Twenty Fourth Meeting of the Hipparcos Science Team

ESOC, 21-22 February 1990

Attendance:

HST: Prof. P.L. Bernacca, Dr M. Crézé (second day), Dr. M. Grenon, Prof. E. Høg, Prof. J. Kovalevsky, Dr F. van Leeuwen, Dr L. Lindegren, Dr H. van der Marel, Mr C.A. Murray, Mr R.S. Le Poole, Dr C. Turon.

ESTEC: M.A.C. Perryman, R. D. Wills (first day)

ESOC: J. van der Ha, A. Schütz, P. Davies, D. Heger, C. Sollazzo, A. Macdonald.

Invited: H. Schrijver

Prof. M. Grewing was unable to attend

The agenda given in Annex I was adopted. Actions agreed at the meeting are included as Annex II.

1. Satellite Status

Heger reported on the satellite status (Annex III). The solar array degradation V and I curves (Annex IV) were leading to an expected lifetime of at least three years. An ESTEC report had been distributed to the HST (Power System Performance Prediction).

Heger summarised the operations which had been conducted since December. 55-60 per cent data recovery is being achieved, and Goldstone is due on line in mid-March (Annex V).

Plans for the eclipse operations were presented (Annex VI). Minimal impacts on the scientific data quality was now expected. Kovalevsky reported that FAST intended to process the eclipse data as good *a priori*.

Improvements brought to the RTAD (Annex VII) were presented.

After discussions, HST agreed that: (i) use of the Kourou station after inclusion of Goldstone was not mandatory, and would be left to ESOC's discretion; (ii) no changes to the gyro or detector configurations would be made (Annex VIII).

2. Calibration Results

Davies updated the calibration status since the last HST meeting (Annex IX). All of these aspects had been reported in the ESTEC status reports and are not repeated here; however a value for the grid period of 1.207355 was agreed (the 'ESOC value' of 1.20747 following on from the revised scale factor applied to the previous 'nominal' value of 1.20812).

Utrecht would investigate further the use of the grid MSI, and the data for an assessment of the basic angle stability (possible dates for this verification of the basic angle stability were: 4 December - 25 February; 12 December - 17 February.)

3. Results of Consortia Evaluation

Schrijver presented the results of the analyses carried out at Utrecht, including the time evolution of the basic angle and photometric response (Annex X).

Van der Marel reported on further aspects of the great circle analyses, including estimates of the INCA positions (Annex XI).

Van Leeuwen presented results of the RGO work (Annex XII). Difficulties in achieving a great circle reduction were related to the problems of attitude determination in the present orbit (note: successful GCR processing has now been reported from Copenhagen, 26 February). He also presented his findings on the SSR (a comparison would be performed by Schrijver), the star mapper photometry, and the gyro noise, drift and scale factor estimates. These were consistent with ESOC's knowledge, but no changes in the gyro configuration would be made until further investigations made such a change mandatory, in view of the risks identified by Heger.

Kovalevsky reported on the progress using simulated and real data at CERGA/CNES. FAST estimated that 43 per cent of useful data was contained in data set 6 (in agreement with van Leeuwen's findings). Studies of the phase difference between the first and second harmonic are given in Annex XIII.

Tycho: Høg reported on the Tycho analysis at Heidelberg and Tubingen. Analysis had started on the star mapper spikes, and a report would be issued shortly.

4. DDID Discussions

The main item outstanding in the interface was the definition of the time intervals over which RTAD was converged. A solution was identified during a splinter meeting, calling for the inclusion in the data catalogue file of the times at which payload monitoring identifies that the trend is changing from good to bad or vice versa.

5. Comparisons

A splinter had been dedicated to discussions of the IDT comparisons which had already taken place. The results were encouraging, and a series of further actions had been identified for further progress.

Actions were agreed related to the comparisons going on in the areas of star mapper, attitude and great circle processing. Briefly, the situation is as follows:

(i) comparisons will be made on the first data interval defined by Schrijver (Schrijver will distribute deatils of this interval to all relevant groups). Further comparisons will take place, using data intervals yet to be defined;

(ii) van Leeuwen will finalise the star mapper document. Kovalevsky will then send the relevant FAST data to van Leeuwen for comparison;

(iii) Kovalevsky and Petersen will send the attitude data to Donati for comparison;

(iv) Kovalevsky, Schrijver and Petersen will send the great circle data to Le Poole for comparison.

6. Input Catalogue

Schütz and Crézé reported on the plans for the implementation of the modulation strategy (should be implemented on 1 April) and the feedback of the test data to Crézé (every 2 months).

Turon reported on the successful feedback achieved for minor planets and variable stars (where an agreed format for feedback had been reached). ESOC would verify observations on Titan and Europa (see ESTEC.STATUS.08).

Turon distributed draft formats for the Input Catalogue publication (still foreseen for the end of 1990). Comments on the format were still invited.

7. Photometry

A splinter meeting was organised on photometry. A series of actions was identified (ITF correction: the decompression tables used by ESOC were distributed by e-mail after the meeting; IFOV pointing precision; and response normalisation). Grenon would discuss the actions with the groups involved in the IDT work (Mignard, Schrijver) and the star mapper (Scales, van Leeuwen).

8. Miscellaneous

Perryman presented some first thoughts on criteria for proceeding to the main mission reductions. The comments made by the HST are included in the text given as Annex XIV.

Hassan joined the meeting to give his appraisal of the future mission prospects, and to convey his best wishes to the HST now that he was moving to take over the Cassini/Huygens mission.

ISO Input Catalogue: Perryman informed the involved groups about the activities starting in the area of the ISO Input Catalogue.

Regatta-Astro: Perryman would distribute a copy of the report to HST members, who could then comment on how they wished to proceed with any possible scientific collaboration.

9. Next HST Meeting

Next HST meeting: 10-11 May 1990 at Geneva, starting at 09:00 on Thursday 10 May, and finishing early afternoon on Friday 11 May, at the invitation of Grenon (who would take care of local arrangements).

M.A.C. Perryman

26 February 1990

Distribution: Participants, H. Hassan

ANNEX I

Twenty Fourth Meeting

of the

HIPPARCOS SCIENCE TEAM

ESOC, 21-22 February 1990

(VIP Room, starting 14:00 on 21 February)

AGENDA

1. Satellite status (Heger/Perryman)
   - payload status
   - RTAD innovation improvement/SM scale factor
   - MATRA work on RTAD improvement
   - RTAD useful data, tape 7
   - lifetime and eclipse
   - ground station coverage
   - calibration of IDT1/SM1, other gyro configuration

2. Calibration/monitoring results (Davies)
   - review of CCCM and on-board transformation parameters
   - IFOV profile
   - refocusing status

3. Utrecht first-look overview (Schrijver/van der Marel)
   - overview of all results
   - to discuss: MSI, basic angle stability check points

4. NDAC (RGO/CUO) progress report (van Leeuwen/Hoeg)
   - including gyro noise and drift discussion
   - rotation of SM

5. FAST (CNES/CERGA) progress report (Kovalevsky)

6. TDAC (ARI/AIT) progress report (Hoeg/Grewing)

7. Astrometry/photometry comments (Lindegren/Grenon)

8. Comparisons of IDT/SM/attitude/GCR (all those involved)

9. INCA: variable stars, minor planets, catalogue updates (Turon)
   - PSF feedback to INCA

10. DDID:
    - names on DDID list
    - actions oustanding, including RTAD convergence times (Blake)
    - DRC comments on bad data (van Leeuwen/Kovalevsky)

11. Criteria for proceeding to full mission reductions (Perryman)

12. Miscellaneous:
    - next HST meeting
    - Regatta-Astro mission
    - ISO input catalogue

Note: hotel accomodation has been booked for the night of 21 February for all HST members, including H. Schrijver, at Parkhaus, Grafenstr. 31, Tel. 6151-28100 (5 min from Luisenplatz, centre, 88 DM).

ANNEX 4

Actions printed on 26 Feb 1990 at 11:24

Title : DDID distribution list Reference: MPERR0023
Issue-Date: 90-02-16 Origin : Initiator: MPERRYMA
Due-Date : 90-02-16 Status : Closed Priority :
Documentation Ref: Closed_by :Common agrrement
Actionees : HST + Bastian/Pieplu/Scales/Blake

Comments

Update the distribution list for DDID discussions and comments on data tapes, as defined in ESTEC.STATUS.07 (administration)

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Title : Star Mapper scale factor Reference: MPERR0003
Issue-Date: 90-02-15 Origin : Initiator: MPERRYMA
Due-Date : 90-02-15 Status : Closed Priority :
Documentation Ref: Closed_by :ESOC action 19 Feb
Actionees : Macdonald

Comments

Implement revised scale factor for star mapper on board

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Title : Data tape 8 Reference: MPERR0033
Issue-Date: 90-02-23 Origin : HST24 Initiator: MPERRYMA
Due-Date : 90-02-23 Status : Open Priority :
Documentation Ref: Closed_by :
Actionees : Blake

Comments

Send out data tape 8 (1 week) for data from early March to all DRC

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Title : Useful observing time tapes 6 and 7 Reference: MPERR0035
Issue-Date: 90-02-23 Origin : HST24 Initiator: MPERRYMA
Due-Date : 90-02-23 Status : Open Priority :
Documentation Ref: Closed_by :
Actionees : Davies/Kovalevsky/van Leeuwen

Comments

ESOC to provide useful observing time estimates for tape 6. All three groups to provide such estimates for tape 7.

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Title : Attitude data comparison for tape 5 Reference: MPERR0011
Issue-Date: 90-02-16 Origin : Initiator: MPERRYMA
Due-Date : 90-02-16 Status : Open Priority :
Documentation Ref: Closed_by :
Actionees : Donati

Comments

Complete attitude comparison for the data set defined by Schrijver, using data from CNES/CERGA (Kovalevsky) and from CUO (Petersen).

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Actions printed on 26 Feb 1990 at 11:24

Title : IDT photometry convergence Reference: MPERR0030
Issue-Date: 90-02-23 Origin : Initiator: MPERRYMA
Due-Date : 90-02-23 Status : Open Priority :
Documentation Ref: Closed_by :
Actionees : Grenon/Mignard/Schrijver
Comments
Agree on implementation of IDT photometry

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Title : SM photometry convergence Reference: MPERR0031
Issue-Date: 90-02-23 Origin : Initiator: MPERRYMA
Due-Date : 90-02-23 Status : Open Priority :
Documentation Ref: Closed_by :
Actionees : Grenon/Schrijver/Scales
Comments
Agree on SM photometry implementation

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Title : Tycho magnitude ranges Reference: MPERR0006
Issue-Date: 90-02-15 Origin : Initiator: MPERRYMA
Due-Date : 90-02-15 Status : Open Priority :
Documentation Ref: Closed_by :
Actionees : Hoeg
Comments
Provide limits of brightest and faintest stars observable by Tycho

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Title : Use of Tycho colours for main mission Reference: MPERR0008
Issue-Date: 90-02-16 Origin : HST23 No. 10 Initiator: MPERRYMA
Due-Date : 90-02-16 Status : Open Priority :
Documentation Ref: Closed_by :
Actionees : Hoeg
Comments
Answer question posed by Kovalevsky - can the published version of
the main mission use the colours determined by TDAC, from the point
of view of (a) TDAC agreements (b) TDAC data availability schedule
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Title : Spikes in star mapper data Reference: MPERR0005
Issue-Date: 90-02-15 Origin : HST23 No. 6 Initiator: MPERRYMA
Due-Date : 90-02-15 Status : Open Priority :
Documentation Ref: Closed_by :
Actionees : Hoeg/Grewing
Comments
Provide statistics of spikes in star mapper data

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Actions printed on 26 Feb 1990 at 11:24

Title : Criteria for starting full analysis Reference: MPERR0024
Issue-Date: 90-02-16 Origin : Initiator: MPERRYMA
Due-Date : 90-02-16 Status : Open Priority :
Documentation Ref: Closed_by :
Actionees : HST

Comments

Comment on proposed criteria to be completed before ESOC commences distribution of the full mission data - see HST24, Annex XIV.

