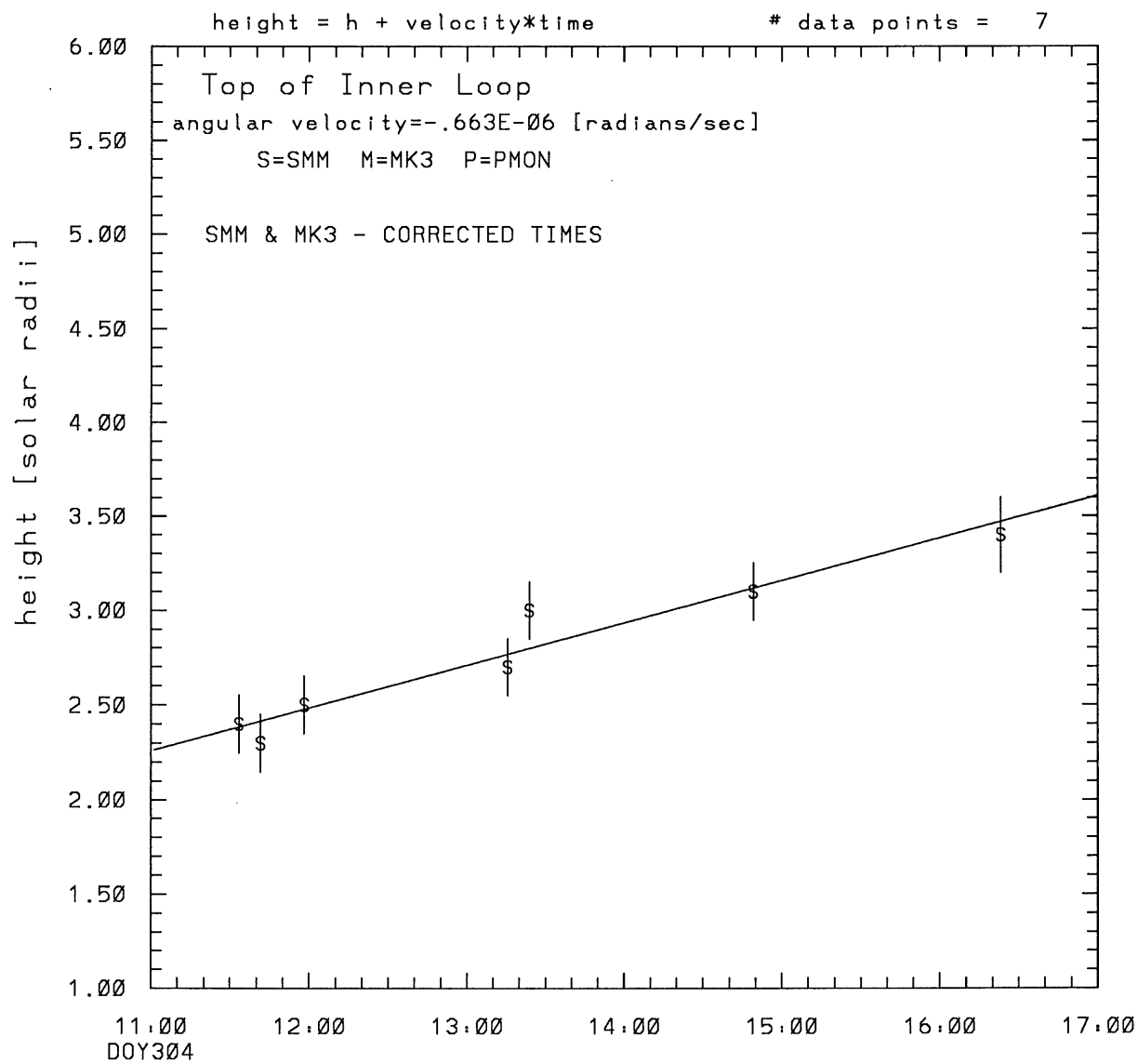
 Fit is ok [ier=1]

 Standard Deviation in the height = 0.58
 Standard Deviation in start time measurement =   0.873E+02
 Value of reduced Chi Squared returned from nllst2 = 0.558E-02
 Reduced Chi Squared = 0.666E-01
 Chi Squared = 0.466E+00
 The probability for exceeding chi square = 0.100E+01

