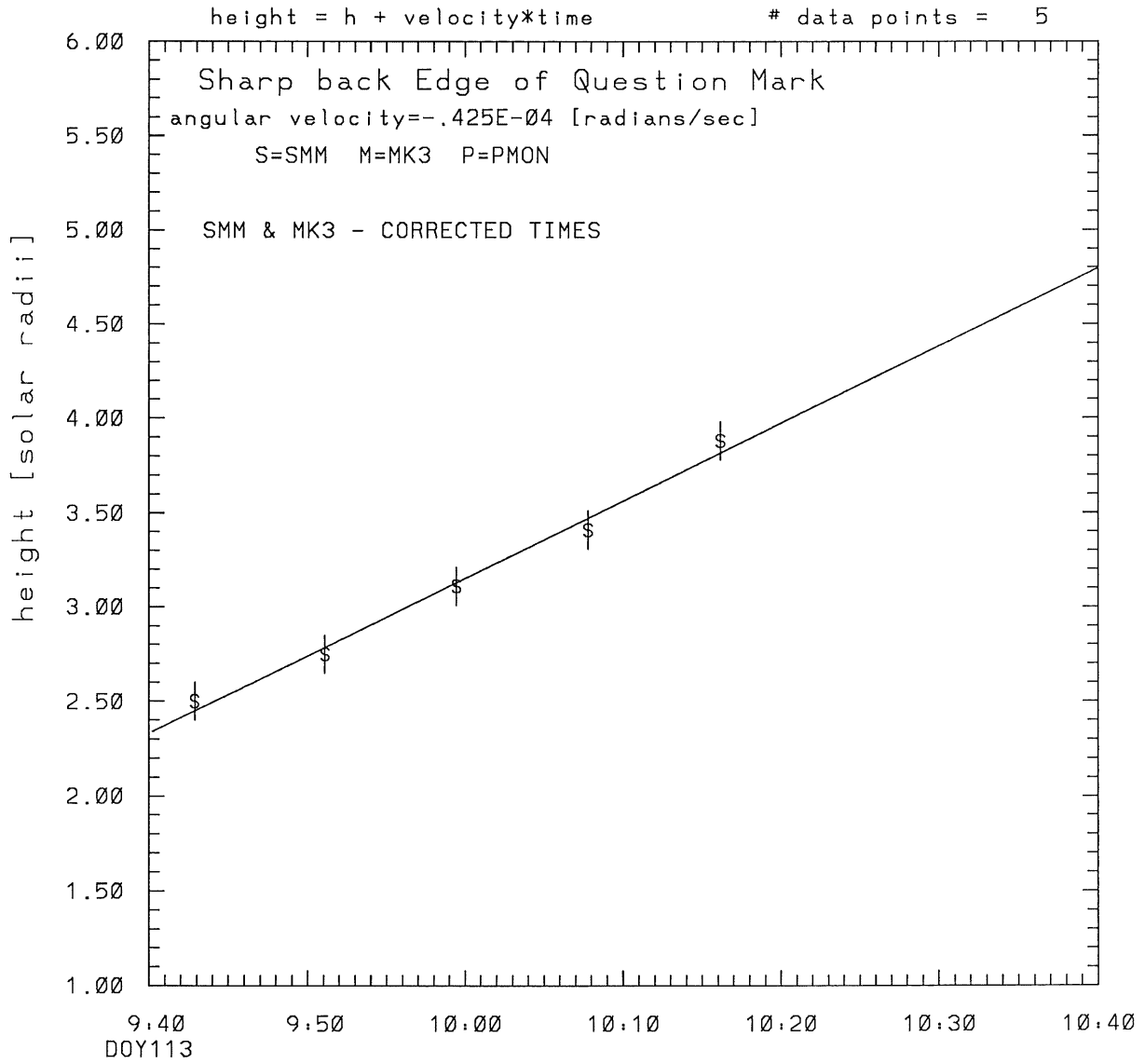