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Title : Hipparcos 2 Reference: MPERR0028
Issue-Date: 90-02-17 Origin : Initiator: MPERRYMA
Due-Date : 90-02-17 Status : Open Priority :
Documentation Ref: Closed_by :
Actionees : HST

Comments

Agree on ESA/SPC Hipparcos 2 strategy for mid-May report to SPC. Criteria for Hipparcos operations - funding of operations for 3+ years and Goldstone coverage

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Title : Input Catalogue publication format Reference: MPERR0036
Issue-Date: 90-02-26 Origin : HST24 Initiator: MPERRYMA
Due-Date : 90-02-26 Status : Open Priority :
Documentation Ref: Closed_by :
Actionees : HST

Comments

Comment on the draft formats provided by C. Turon

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Title : Star mapper calibration Reference: MPERR0038
Issue-Date: 90-02-26 Origin : Initiator: MPERRYMA
Due-Date : 90-02-26 Status : Open Priority :
Documentation Ref: Closed_by :
Actionees : Kovalevsky

Comments

Provide star mapper calibration parameters to TDAC (Bastian) for definition of PGC's

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Title : Attitude jitter Reference: MPERR0039
Issue-Date: 90-02-26 Origin : HST24 Initiator: MPERRYMA
Due-Date : 90-02-26 Status : Open Priority :
Documentation Ref: Closed_by :
Actionees : Macdonald

Comments

Evaluate feasibility of performing jitter calibration, with jitter PSF, in present operational configuration

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Actions printed on 26 Feb 1990 at 11:24

Title : EFSY access authorisation Reference: MPERR0014
Issue-Date: 90-02-16 Origin : Initiator: MPERRYMA
Due-Date : 90-02-16 Status : Open Priority :
Documentation Ref: Closed_by :
Actionees : Morgan

Comments

Allow access to budget line for HST missions

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Title : Attitude data comparison set 1 Reference: MPERR0021
Issue-Date: 90-02-16 Origin : Initiator: MPERRYMA
Due-Date : 90-02-16 Status : Open Priority :
Documentation Ref: Closed_by :
Actionees : Petersen/Kovalevsky

Comments

Send attitude data over the long dat interval defined by Schrijver, in the format defined by Donati, to Donati for comparison

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Title : Grid MSI Reference: MPERR0001
Issue-Date: 90-02-15 Origin : Initiator: MPERRYMA
Due-Date : 90-02-15 Status : Open Priority :
Documentation Ref: Closed_by :
Actionees : Schrijver

Comments

Check implementation of grid MSI

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Title : Data comparison set definition Reference: MPERR0037
Issue-Date: 90-02-26 Origin : HST24 Initiator: MPERRYMA
Due-Date : 90-02-26 Status : Open Priority :
Documentation Ref: Closed_by :
Actionees : Schrijver

Comments

Inform the following about any interval definition: van Leeuwen, Kovalevsky, Hoeg/Petersen, Donati, Le Poole/van der Marel

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Title : RGC data comparison set 1 Reference: MPERR0022
Issue-Date: 90-02-16 Origin : Initiator: MPERRYMA
Due-Date : 90-02-28 Status : Open Priority :
Documentation Ref: Closed_by :
Actionees : Schrijver/Petersen/Kovalevsky

Comments

Send the GCR data from the long data set defined by Schrijver, in the format defined by van der Marel, to Le Poole for comparison

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Actions printed on 26 Feb 1990 at 11:24

Title : Basic angle stability checkpoints Reference: MPERR0029
Issue-Date: 90-02-17 Origin : Initiator: MPERRYMA
Due-Date : 90-02-17 Status : Open Priority :
Documentation Ref: Closed_by :
Actionees : Schrijver/Schutz
Comments
Perform GCR reduction to check basic angle stability over repeated great circles

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Title : PSF feedback to INCA Reference: MPERR0016
Issue-Date: 90-02-16 Origin : Initiator: MPERRYMA
Due-Date : 90-02-16 Status : Open Priority :
Documentation Ref: Closed_by :
Actionees : Schutz/Creze
Comments
Verify PSF functioning using the test zone feedback

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Title : Observations of Europa/Titan Reference: MPERR0009
Issue-Date: 90-02-16 Origin : Initiator: MPERRYMA
Due-Date : 90-02-16 Status : Open Priority :
Documentation Ref: Closed_by :
Actionees : Schutz/Davies
Comments
Inform on dates of observation of Europa and Titan. Examine ESOC telemetry to verify correct implementation of ephemerides

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Title : Input Catalogue publication Reference: MPERR0007
Issue-Date: 90-02-15 Origin : Initiator: MPERRYMA
Due-Date : 90-02-15 Status : Open Priority :
Documentation Ref: Closed_by :
Actionees : Turon
Comments
Provide draft pages for INCA publication

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Title : INCA residuals Reference: MPERR0032
Issue-Date: 90-02-23 Origin : HST24 Initiator: MPERRYMA
Due-Date : 90-02-23 Status : Open Priority :
Documentation Ref: Closed_by :
Actionees : van der Marel/Davies
Comments
van der Marel to forward INCA id. plus GCR residulas to Davies for correlation with INCA position. Davies to forward results to Wills (Matra RTAD studies) and Turon (INCA studies)

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Actions printed on 26 Feb 1990 at 11:24

Title : SM data comparison format Reference: MPERR0010
Issue-Date: 90-02-16 Origin : Initiator: MPERRYMA
Due-Date : 90-02-16 Status : Open Priority :
Documentation Ref: Closed_by :
Actionees : van Leeuwen

Comments
Finalise SM comparison document. Distribute to Utrecht/CERGA

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Title : IDT comparisons - updates Reference: MPERR0013
Issue-Date: 90-02-16 Origin : Initiator: MPERRYMA
Due-Date : 90-02-16 Status : Open Priority :
Documentation Ref: Closed_by :
Actionees : van Leeuwen

Comments
(i) distribute data files via SPAN (truncation), (2) correct frame (FOV) sign inversion, (3) investigate frames 292-296 anomalies

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Title : SM data comparison set 1 Reference: MPERR0019
Issue-Date: 90-02-16 Origin : Initiator: MPERRYMA
Due-Date : 90-02-16 Status : Open Priority :
Documentation Ref: Closed_by :
Actionees : van Leeuwen/Kovalevsky

Comments
Send the SM data over the interval defined by Schrijver, in the format defined by van Leeuwen, to van Leeuwen for comparison (use e-mail)

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Title : IDT data comparison set 1 Reference: MPERR0020
Issue-Date: 90-02-16 Origin : Initiator: MPERRYMA
Due-Date : 90-02-16 Status : Open Priority :
Documentation Ref: Closed_by :
Actionees : van Leeuwen/Kovalevsky

Comments
Send IDT data over the interval defined by Schrijver, in the format defined by van Leeuwen, to Perryman for comparison

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Title : IDT comparisons - use of magnitude Reference: MPERR0012
Issue-Date: 90-02-16 Origin : Initiator: MPERRYMA
Due-Date : 90-02-16 Status : Open Priority :
Documentation Ref: Closed_by :
Actionees : van Leeuwen/Schrijver

Comments
Agree on use of B or H magnitudes for comparison format

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Actions printed on 26 Feb 1990 at 11:25

Title : SSR comparison Reference: MPERR0034
Issue-Date: 90-02-23 Origin : HST24 Initiator: MPERRYMA
Due-Date : 90-02-23 Status : Open Priority :
Documentation Ref: Closed_by :
Actionees : van Leeuwen/Schrijver/Kovalevsky
Comments
van Leeuwen to send SSR to Utrecht and CERGA for comparisons

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ANNEX III

S P A C E C R A F T S T A T U S (20.02.90)

TCMS

TRANSMITTER 1 ON

TRANSPONDER 1 ON DURING RANGING

EPSS

CONFIGURATION OF EPSS IS PARALLEL BATTERY CHARGE MODE (PBCM)
2 ECLIPSES PER DAY

POWER DEGRADATION TEST EVERY 2 DAYS
(SUSPENDED SINCE DAY 045)

THERMAL

ALL S/C HEATERS ARE OFF

DHSS

DHSS IS NOMINAL

CBS CONFIGURATION IS IN IDT NOMINAL

FORMAT 3 SELECTED

CBS VERSION 4.02

AOCS

S/W NORMAL MODE SELECTED

GYRO CONFIGURATION (1-2-4)

CONTROL PARAMETER LIMIT CYCLING WITHIN LIMITS

P A Y L O A D S T A T U S (20.02.90)

P/L SUBSYSTEM NOMINAL WITH FOLLOWING EXCEPTION:

- FAILURE OF MUX 8 OF IMX2 OF THE P/L RTU (AR 17)
- FOCUS ANOMALY (AR 19)
- P/L IDT ANOMALY
  ANOMALOUS RESULTS OF BRIGHT STARS OBSERVED (AR 22)

P/L THERMAL CONTROL IS NOMINAL

IDT CHAIN 2 SELECTED

TYCHO CHAIN 2 SELECTED

MDE1, TCE1, AND INVERTER 1 ON

CALIBRATIONS SCHEDULED AND PERFORMED
ISPA AND GRM

HIPPARCOS LIFETIME PREDICTION

- DETAILS OF HIPPARCOS LIFETIME PREDICTION ARE GIVEN IN THE 'POWER SYSTEM PERFORMANCE PREDICTION FOR THE HIPPARCOS SPACECRAFT' REPORT PREPARED BY THE XP DIVISION IN ESTEC.

- THE OBJECT OF THIS REPORT IS TO EXAMINE THE IMPLICATIONS FOR THE HIPPARCOS POWER SYSTEM IN ITS PRESENT ORBIT AND FROM THIS ESTABLISH A MISSION LIFETIME PREDICTION.

- THE CONCLUSION OF THIS REPORT THAT THE SATELLITE WILL BE FULLY FUNCTIONAL UNTIL AT LEAST EARLY 1992, PROBABLY UNTIL MID OR END 1992.