 For a second order fit 3 correlation coefficients are given:
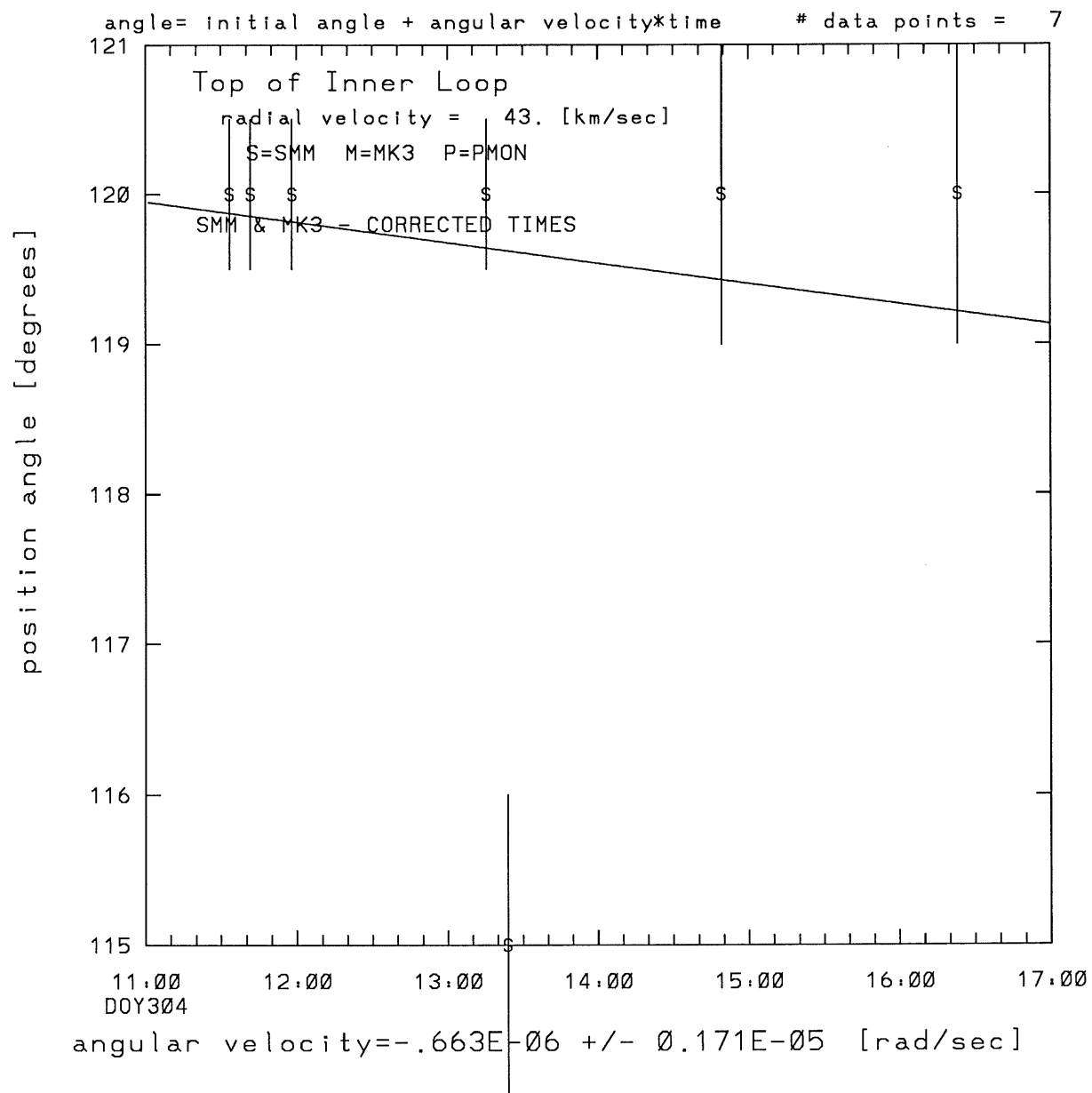 (Using equation of motion: r = a + bt + at**2)
 The correlation between the data and the term linear in time =   0.1009E+01
 The correlation between the data and the time**2 term =   0.9068E+00
 The correlation between the data and the complete equation of motion=0.9739E+00
 SEE BEVINGTON "Data Reduction and Error Analysis" [1969]