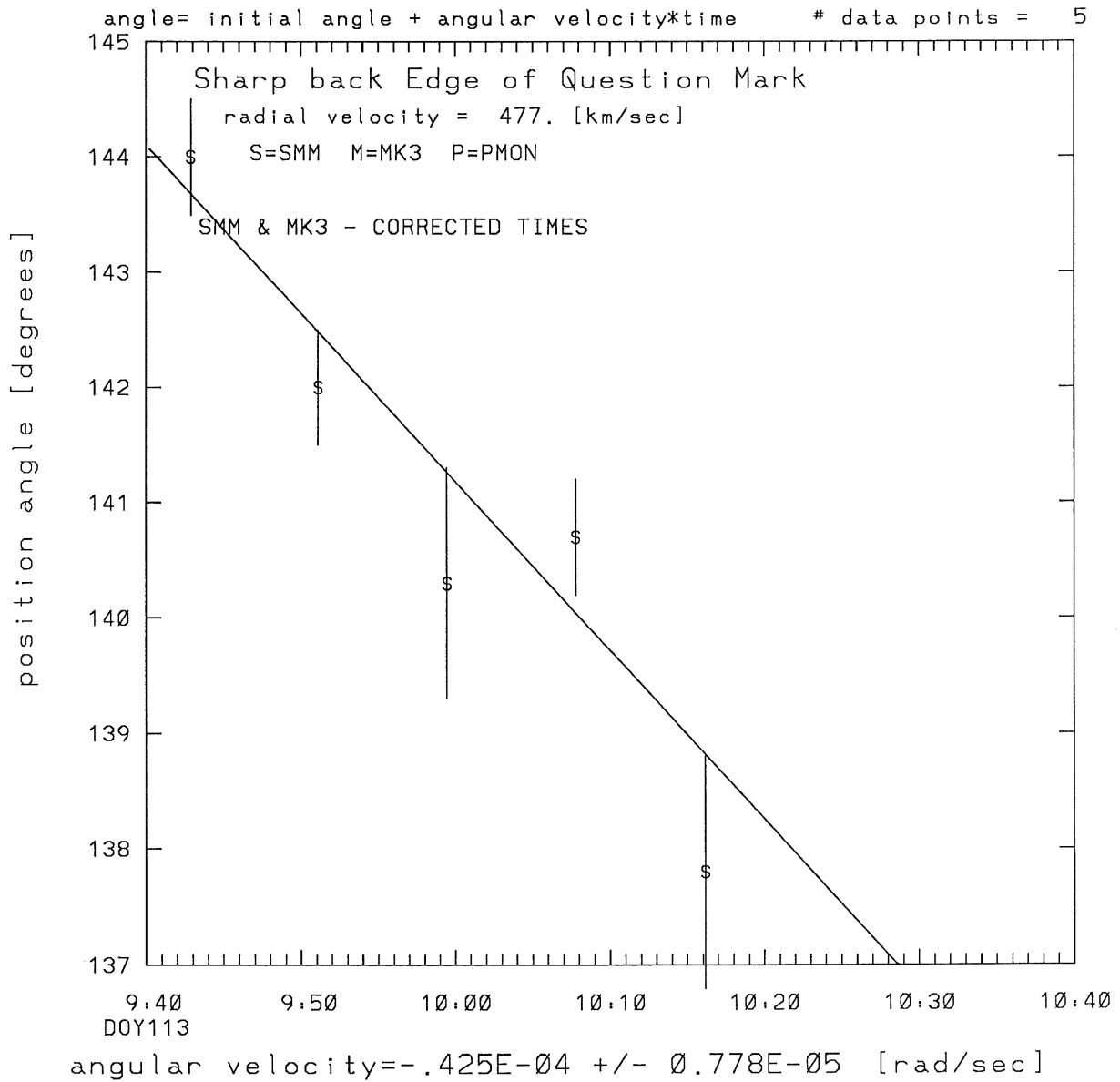