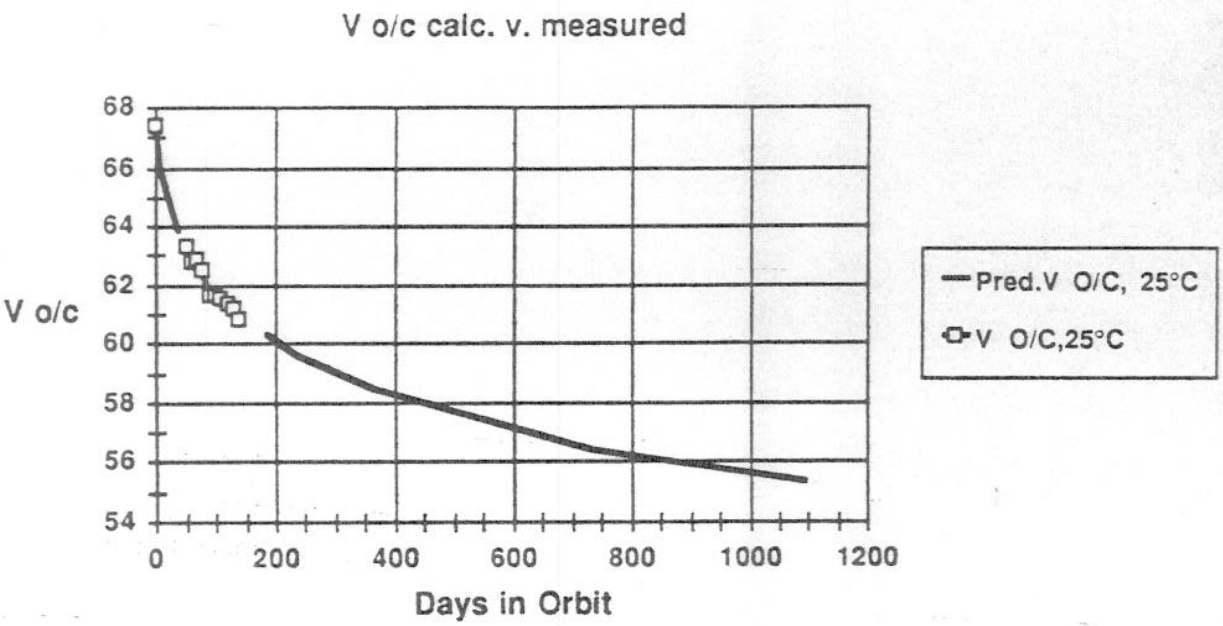

Figure 3.4. : Open Circuit Voltage Degradation (Predicted and Measured)