SMM C/P 1988 DOY304 119 +/- 4 degrees

height = h + velocity*time   # data points =   7
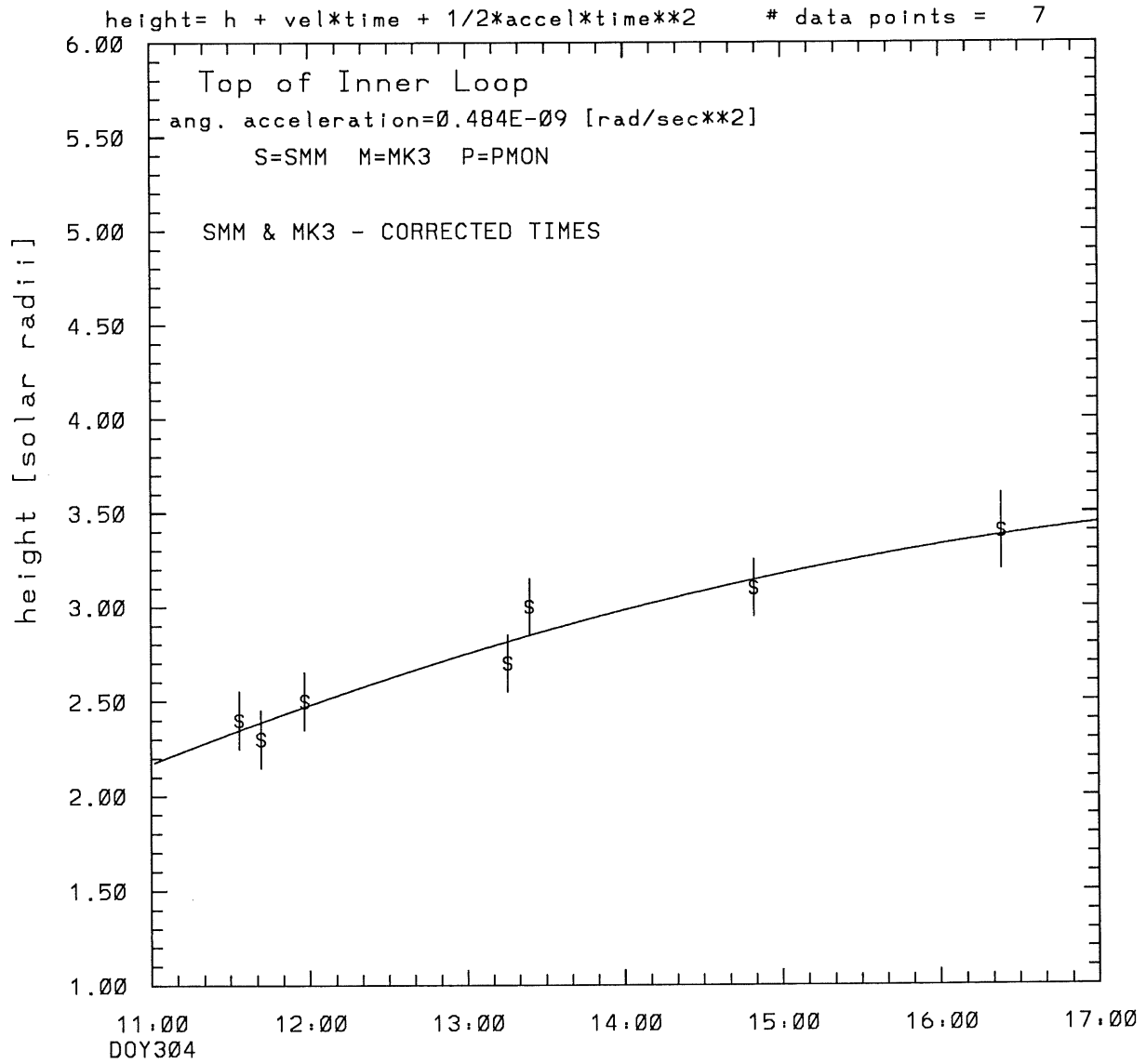
Top of Inner Loop
angular velocity=-.663E-06 [radians/sec]
      S=SMM   M=MK3   P=PMON

SMM & MK3 - CORRECTED TIMES

height [solar radii]

tstart=DOY304 5:24 +/-   4.6 [min.]
radial velocity=   43. +/-   5. [km/sec]

SMM C/P   1988 DOY304   119 +/-   4 degrees

angle= initial angle + angular velocity*time   # data points =   7

Top of Inner Loop
   radial velocity =   43. [km/sec]
      S=SMM   M=MK3   P=PMON

SMM & MK3 = CORRECTED TIMES

position angle [degrees]

121

120

119

118

117

116

115

11:00   12:00   13:00   14:00   15:00   16:00   17:00
DOY304

angular velocity=-.663E-06 +/- 0.171E-05 [rad/sec]