SMM C/P 1989 DOY113 140 +/- 4 degrees

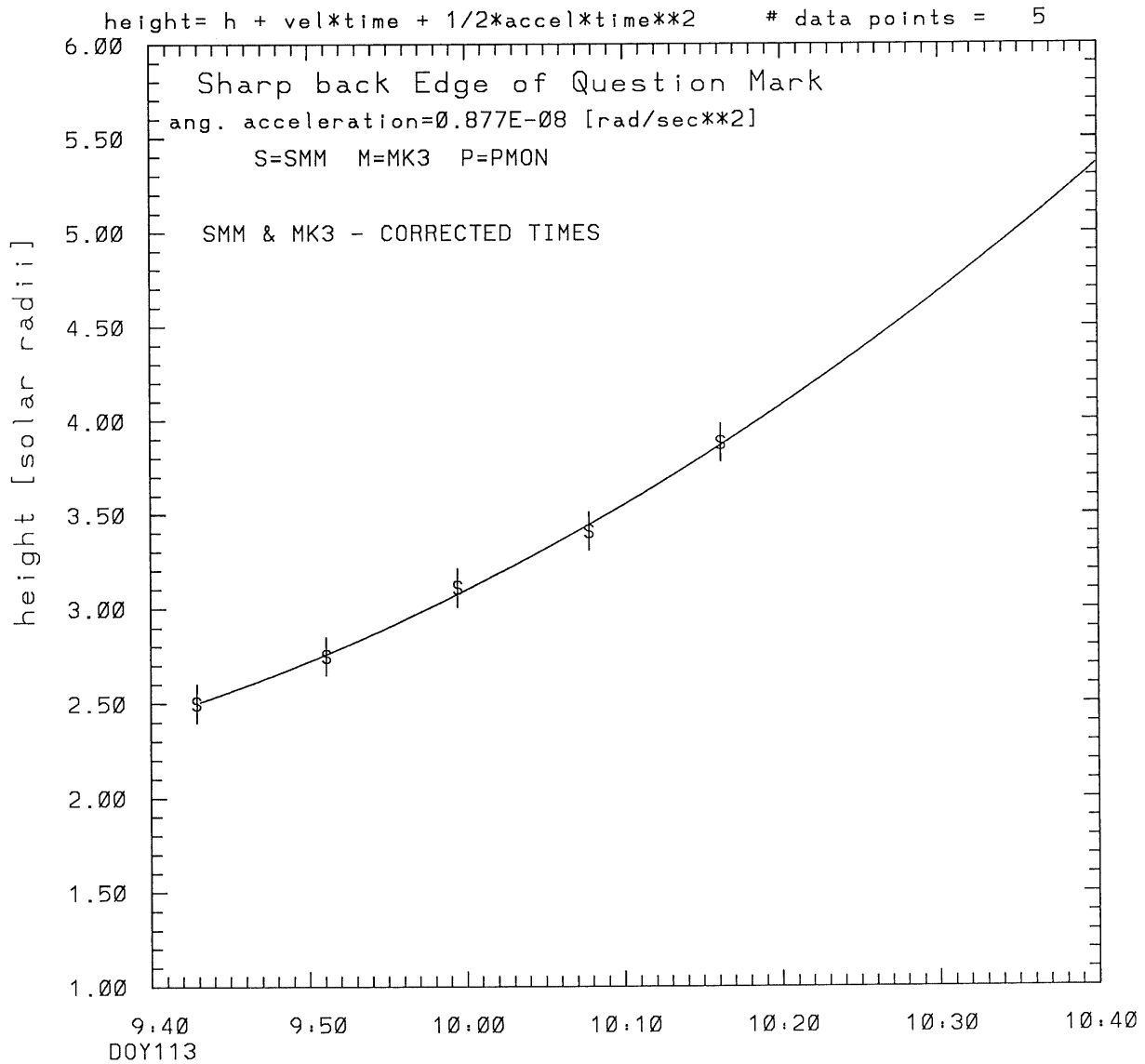


tstart=DOY113 9: 8 +/- 1.0 [min.]  
radial velocity= 477. +/- 24. [km/sec]