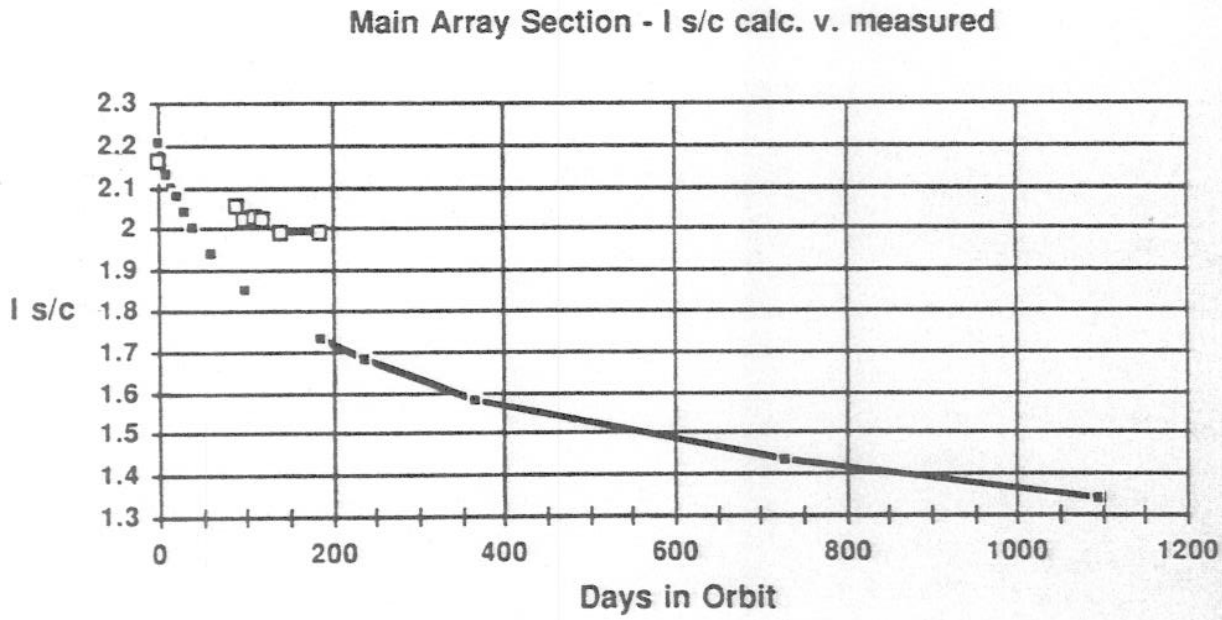

Figure 3.5. : Short Circuit Current Degradation (Predicted and Measured)

```
    O+P         visibility ODNWAL + PERTH
    O+P+K       visibility ODNWAL + PERTH  + KOUROU
    G+O+P+K     visibility GLDSTN + ODNWAL + PERTH  + KOUROU

    G*+O+P      visibility GLD/7h + ODNWAL + PERTH
    G*+O+P+K    visibility GLD/7h + ODNWAL + PERTH  + KOUROU


ODNWAL      TOTAL COVERAGE TIME  892: 2:49  ( 30.47%)
PERTH       TOTAL COVERAGE TIME 1092:42:30  ( 37.32%)
KOUROU      TOTAL COVERAGE TIME 1134:57:11  ( 38.76%)
GLDSTN      TOTAL COVERAGE TIME 1016:15:53  ( 34.71%)
GLD/7h      TOTAL COVERAGE TIME  766:38:56  ( 26.18%)

O+P         TOTAL COVERAGE TIME 1790:29:46  ( 61.15%)
O+P+K       TOTAL COVERAGE TIME 2393: 4:14  ( 81.73%)
G+O+P+K     TOTAL COVERAGE TIME 2743:58: 8  ( 93.71%)

                                           +--------------------------+
G*+O+P      TOTAL COVERAGE TIME 2448: 0:53 |( 83.61%) MAX. GAP  3:56:24|
G*+O+P+K    TOTAL COVERAGE TIME 2626:58:43 |( 89.72%) MAX. GAP  3: 6:30|
                                           +--------------------------+
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Table 1 - Visibility and Maximum Gaps: 1990-3-1 to 1990-6-30

G O L D S T O N E

TIME SCHEDULE

16 FEB	COMPLETION OF ESOC INTEGRATION AND TEST ACTIVITIES
19-23 FEB	TRANSPORT FROM ESOC TO GOLDSTONE
26- 2 MARCH	INSTALLATION AND INTEGRATION OF EQUIPMENT AT GOLDSTONE
5-9 MARCH	TESTING OF COMMUNICATIONS LINKS AND INTERFACES
12 MARCH	COMPLETION OF TEST ACTIVITIES & START OF OPERATIONS

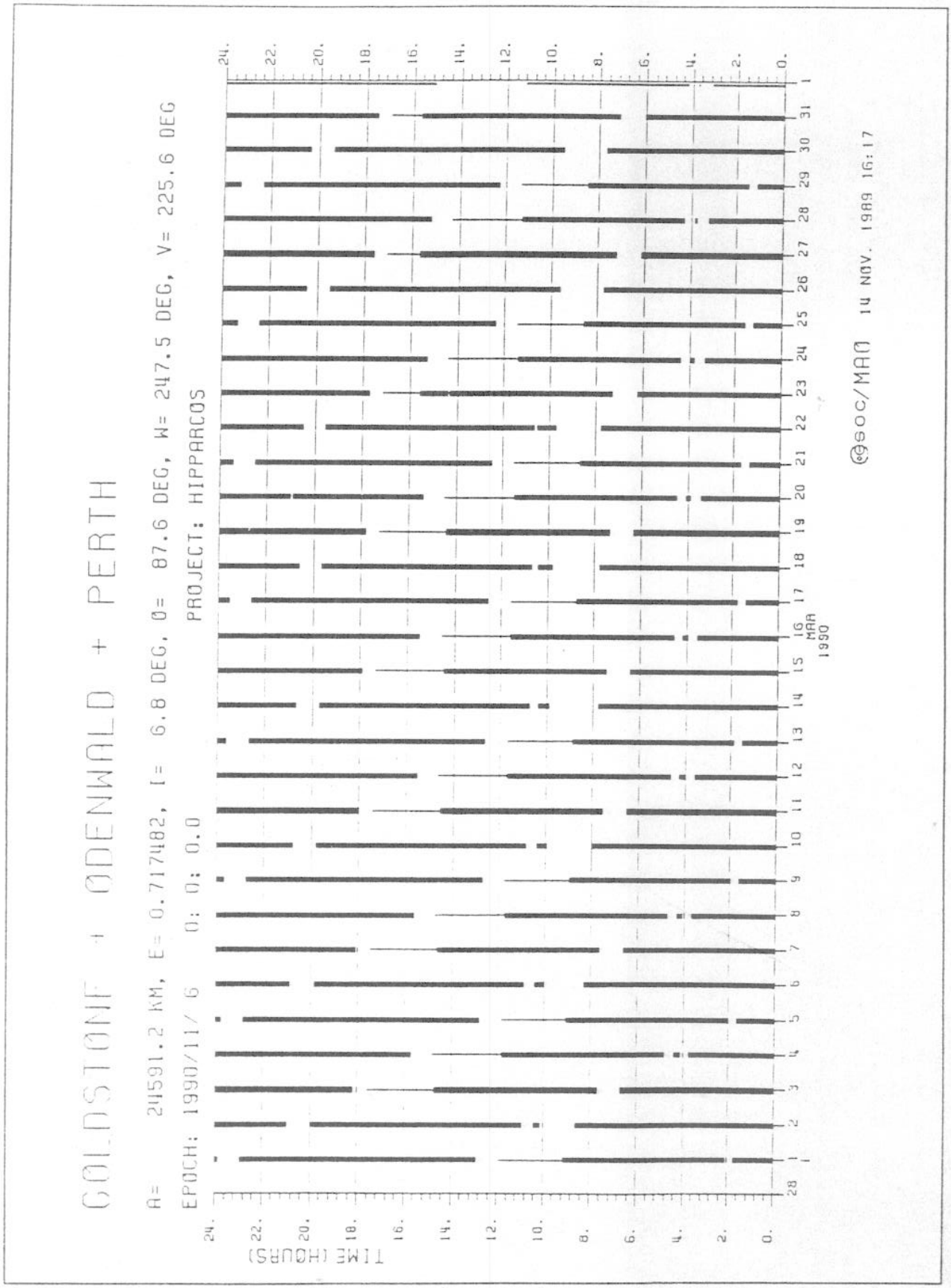


FIGURE 2. Coverage for Goldstone + Odenwald + Perth: March 1990

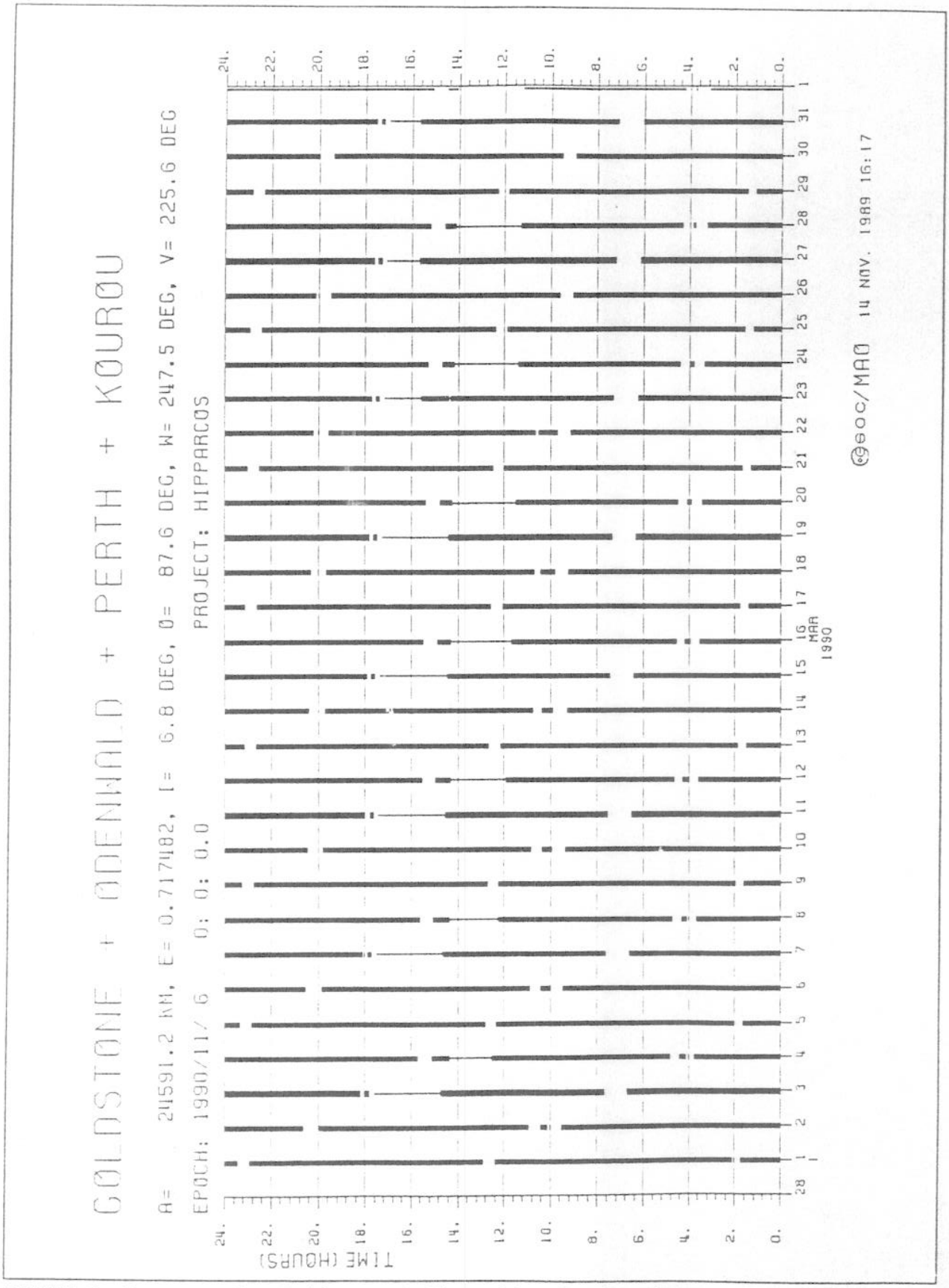


FIGURE 3. Coverage for Goldstone + Odenwald + Perth + Kourou: March 1990

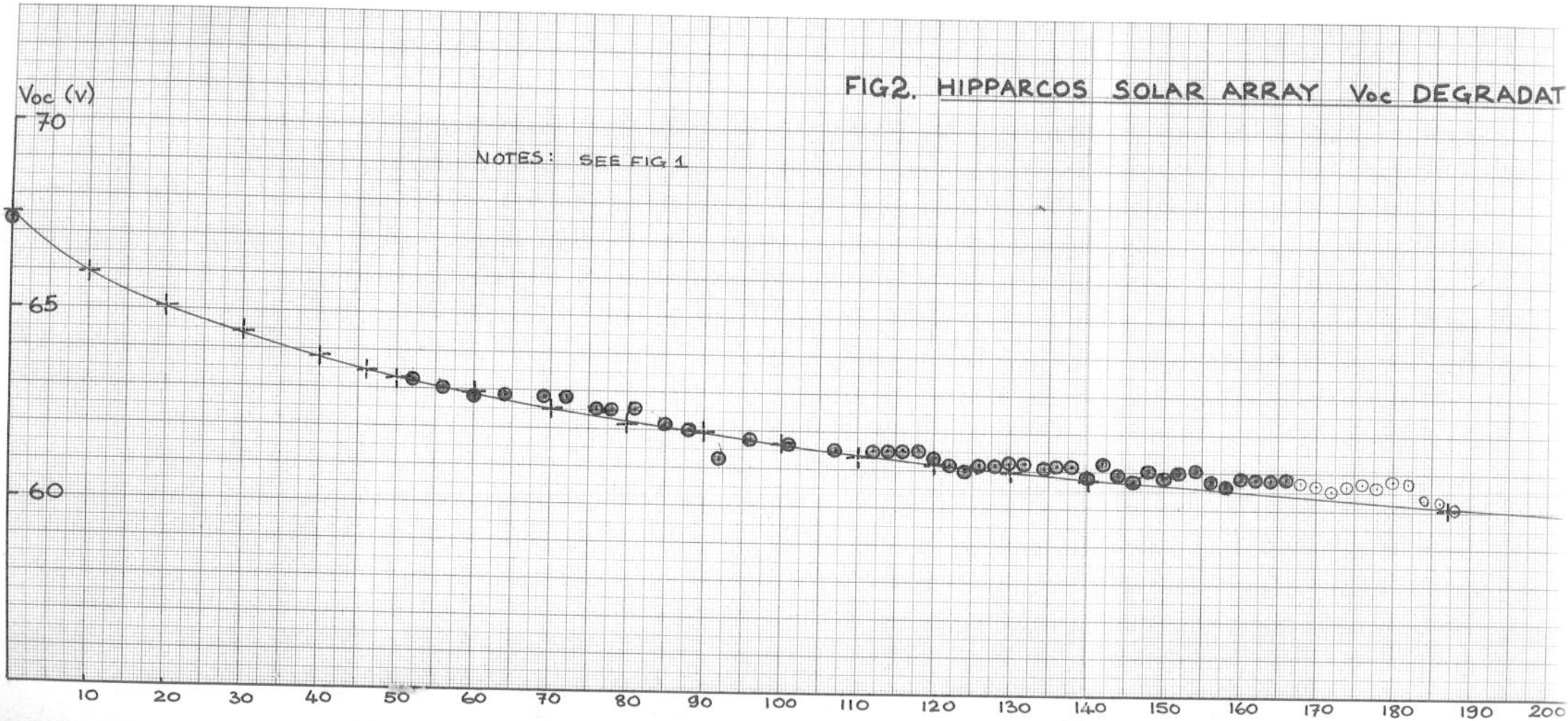
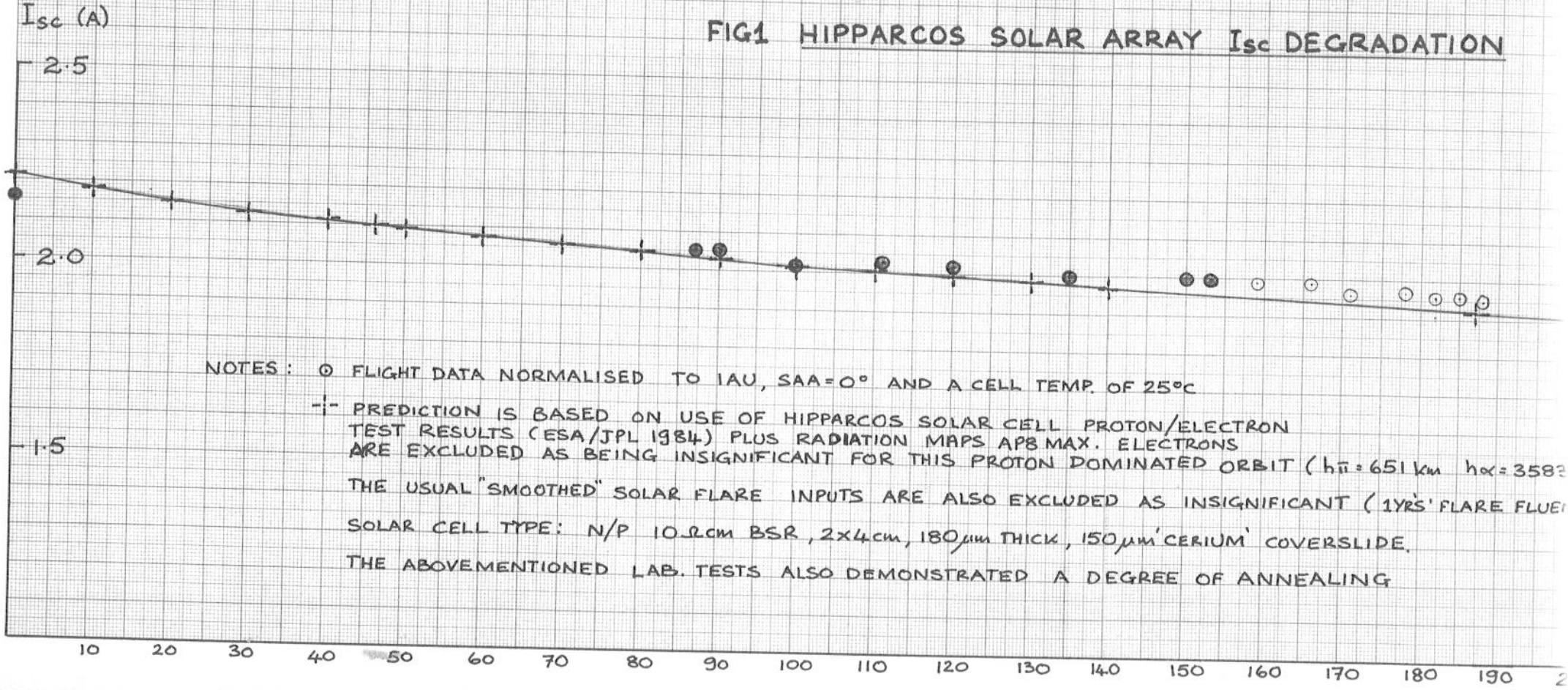


FIG2. HIPPARCOS SOLAR ARRAY Voc DEGRADAT
Voc (v)
70
65
60
NOTES: SEE FIG 1
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200

Annex 12

FIG1 HIPPARCOS SOLAR ARRAY Isc DEGRADATION



NOTES: ⊙ FLIGHT DATA NORMALISED TO 1AU, SAA = 0° AND A CELL TEMP. OF 25°C

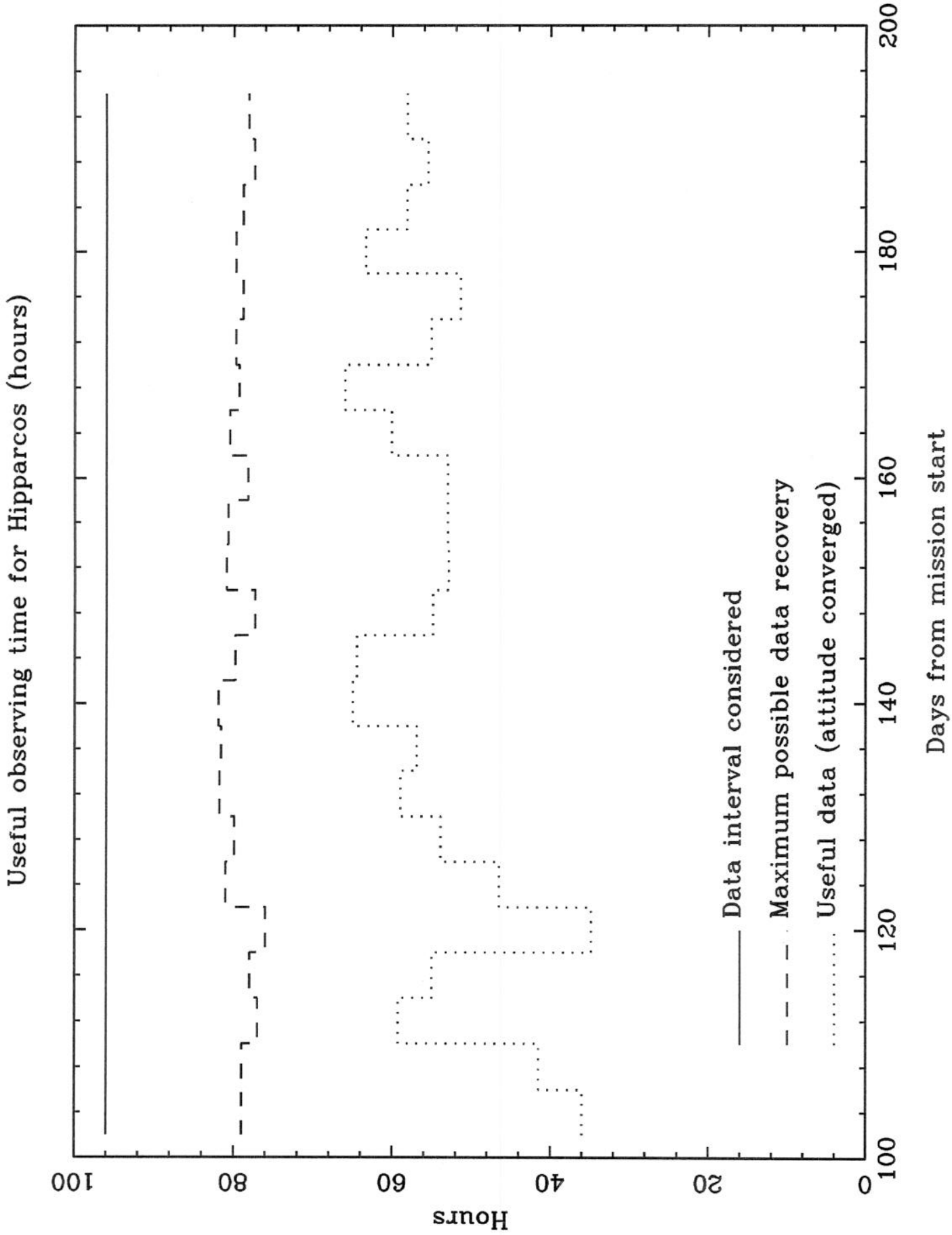