SMM C/P 1988 DOY304 119 +/- 4 degrees

height= h + vel*time + 1/2*accel*time**2   # data points =   7

Top of Inner Loop
ang. acceleration=0.484E-09 [rad/sec**2]
        S=SMM   M=MK3   P=PMON

SMM & MK3 - CORRECTED TIMES

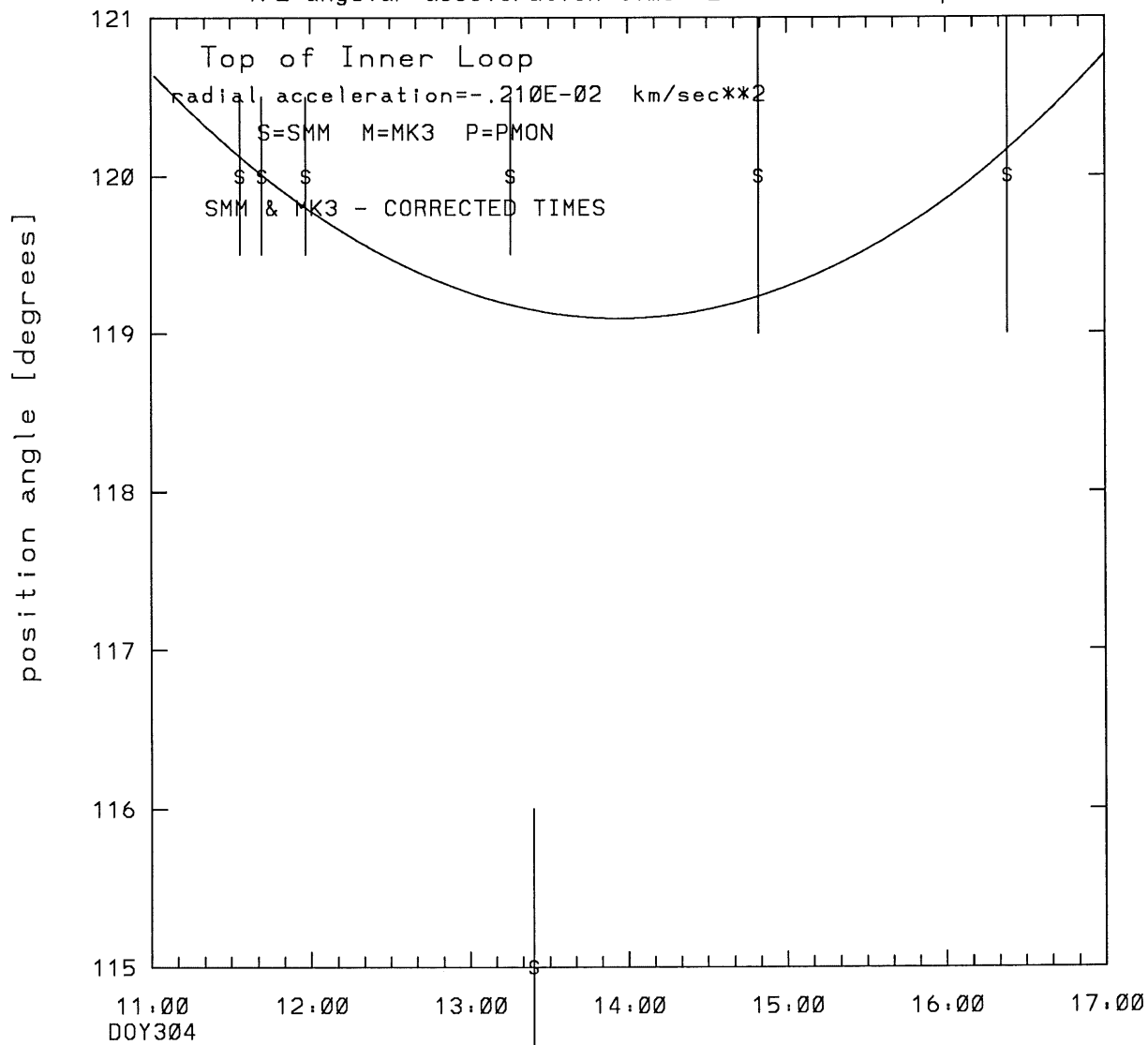tstart=DOY304 8: 0 +/-   43.8 [min.]

radial acceleration=-0.0021 +/- 0.0019 [km/sec**2]