SMM C/P 1989 DOY113 140 +/- 4 degrees



SMM C/P 1989 DOY113 140 +/- 4 degrees



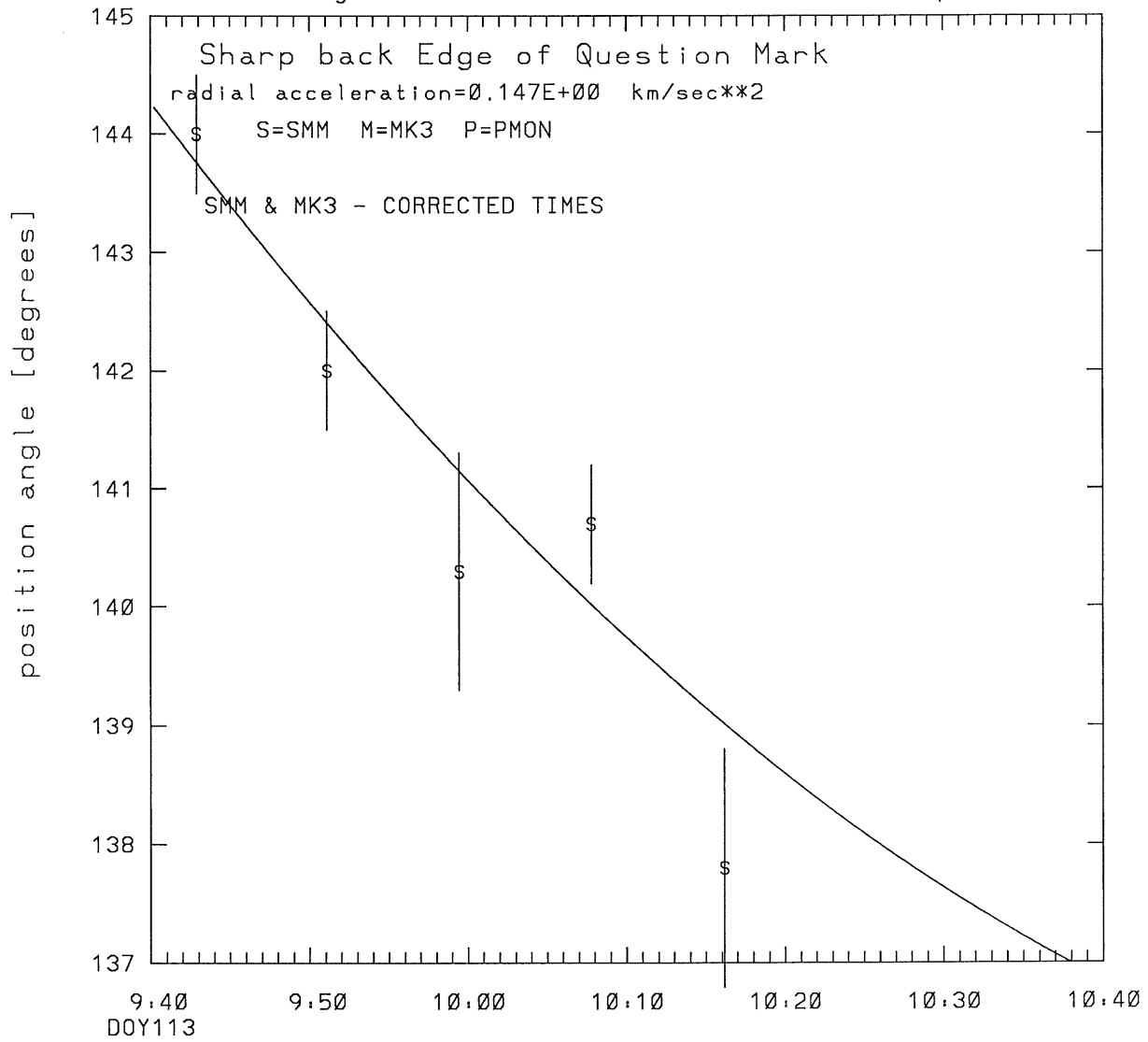
tstart=DOY113 9.6 from derivative=0

Event begins at 1.97 Solar Radii