-|- PREDICTION IS BASED ON USE OF HIPPARCOS SOLAR CELL PROTON/ELECTRON TEST RESULTS (ESA/JPL 1984) PLUS RADIATION MAPS AP8 MAX. ELECTRONS ARE EXCLUDED AS BEING INSIGNIFICANT FOR THIS PROTON DOMINATED ORBIT (h_p = 651 km h_a = 358

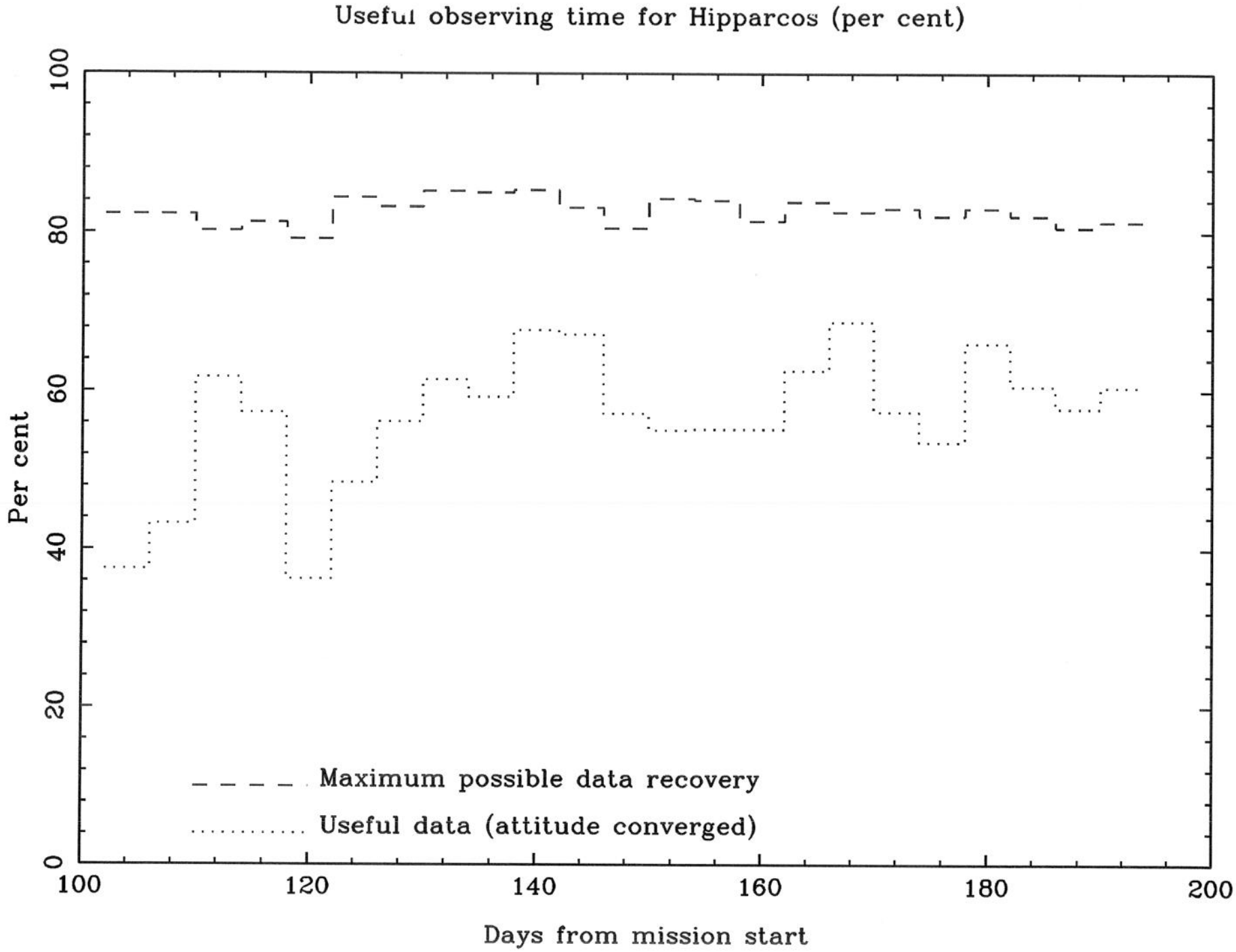
THE USUAL "SMOOTHED" SOLAR FLARE INPUTS ARE ALSO EXCLUDED AS INSIGNIFICANT (1YR'S' FLARE FLUE

SOLAR CELL TYPE: N/P 10.2cm BSR, 2x4cm, 180μm THICK, 150μm 'CERIUM' COVERSLIDE.

THE ABOVEMENTIONED LAB. TESTS ALSO DEMONSTRATED A DEGREE OF ANNEALING

ANNEX V


Useful observing time for Hipparcos (hours)
Hours
0
20
40
60
80
100
100
120
140
160
180
200
Days from mission start
Data interval considered
Maximum possible data recovery
Useful data (attitude converged)


Useful observing time for Hipparcos (per cent)
Per cent
0
20
40
60
80
100
100
120
140
160
180
200
Days from mission start
Maximum possible data recovery
Useful data (attitude converged)

ANNEX VI

L O N G E C L I P S E P E R I O D

- BETWEEN 13.02.90 AND 06.04.90 THE SPACECRAFT PASSES LONGER ECLIPSE PERIODS THAN THOSE DESIGNED FOR (72 MINS ONCE PER DAY).

- 2 ECLIPSES PER DAY WITH A MAXIMUM DURATION OF 104 MINS. BETWEEN 14.03.90 AND 20.03.90

- DURING MONTH OF MARCH POWER SAVING TO BE INTRODUCED FROM NOMINALLY 224 W. DURING ECLIPSE PERIODS TO ENSURE BATTERIES BEING FULLY CHARGED DURING SUNLIGHT PERIOD.

- MAXIMUM POWER TO BE SAVED DURING LONGEST ECLIPSE IS 26 WATTS.

- EASY WAY TO SAVE POWER IS TO REDUCE THE P/L ACTIVE THERMAL CONTROL, CURRENTLY USING ABOUT 48 WATTS.

- POWER SAVING PERFORMED SUCH THAT THE RECHARGE TIME OF THE BATTERIES KEEPS THE STAND-BY TIME WITHIN 30 MINS. TO NEXT ECLIPSE.

- PAYLOAD THERMAL CONTROL POWER SAVING DONE BY EITHER REDUCING THE Pmax VALUE OR REGULATING THE D-VALUES.

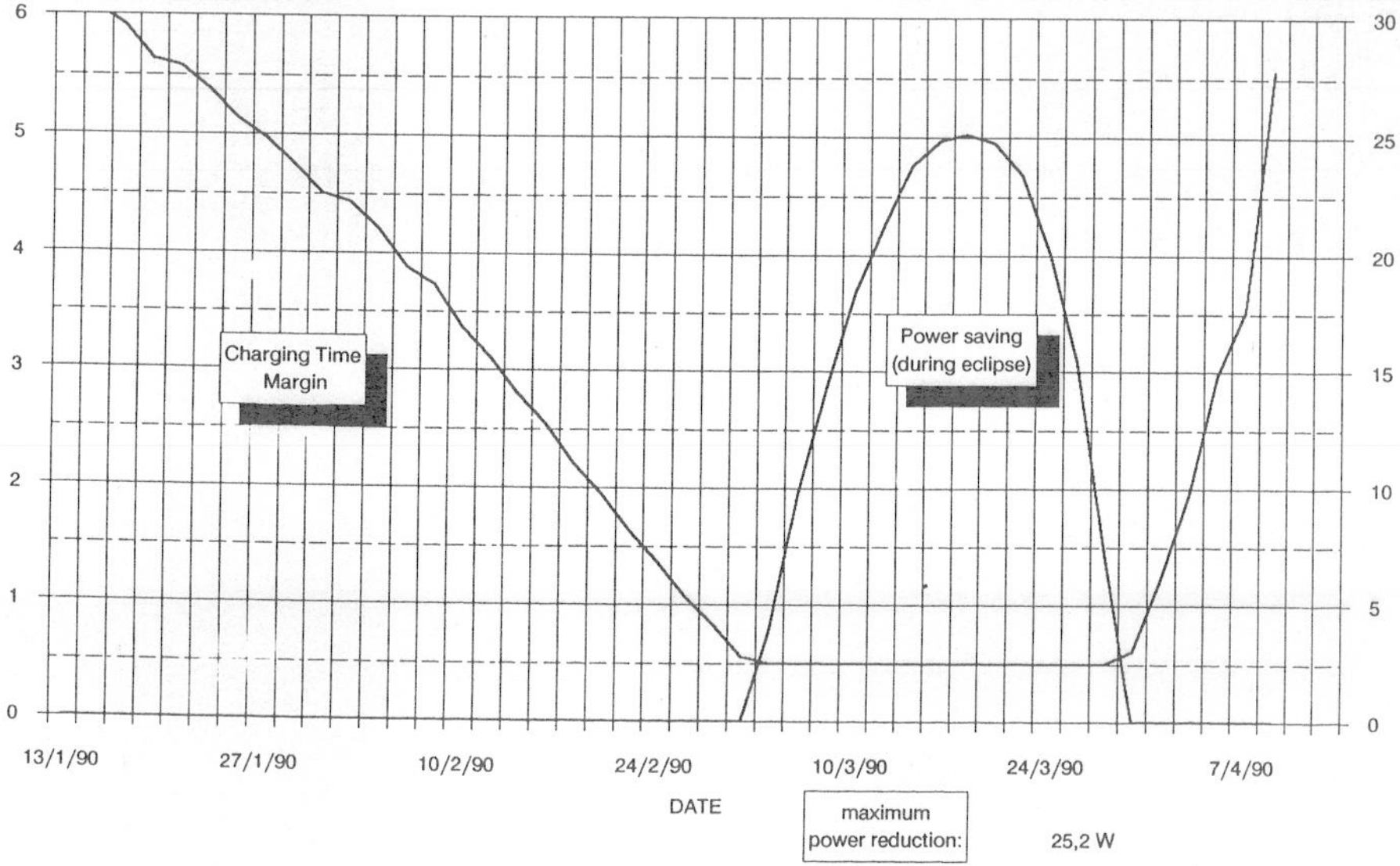


FIGURE1:HIPPARCOS POWER REDUCTION DURING THE LONG ECLIPSES PERIOD.

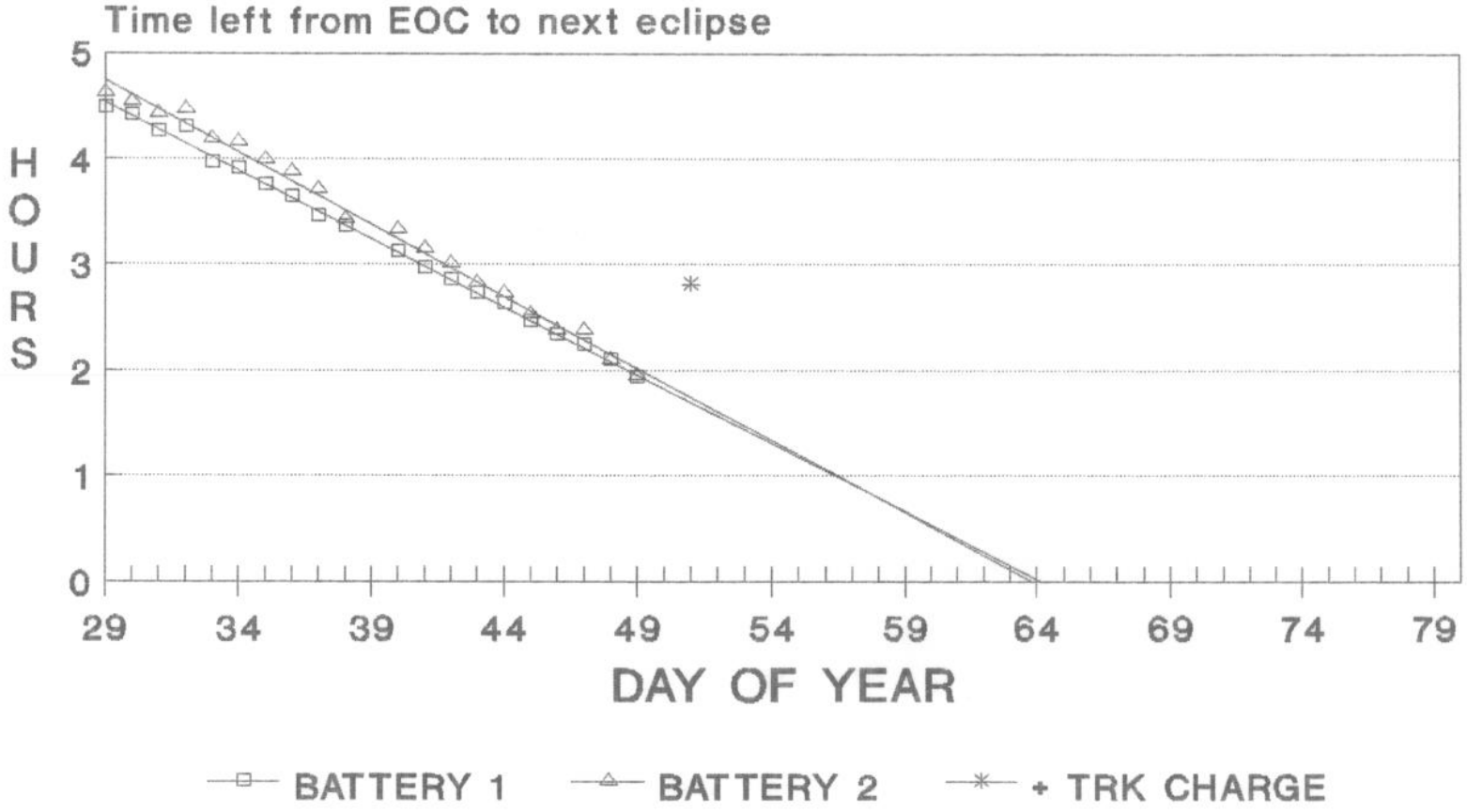
START/END TIMES AND DURATION OF ECLIPSE PERIODS

The start/end times and the duration of all eclipses are given below, as well as the times battery 1 and have terminated their charge cycle. Forthermore, the remaining time prior to the next eclipse entry is given.

E/START = ECLIPSE START
E/END = ECLIPSE END
E/DUR = ECLIPSE DURATION
B1/EOC = BATTERY 1 END OF CHARGE TIME
B2/EOC = BATTERY 2 END OF CHARGE TIME
RT/B1 = REMAINING TIME OF BATTERY 1 TO NEXT ECLIPSE