SMM C/P 1988 DOY304 119 +/- 4 degrees

angle= initial angle + angular velocity*time
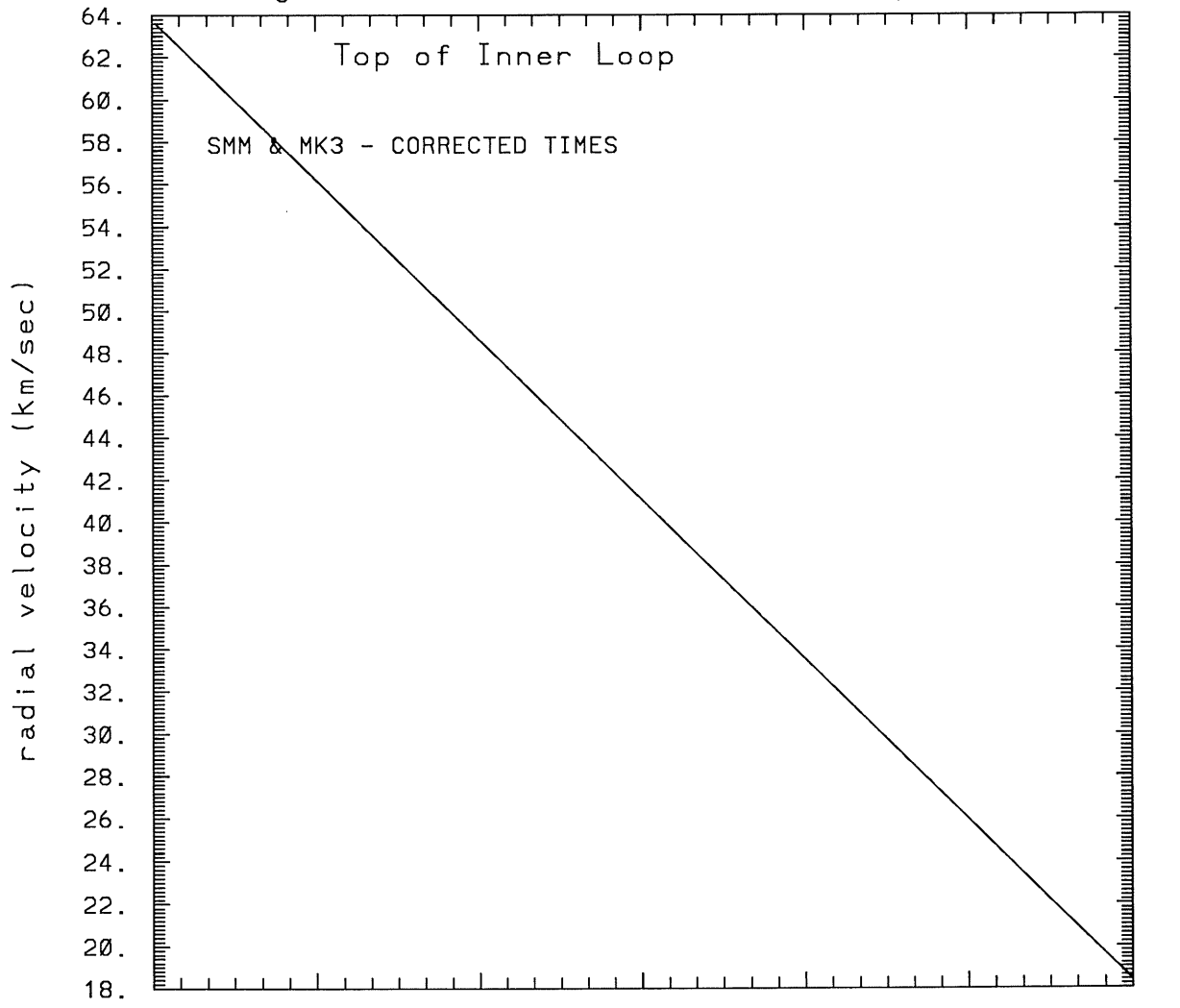   + 1/2 angular acceleration*time**2   # data points =   7

Top of Inner Loop
radial acceleration=-.210E-02 km/sec**2
S=SMM   M=MK3   P=PMON

SMM & MK3 - CORRECTED TIMES

position angle [degrees]

121
120
119
118
117
116
115

11:00   12:00   13:00   14:00   15:00   16:00   17:00
DOY304

angular acceleration=0.484E-09 +/-0.642E-09 [rad/sec**2]