radial acceleration = 0.1469 +/- 0.0442 [km/sec\*\*2]

SMM C/P 1989 DOY113 140 +/- 4 degrees

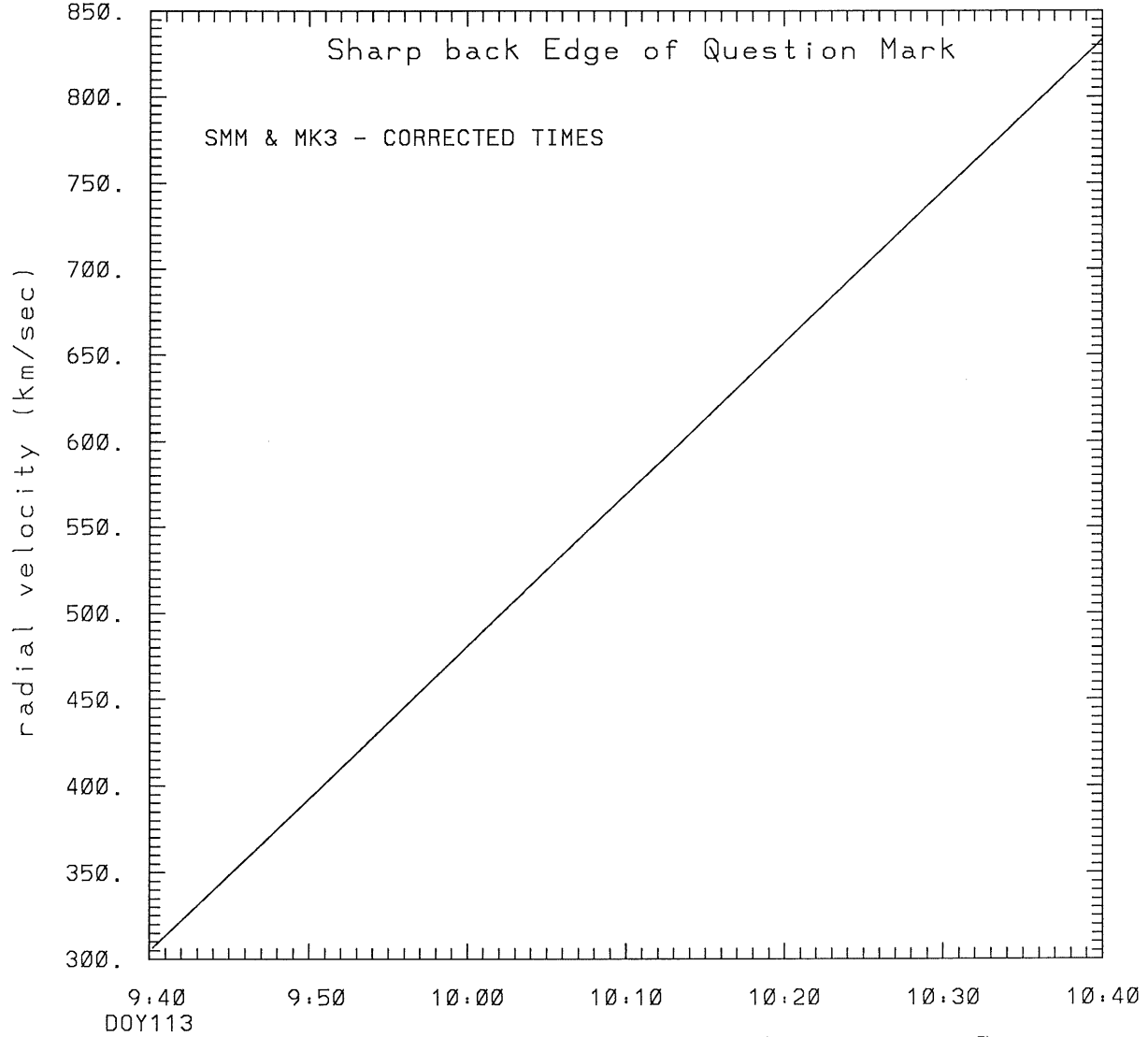
angle = initial angle + angular velocity\*time  
+ 1/2 angular acceleration\*time\*\*2 # data points = 5