RT/B2 = REMAINING TIME OF BATTERY 2 TO NEXT ECLIPSE

DAY	E/START	E/END	E/DUR	B1/EOC	B2/EOC	RT/B1	RT/B2
029	00:30:28	01:23:44	53.3	06:34	06:28	4.7	4.8
	11:10:18	12:03:59	53.7	17:11	17:07	4.65	4.71
	21:50:08	22:44:18	54.2	04:01	03:53	4.48	4.61
030	08:29:59	09:24:35	54.6				
	19:09:49	20:04:55	55.1	01:26	01:18	4.4	4.53
031	05:49:40	06:45:14	55.6				
	16:29:31	17:25:34	56.0	22:54	22:44	4.25	4.42
032	03:09:22	04:05:54	56.5				
	13:49:14	14:46:15	57.0	20:19	20:09	4.3	4.46
033	00:29:05	01:26:36	57.5	07:02	06:52	4.11	4.28
	11:08:58	12:06:58	58.0	17:40	17:30	4.15	4.31
	21:48:49	22:47:20	58.5	04:30	04:17	3.96	4.18
034	08:28:41	09:27:42	59.0				
	19:08:34	20:08:06	59.5	01:54	01:42	3.9	4.16
035	05:48:22	06:48:24	60.0	12:37	12:24	3.85	4.06
	16:28:13	17:28:48	60.6	23:23	23:09	3.75	3.98
036	03:08:05	04:09:10	61.1	10:06	09:52	3.7	3.93
	13:47:58	14:49:34	61.6	20:50	20:35	3.63	3.88
037	00:27:49	01:29:57	62.1	07:32	07:18	3.6	3.83
	11:07:41	12:10:22	62.7	18:11	17:57	3.6	3.83
	21:47:34	22:50:46	63.2	05:00	04:45	3.45	3.7
038	08:27:26	09:31:11	63.8				
	19:07:19	20:11:36	64.3	02:25	02:11	3.36	3.43
039	05:47:11	06:52:01	64.8				
	16:27:03	17:32:26	65.4				
040	03:06:56	04:12:52	65.9				
	13:36:49	14:53:18	66.5	21:19	21:06	3.12	3.33
041	00:26:41	01:33:45	67.1	08:02	07:50	3.06	3.26
	11:06:36	12:14:12	67.6	18:40	18:29	3.10	3.28
	21:46:29	22:54:40	68.2	05:28	05:17	2.96	3.15
042	08:26:23	09:35:07	68.7				
	19:06:17	20:15:35	69.3	02:55	03:46	2.85	3.00
043	05:46:12	06:56:03	69.8				
	16:26:06	17:36:32	70.4	00:22	00:16	2.73	2.83
044	03:06:01	04:17:02	71.0	11:05	10:58	2.66	2.78
	13:45:47	14:57:32	71.6	21:48	21:42	2.62	2.72
045	00:25:53	01:38:02	72.1				

T-LEFT
BATTERY 1 & 2 + TRK



ANNEX VII

R T A D P E R F O R M A N C E

RTAD PERFORMANCE HAS IMPROVED AFTER THE FOLLOWING CHANGES HAVE BEEN INCLUDED INTO THE OPERATIONS:

- GYRO DRIFT CORRECTION HAS BEEN INCLUDED INTO THE TAIT-BRYAN ANGLES AND DRIFTS UPLINKES

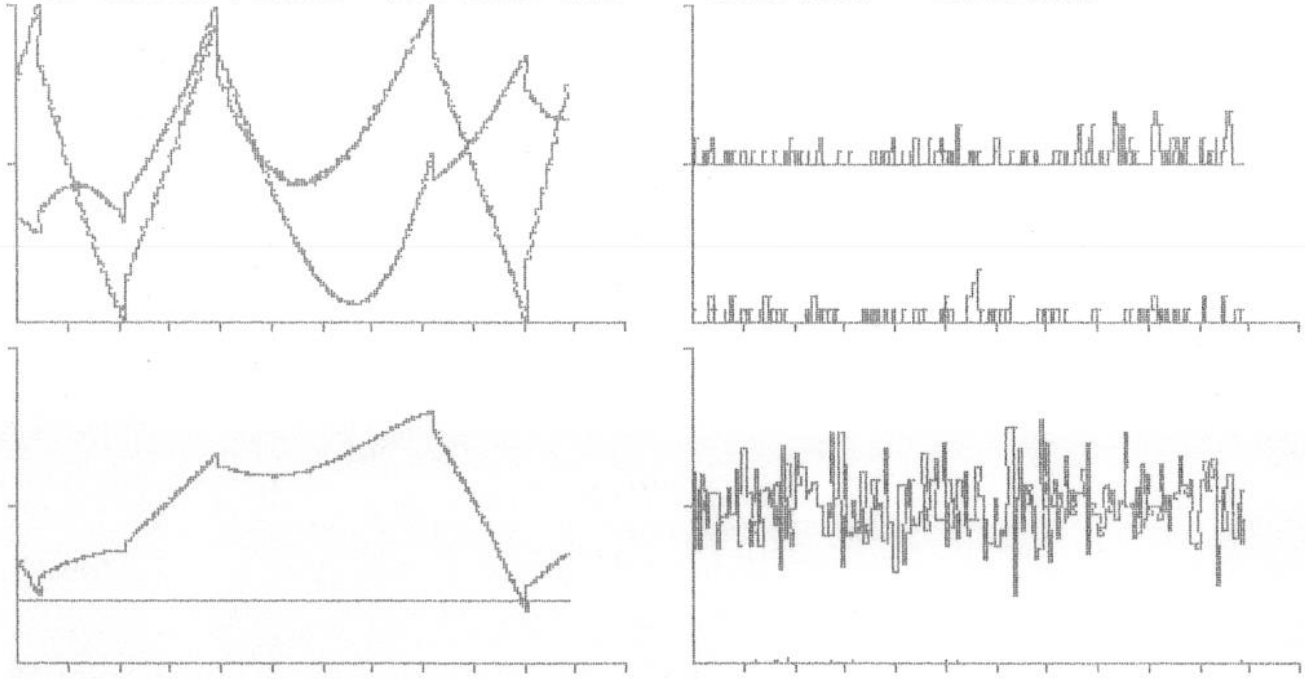
- NORMAL MODE DISTURBANCE TORQUE CONTROL PARAMETERS HAVE BEEN CALIBRATED ARE ROUTINELY UPLINKED WITH THE ORBITAL OSCILLATOR COMMANDS

- GRID ROTATION VALUE AS CALIBRATED HAS BEEN UPLINKED

FURTHER IMPROVEMENTS, STILL OUTSTANDING, WILL BE THE ELIMINATION OF 'FALSE' STAR IDENTIFICATIONS IN PRESENCE OF HIGH BACKGROUND NOISE.