SMM C/P 1988 DOY304 119 +/- 4 degrees

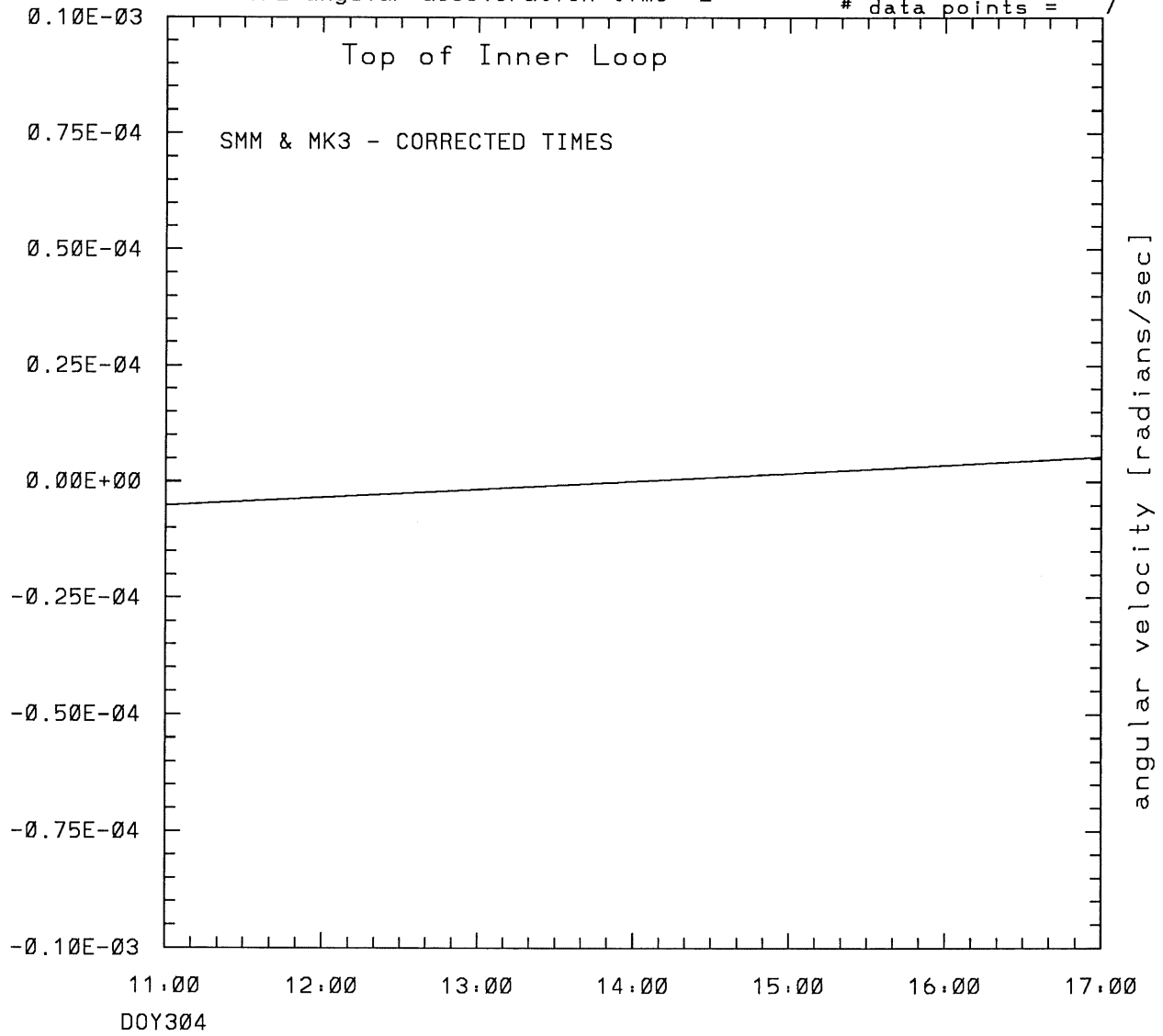+ 1/2 angular acceleration*time**2   # data points =   7

Top of Inner Loop

SMM & MK3 - CORRECTED TIMES

radial velocity (km/sec)

64.
62.
60.
58.
56.
54.
52.
50.
48.
46.
44.
42.
40.
38.
36.
34.
32.
30.
28.
26.
24.
22.
20.
18.