Event begins at 1.97 Solar Radii  
angular acceleration=0.877E-08 +/- 0.351E-07 [rad/sec\*\*2]

SMM C/P 1989 DOY113 140 +/- 4 degrees

+ 1/2 angular acceleration\*time\*\*2 # data points = 5

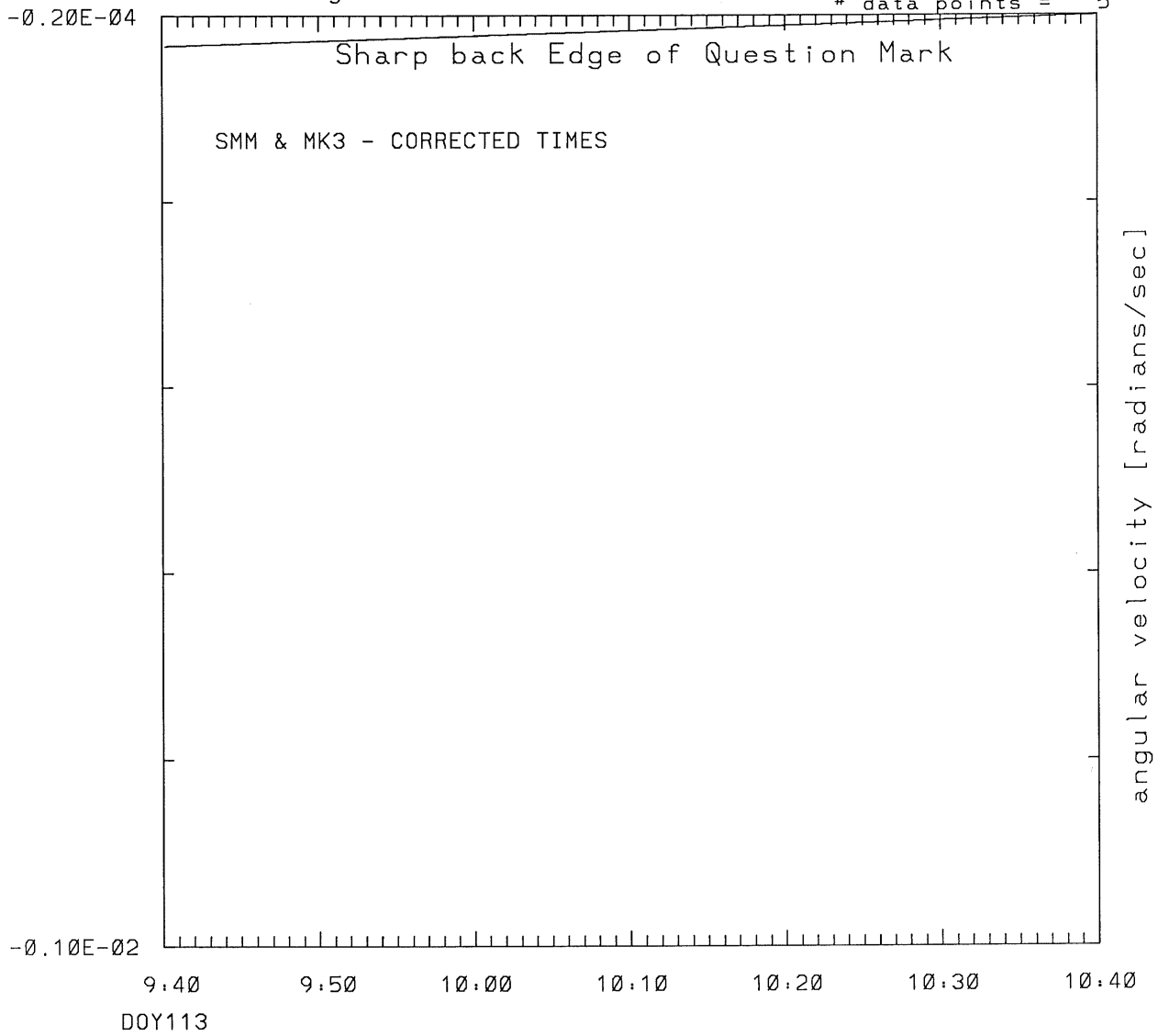


tstart=DOY113 9.6 from derivative=0  
Event begins at 1.97 Solar Radii  
radial acceleration=0.147E+00 km/sec\*\*2

SMM C/P 1989 DOY113 140 +/- 4 degrees

$$\text{angle} = \text{initial angle} + \text{angular velocity} * \text{time} + \frac{1}{2} \text{angular acceleration} * \text{time} ** 2$$

# data points = 5



angular acceleration =  $0.877E-08 \pm 0.351E-07$  [rad/sec\*\*2]

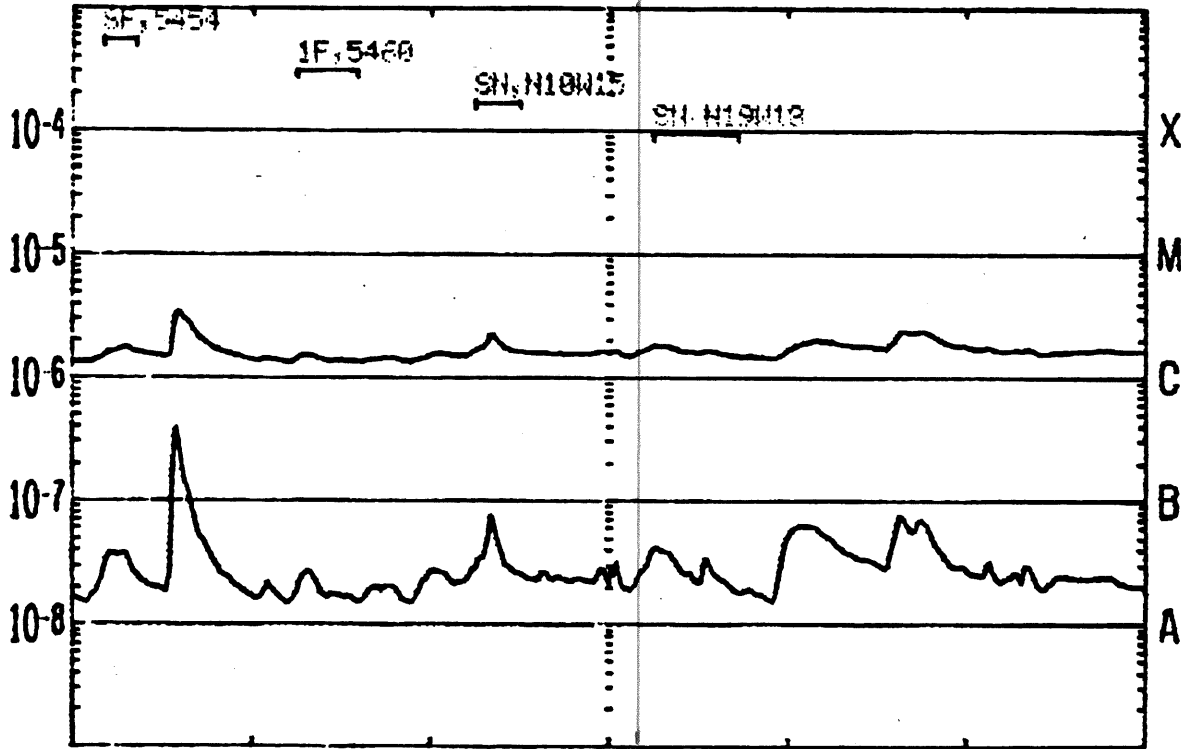
1989 Day 113

Back edge of Question Mark Prominence  
center = 143° [9:08] 1st order  
[9:06] 2nd order  
Top of Question Mark, [9:09] 1st order  
[9:06] 2nd order