```
HDCS  0.1 STATUS=USER NAME=SPACON2  S/C=HIPPARCO                    23:01:01:04
$999 /AOCS CNTR & RTAD MONITIRING       REALT          PKT.TIME:023.01.01.01.256
D/S= 0  /SRCE=SRCA/GDGT/OPT= DP SC FS LI FI VA AL          PKT.ID=SMP .01 /    0

  ID      DESCRIPTION        VALUE   UNIT      MIN          MAX          LINE
E042   NM XERROR SIGNAL   .00056865 RAD   -.00200000   .00200000   ____________
E043   NM YERROR SIGNAL   .00099522 RAD   -.00200000   .00200000   ____________
D625   PFOV CHEV REJECT          0              65524           12   ____________
D626   FFOV CHEV REJECT          1                  0           24   ____________
F203   OVERALL BACKGRND          3                  0         2000   ____________
B031   INNOVATION         .00000490 RAD   -.00005000   .00005000   ____________
J251   MDE1 TYC2SHUTTER          2                  0           10   ____________
E044   NM ZERROR SIGNAL  -.00081067 RAD   -.00270000   .00270000   ____________
```



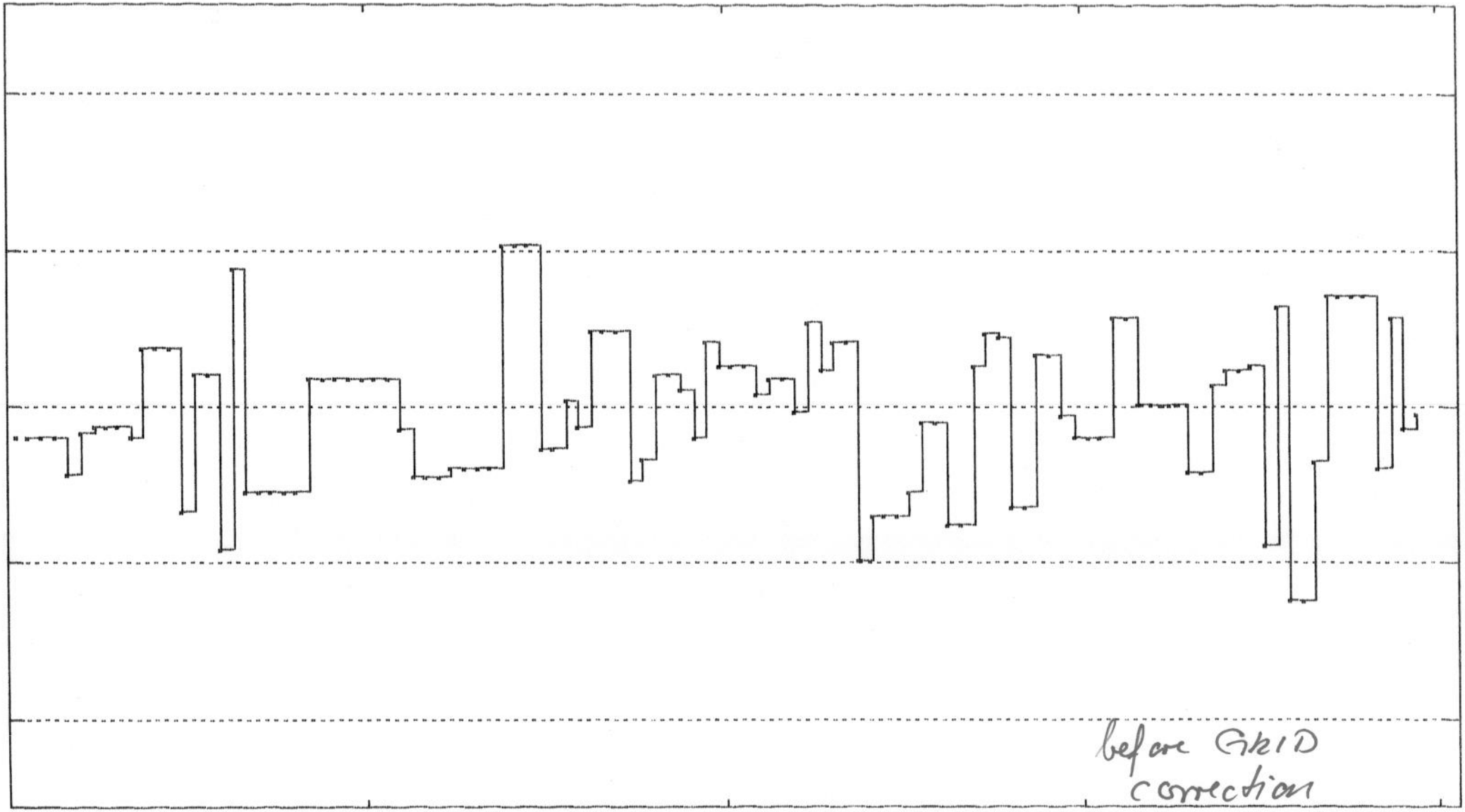
before GRID correction

```
    90.023.00.06.29                  TIME                  90.023.01.06.29
SCHD_DSP   D104 Job AUTO_1....2     dispatched to process SFS_BATCHSE 00:55:00
```

SPES•HIPP05• •CON IY 0• 90/02/15 11.58.58

GPD: INN B031 INNOVATION DsId: TM OwnerId: PRIVAT

SYMBOLS	ID	DESCRIPTION	TICKS	GRIDS	MINIMUM	MAXIMUM	UNIT
———	B031	INNOVATION	0.000	0.000	-5.0000E-05	5.0000E-05	RAD

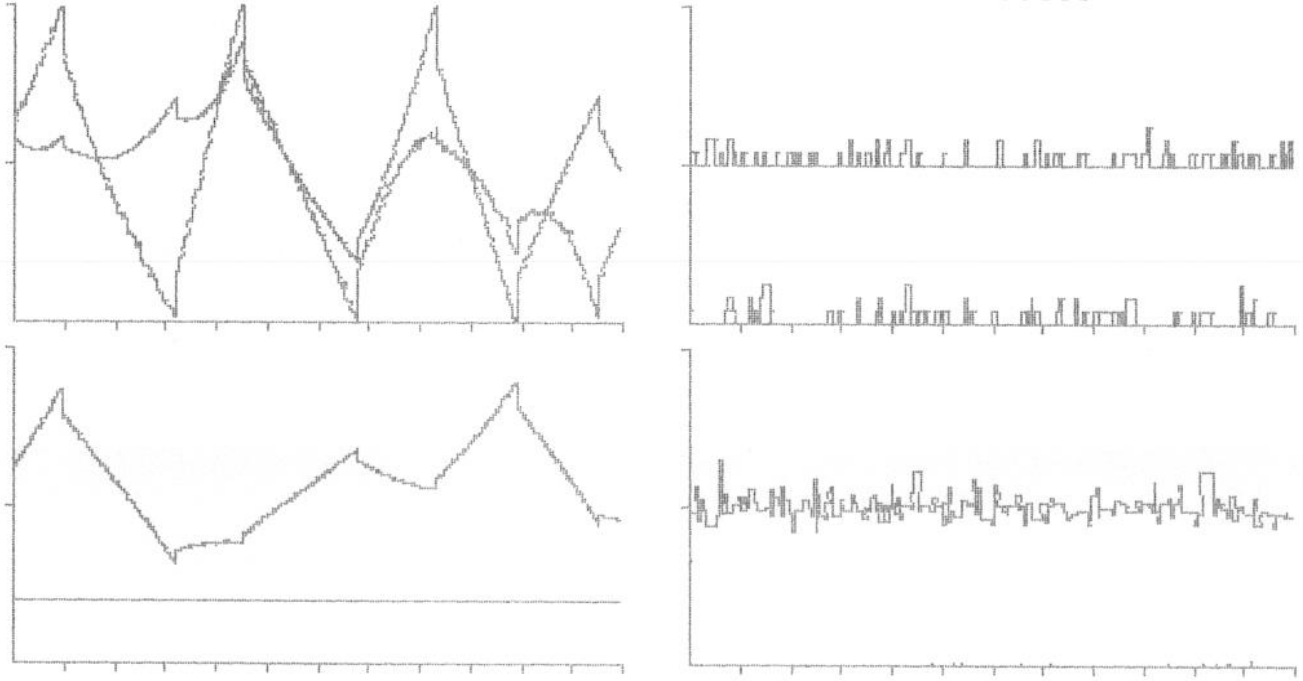


90/01/22 23.10.09TIME T=5 MIN 90/01/22 23.30.09

51