11:00   12:00   13:00   14:00   15:00   16:00   17:00
DOY304

tstart=DOY304 8: 0 +/-   43.8 [min.]

radial acceleration=-.210E-02 km/sec**2

SMM C/P 1988 DOY304 119 +/- 4 degrees

angle= initial angle + angular velocity*time +
1/2 angular acceleration*time**2

data points =   7

Top of Inner Loop

SMM & MK3 - CORRECTED TIMES

angular velocity [radians/sec]

0.10E-03
0.75E-04
0.50E-04
0.25E-04
0.00E+00
-0.25E-04
-0.50E-04
-0.75E-04
-0.10E-03

11:00   12:00   13:00   14:00   15:00   16:00   17:00

DOY304

angular acceleration=0.484E-09 +/-
0.642E-09 [rad/sec**2]

```
**********************
 This is a 1 order run
**********************

*******
 INPUT:
*******

                                error in        error in
        year doy    time     radii  radius       angle   angle    datatype
        1988 304  11:33:25   2.40 +/- 0.15      120.0 +/-  0.5      SMM
        1988 304  11:41:38   2.30 +/- 0.15      120.0 +/-  0.5      SMM
        1988 304  11:58:10   2.50 +/- 0.15      120.0 +/-  0.5      SMM
        1988 304  13:15:36   2.70 +/- 0.15      120.0 +/-  0.5      SMM
        1988 304  13:23:50   3.00 +/- 0.15      115.0 +/-  1.0      SMM
        1988 304  14:49:17   3.10 +/- 0.15      120.0 +/-  1.0      SMM
        1988 304  16:23:13   3.40 +/- 0.20      120.0 +/-  1.0      SMM

****************************************
 Structure being measured:
Top of Inner Loop
****************************************

********
 OUTPUT:
********

START TIME:

 Event began at t = 0 + -0.336E+03 +/-  0.456E+01 [minutes]
 In more convenient units:
 Event began at DOY 304  5:24 +/-  0.456E+01 [minutes]

 Origin defined at DOY304 11: 0

RADIAL INFORMATION:

RADIAL VELOCITY =     43. +/-      5. km/sec

The computed RADIAL coefficients and errors FROM NLLST2 are:

   c(1) =     0.226E+01 +/-    0.683E-01 [solar radii]
   c(2) =     0.375E-02 +/-    0.442E-03 [radii/min]
   c(2) =     0.435E+02 +/-    0.513E+01 [km/sec]
   c(3) =     0.000E+00 +/-    0.000E+00 [radii/min**2]
   c(3) =     0.000E+00 +/-    0.000E+00 [km/sec**2]

  The computed ERRORS in coefficients [BEVINGTON] are:

              error in c(1)=  0.73416E-01 [radii] see Bevington pg. 114
              error in c(2)=  0.43181E-03 [radii/min] see Bevington pg. 114
ANGULAR INFORMATION:

ANGULAR VELOCITY = -0.6628E-06 +/-   0.1713E-05[radians/sec]

The computed ANGULAR coefficients and errors FROM NLLST2 are:

 a(1) = 120. +/-   1. [degrees]
 a(2) =   -0.228E-02 +/-    0.589E-02 [degrees/min]
 a(2) =   -0.663E-06 +/-    0.171E-05 [rad/sec]
 a(3) =    0.000E+00 +/-    0.000E+00 [degrees/min**2]
 a(3) =    0.000E+00 +/-    0.000E+00 [rad/sec**2]

The RADIAL velocity at 11:33 =   43. km/sec

The RADIAL velocity at 11:41 =   43. km/sec
```

The RADIAL velocity at 11:58 =   43. km/sec

The RADIAL velocity at 13:15 =   43. km/sec

The RADIAL velocity at 13:23 =   43. km/sec

The RADIAL velocity at 14:49 =   43. km/sec

The RADIAL velocity at 16:23 =   43. km/sec

****
 The following info is for estimating goodness of the fit
****

Fit is ok [ier=1]

Standard Deviation in the height = 0.41
Standard Deviation in start time measurement =   0.995E+02
Error in time =   0.67827E+02 using best fit method
See Taylor Error Analysis [Univ of Colorado] pg.78

Value of reduced Chi Squared returned from nllst2 = 0.111E-01
Reduced Chi Squared = 0.574E-01
Chi Squared = 0.287E+00
The probability for exceeding chi square = 0.100E+01