XRAY and OPTICAL DATA TOGETHER

BEGIN: 23 APR 89

Watts meter<sup>2</sup>



GOES 7 0.5-4.0A GOES 7 1.0-8.0A  
OPTICAL FLARES

23/0600

23/0900

23/1200

SAA's  
NIGHT

GOES-7 1 MIN DATA; OPTICAL FLARE DUR. IMP. REGION

BUH: 1730UT  
24 APR 89

\*\*\*\*\*  
This is a 1 order run  
\*\*\*\*\*

\*\*\*\*\*  
INPUT:  
\*\*\*\*\*

year	doy	time	radii	radius	angle	error in angle	datatype
1989	113	9:42:53	2.50 +/- 0.10	0.10	144.0 +/- 0.5	0.5	SMM
1989	113	9:51: 6	2.75 +/- 0.10	0.10	142.0 +/- 0.5	0.5	SMM
1989	113	9:59:27	3.11 +/- 0.10	0.10	140.3 +/- 1.0	1.0	SMM
1989	113	10: 7:48	3.41 +/- 0.10	0.10	140.7 +/- 1.0	1.0	SMM
1989	113	10:16:10	3.88 +/- 0.10	0.10	137.8 +/- 1.0	1.0	SMM

\*\*\*\*\*  
Structure being measured:  
Sharp back Edge of Question Mark  
\*\*\*\*\*

\*\*\*\*\*  
OUTPUT:  
\*\*\*\*\*

START TIME:

Event began at t = 0 + -0.324E+02 +/- 0.996E+00 [minutes]  
In more convenient units:  
Event began at DOY 113 9: 8 +/- 0.996E+00 [minutes]

Origin defined at DOY113 9:40

RADIAL INFORMATION:

RADIAL VELOCITY = 477. +/- 24. km/sec

The computed RADIAL coefficients and errors FROM NLLST2 are:

c(1) =	0.233E+01 +/-	0.479E-01 [solar radii]
c(2) =	0.411E-01 +/-	0.211E-02 [radii/min]
c(2) =	0.477E+03 +/-	0.244E+02 [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)= 0.55335E-01 [radii] see Bevington pg. 114  
error in c(2)= 0.24309E-02 [radii/min] see Bevington pg. 114

ANGULAR INFORMATION:

ANGULAR VELOCITY = -0.4964E-04 +/- 0.6765E-05[radians/sec]

The computed ANGULAR coefficients and errors FROM NLLST2 are:

a(1) =	144. +/- 0. [degrees]
a(2) =	-0.171E+00 +/- 0.233E-01 [degrees/min]
a(2) =	-0.496E-04 +/- 0.676E-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 TANGENTIAL, RADIAL AND TOTAL SPEEDS AT EACH DATA POINT ARE:  
The TANGENTIAL velocity at 9:42 = -86. km/sec  
The RADIAL velocity at 9:42 = 477. km/sec



The TOTAL velocity at 9:42 = 484. km/sec

The TANGENTIAL velocity at 9:51 = -95. km /sec

The RADIAL velocity at 9:51 = 477. km/sec

The TOTAL velocity at 9:51 = 486. km/sec

The TANGENTIAL velocity at 9:59 = -107. km /sec

The RADIAL velocity at 9:59 = 477. km/sec

The TOTAL velocity at 9:59 = 489. km/sec

The TANGENTIAL velocity at 10: 7 = -118. km /sec

The RADIAL velocity at 10: 7 = 477. km/sec

The TOTAL velocity at 10: 7 = 491. km/sec

The TANGENTIAL velocity at 10:16 = -134. km /sec

The RADIAL velocity at 10:16 = 477. km/sec

The TOTAL velocity at 10:16 = 495. km/sec

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

Fit is ok [ier=1]

Standard Deviation in the height = 0.54

Standard Deviation in start time measurement = 0.118E+02

Error in time = 0.26986E+01 using best fit method

See Taylor Error Analysis [Univ of Colorado] pg.78

Value of reduced Chi Squared returned from nllst2 = 0.307E-02

Reduced Chi Squared = 0.141E-01

Chi Squared = 0.423E-01

The probability for exceeding chi square = 0.100E+01

The correlation coefficient = 0.995E+00

The probability that no LINEAR correlation exists between the variables = 0.4512]

SEE BEVINGTON "Data Reduction and Error Analysis" [1969]