The correlation coefficient =   0.967E+00
The probability that no LINEAR correlation exists between the variables =   0.3652)
SEE BEVINGTON "Data Reduction and Error Analysis" [1969]

```
*********************
 This is a 2 order run
*********************

*******
 INPUT:
*******

                                error in        error in
 year doy     time     radii   radius      angle   angle   datatype
 1988 304  11:33:25   2.40 +/- 0.15     120.0 +/-  0.5       SMM
 1988 304  11:41:38   2.30 +/- 0.15     120.0 +/-  0.5       SMM
 1988 304  11:58:10   2.50 +/- 0.15     120.0 +/-  0.5       SMM
 1988 304  13:15:36   2.70 +/- 0.15     120.0 +/-  0.5       SMM
 1988 304  13:23:50   3.00 +/- 0.15     115.0 +/-  1.0       SMM
 1988 304  14:49:17   3.10 +/- 0.15     120.0 +/-  1.0       SMM
 1988 304  16:23:13   3.40 +/- 0.20     120.0 +/-  1.0       SMM

*******************************************
 Structure being measured:
 Top of Inner Loop
*******************************************

********
 OUTPUT:
********

 START TIME:

 Event began at t = 0 + -0.180E+03 +/-  0.438E+02 [minutes]
 In more convenient units:
 Event began at DOY 304  8:00 +/-  0.438E+02 [minutes]

 Event began at DOY 304  8: 0 +/-  0.438E+02 [minutes]

 Origin defined at DOY304 11: 0

RADIAL INFORMATION:

RADIAL ACCELERATION = -0.210E-02 +/-  0.190E-02 km/sec**2

The computed RADIAL coefficients and errors FROM NLLST2 are:

 c(1) =      0.217E+01 +/-     0.106E+00 [solar radii]
 c(2) =      0.550E-02 +/-     0.164E-02 [radii/min]
 c(2) =      0.638E+02 +/-     0.191E+02 [km/sec]
 c(3) =     -0.543E-05 +/-     0.492E-05 [radii/min**2]
 c(3) =     -0.210E-02 +/-     0.190E-02 [km/sec**2]

 The computed ERRORS in coefficients [BEVINGTON] are:

     Approximate error in c(1) =  0.11647E+00 [radii] Bevington pg 154 (8-30)
           Exact error in c(1) =  0.27129E-01 [radii] Bevington pg 154 (8-28)
     Approximate error in c(2) =  0.17605E-02 [radii/min] Bevington pg 154 (8-30)
           Exact error in c(2) =  0.46371E-03 [radii/min] Bevington pg 154 (8-28)
     Approximate error in c(3) =  0.49938E-05 [radii/min**2] Bevington pg 154 (8-30)
           Exact error in c(3) =  0.12335E-05 [radii/min**2] Bevington pg 154 (8-28)

ANGULAR INFORMATION:

ANGULAR ACCELERATION=  0.4843E-09 +/-    0.6422E-09[radians/sec**2]

The computed ANGULAR coefficients and errors FROM NLLST2 are:

 a(1) = 121. +/-    1. [degrees]
 a(2) =    -0.177E-01 +/-     0.213E-01 [degrees/min]
```

```
a(2) =    -0.514E-05 +/-     0.620E-05 [rad/sec]
a(3) =     0.499E-04 +/-     0.662E-04 [degrees/min**2]
a(3) =     0.484E-09 +/-     0.642E-09 [rad/sec**2]
```

The RADIAL velocity at 11:33 =   60. km/sec

The RADIAL velocity at 11:41 =   59. km/sec

The RADIAL velocity at 11:58 =   56. km/sec

The RADIAL velocity at 13:15 =   47. km/sec

The RADIAL velocity at 13:23 =   46. km/sec

The RADIAL velocity at 14:49 =   35. km/sec

The RADIAL velocity at 16:23 =   23. km/sec


```
************************************************************
 The following info is for estimating goodness of the fit
************************************************************
```

Fit is ok [ier=1]

Standard Deviation in the height = 0.41
Standard Deviation in start time measurement =   0.995E+02
Value of reduced Chi Squared returned from nllst2 = 0.107E-01
Reduced Chi Squared = 0.512E-01
Chi Squared = 0.205E+00
The probability for exceeding chi square = 0.100E+01

For a second order fit 3 correlation coefficients are given:
  (Using equation of motion: r = a + bt + at**2)
The correlation between the data and the term linear in time =   0.8784E+00
The correlation between the data and the time**2 term =   0.7789E+00
The correlation between the data and the complete equation of motion=0.9385E+00
SEE BEVINGTON "Data Reduction and Error Analysis" [1969]
```