\*\*\*\*\*  
This is a 2 order run  
\*\*\*\*\*

\*\*\*\*\*  
INPUT:  
\*\*\*\*\*

year	doy	time	radii	radius	error in angle	error in angle	datatype
1989	113	9:42:53	2.50 +/-	0.10	144.0 +/-	0.5	SMM
1989	113	9:51: 6	2.75 +/-	0.10	142.0 +/-	0.5	SMM
1989	113	9:59:27	3.11 +/-	0.10	140.3 +/-	1.0	SMM
1989	113	10: 7:48	3.41 +/-	0.10	140.7 +/-	1.0	SMM
1989	113	10:16:10	3.88 +/-	0.10	137.8 +/-	1.0	SMM

\*\*\*\*\*  
Structure being measured:  
Sharp back Edge of Question Mark  
\*\*\*\*\*

\*\*\*\*\*  
OUTPUT:  
\*\*\*\*\*

START TIME:

tstart=DOY113 9: 6 from derivative = 0  
Event begins at 1.97 Solar Radii  
Origin defined at DOY113 9:40

RADIAL INFORMATION:

RADIAL ACCELERATION = 0.147E+00 +/- 0.442E-01 km/sec\*\*2

The computed RADIAL coefficients and errors FROM NLLST2 are:

c(1) = 0.242E+01 +/- 0.377E-01 [solar radii]  
c(2) = 0.263E-01 +/- 0.461E-02 [radii/min]  
c(2) = 0.305E+03 +/- 0.534E+02 [km/sec]  
c(3) = 0.380E-03 +/- 0.114E-03 [radii/min\*\*2]  
c(3) = 0.147E+00 +/- 0.442E-01 [km/sec\*\*2]

The computed ERRORS in coefficients [BEVINGTON] are:

Approximate error in c(1) = 0.46219E-01 [radii] Bevington pg 154 (8-30)  
Exact error in c(1) = 0.33238E-02 [radii] Bevington pg 154 (8-28)  
Approximate error in c(2) = 0.56402E-02 [radii/min] Bevington pg 154 (8-30)  
Exact error in c(2) = 0.12254E-02 [radii/min] Bevington pg 154 (8-28)  
Approximate error in c(3) = 0.14007E-03 [radii/min\*\*2] Bevington pg 154 (8-30)  
Exact error in c(3) = 0.33092E-04 [radii/min\*\*2] Bevington pg 154 (8-28)

ANGULAR INFORMATION:

ANGULAR ACCELERATION= 0.1572E-07 +/- 0.2434E-07[radians/sec\*\*2]

The computed ANGULAR coefficients and errors FROM NLLST2 are:

a(1) = 145. +/- 1. [degrees]  
a(2) = -0.229E+00 +/- 0.938E-01 [degrees/min]  
a(2) = -0.666E-04 +/- 0.273E-04 [rad/sec]  
a(3) = 0.162E-02 +/- 0.251E-02 [degrees/min\*\*2]  
a(3) = 0.157E-07 +/- 0.243E-07 [rad/sec\*\*2]

THE TANGENTIAL, RADIAL AND TOTAL SPEEDS AT EACH DATA POINT ARE:

The TANGENTIAL velocity at 9:42 = -111. km /sec

The RADIAL velocity at 9:42 = 330. km/sec

The TOTAL velocity at 9:42 = 348. km/sec

The TANGENTIAL velocity at 9:51 = -107. km /sec

The RADIAL velocity at 9:51 = 402. km/sec

The TOTAL velocity at 9:51 = 416. km/sec

The TANGENTIAL velocity at 9:59 = -104. km /sec

The RADIAL velocity at 9:59 = 476. km/sec

The TOTAL velocity at 9:59 = 487. km/sec

The TANGENTIAL velocity at 10: 7 = -96. km /sec

The RADIAL velocity at 10: 7 = 549. km/sec

The TOTAL velocity at 10: 7 = 558. km/sec

The TANGENTIAL velocity at 10:16 = -88. km /sec

The RADIAL velocity at 10:16 = 623. km/sec

The TOTAL velocity at 10:16 = 629. km/sec

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

Fit is ok [ier=1]

Standard Deviation in the height = 0.54

Standard Deviation in start time measurement = 0.118E+02

Value of reduced Chi Squared returned from nllst2 = 0.876E-03

Reduced Chi Squared = 0.465E-02

Chi Squared = 0.930E-02

The probability for exceeding chi square = 0.999E+00

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 = 0.9948E+00

The correlation between the data and the time\*\*2 term = 0.9868E+00

The correlation between the data and the complete equation of motion=0.9978E+00

SEE BEVINGTON "Data Reduction and Error Analysis" [1969]