```
HDCS  0.1 STATUS=USER NAME=SPACON2  S/C=HIPPARCO                    24:07:26:42
$999 /AOCS CNTR & RTAD MONITIRING       REALT          PKT.TIME:024.07.26.21.725
D/S= 0  /SRCE=SRCA/GDGT/OPT= DP SC FS LI FI VA AL        PKT.ID=HHR .HK /    0
```

ID	DESCRIPTION	VALUE	UNIT	MIN	MAX	LINE
E042	NM XERROR SIGNAL	-.00006971	RAD	-.00200000	.00200000	
E043	NM YERROR SIGNAL	-.00081211	RAD	-.00200000	.00200000	
D625	PFOV CHEV REJECT	0		65524	12	
D626	FFOV CHEV REJECT	0		0	24	
F203	OVERALL BACKGRND	9		0	2000	
B031	INNOVATION	-.00000247	RAD	-.00005000	.00005000	
J251	MDE1 TYC2SHUTTER	2		0	10	
E044	NM ZERROR SIGNAL	-.00023474	RAD	-.00270000	.00270000	



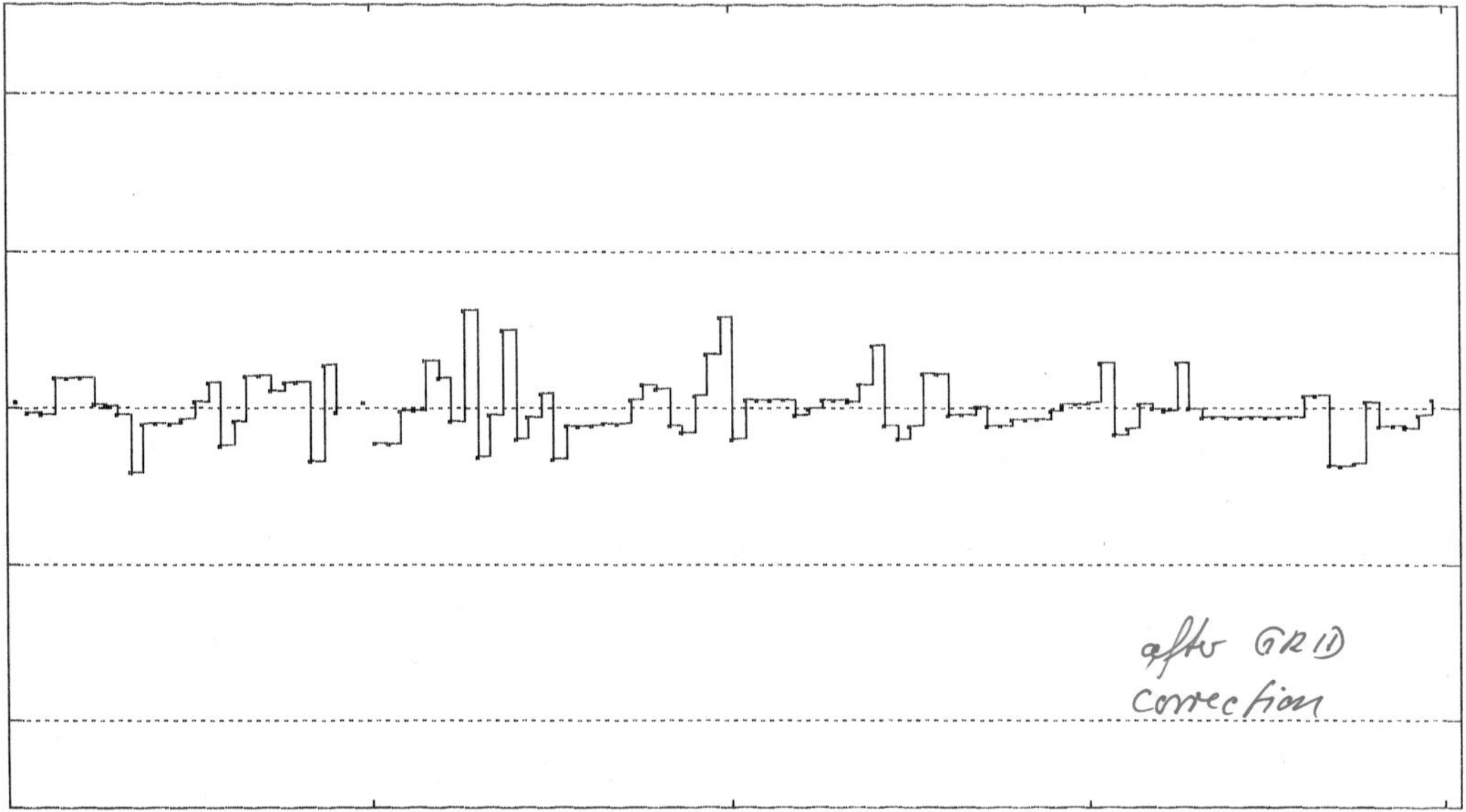
```
     90.024.06.26.36                TIME                90.024.07.26.36
SCHD_DSP   D104 Job AUTO_1....2   dispatched to process SFS_BATCHSE 07:25:00
```

after GRID correction

SPES•HIPP05•UMT•CON IY 0• 90/02/15 14.10.04

GPD: INN B031 INNOVATION DsId: TM OwnerId: PRIVAT

SYMBOLS	ID	DESCRIPTION	TICKS	GRIDS	MINIMUM	MAXIMUM	UNIT
———	B031	INNOVATION	0.000	0.000	-5.0000E-05	5.0000E-05	RAD



90/01/23 20.05.05TIME T=5 MIN 90/01/23 20.25.05

ANNEX VIII

G Y R O C O N F I G U R A T I O N

PRESENT CONFIGURATION:

- GYROS 1,2 AND 4 ON

- 2 CHANNELS ACTIVE

DESIRED CONFIGURATION:

TO PRESERVE CHANNEL REDUNDANCY GYROS 2,3 AND 5 HAVE TO BE SWITCHED ON

OPERATIONAL SCENARIO (AT LEAST 1 ORBIT REQUIRED):

1) ALL GYROS ON (MAX. 4 HOURS)

2) SELECT SBM2 (LOSS OF RTAD, S/C ENTERS FREE DRIFT OF MAXIMUM RATE 3 DEG/HR)

3) CHANGE GYRO PROJECTION COEFFICIENTS USED TO CALCULATE SATELLITE RATES

4) SELECT NORMAL MODE (RTAD FREE RUNNING)

5) SWITCH GYROS 1 AND 4 OFF

6) RTAD INITIALISATION USING GRTAD

RISKS INVOLVED

A) LOSS OF RTAD DURING AND AFTER SBM2 SELECTION
(SINCE THE GYRO DRIFTS HAVE TO BE ESTIMATED, THE LOSS OF RTAD CONVERGENCE WILL BE EXSTENSIVE)

B) GROUND SEGMENT FAILURE

- FAILURE TO SWITCH-OFF GYROS AFTER 4 HOURS CAUSING LOSS OF GYRO(S) (OVERHEATING - LOSS OF MISSION?)

- FAILURE TO RESELECT NORMAL MODE AFTER 1 HOUR RESULTS IN RETURN TO SUN-POINTING ATTITUDE

P A Y L O A D C O N F I G U R A T I O N

PRESENT CONFIGURATION:

- DEB 1
- SM 2
- IDT 2

DESIRED CONFIGURATION:

- DEB 1
- SM 1
- IDT 1

OPERATIONAL SCENARIO

1) SWITCH CBS TO RTAD NOMINAL MODE

2) RECONFIGURE TO IDT 1

3) SWITCH CBS TO MONITORING MODE

4) RECONFIGURE TO SM 1

5) REINITIALIZE RTAD

6) SWITCH CBS UP TO IDT NOMINAL MODE

7) P/L CALIBRATIONS (1 WEEK ?)

8) DECISION TO STAY ON CHAIN 1 OR RETURN TO CHAIN 2
   DEPENDING ON RESULTS OF STEP 7 (??? WEEKS)
   (IF A RETURN TO CHAIN 2 IS REQUIRED ARE RECALIBRATIONS
   REQUIRED ?)

RISKS INVOLVED:

A) PERFORMANCE OF CHAIN 1 NOT AS GOOD AS CHAIN 2 RESULTING
   IN LOSS OR DEGRADED DATA DURING THE CHANGE OVER PERIOD

B) LOSS OF RTAD - WORST CASE RETURN TO SUN POINTING

Status on 20-FEB-1990

- **Regular monitoring of:**
  - **focus position**
  - **photometric performance of IDT**
  - **real-time reduction of observations for ops- purposes**

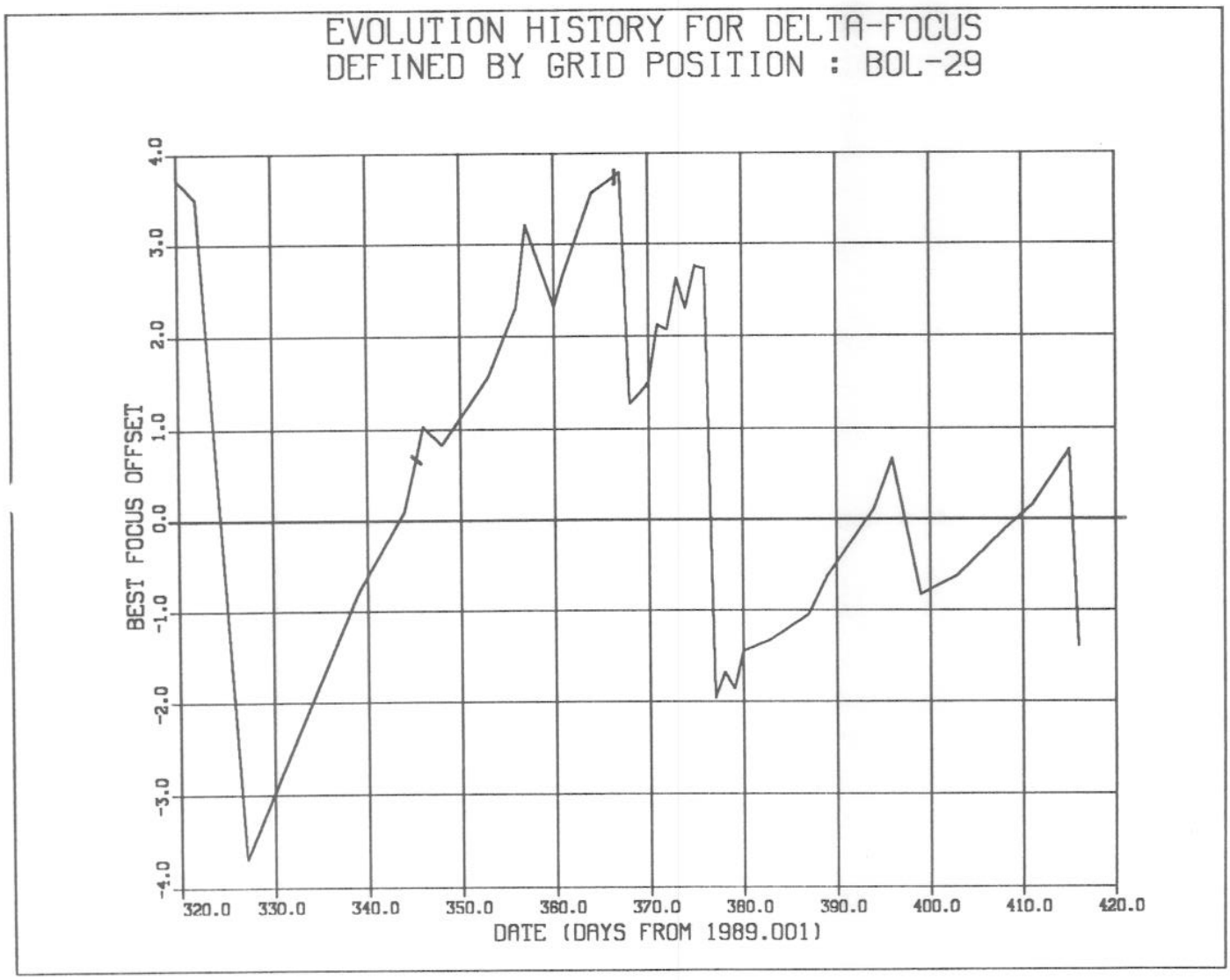
- **Uplink of geometric distortions:**
  - **grid rotations**
  - **basic angle**
  - **scale factor**
  - **CCCM**
  - **verification via offset calibrations**

- **Investigation of anomalies**
  - **focus mechanism**
  - **IDT analogue mode**

- **ad-hoc reports concerning:**
  - **minor planets**
  - **bright stars**
  - **large amplitude variables**

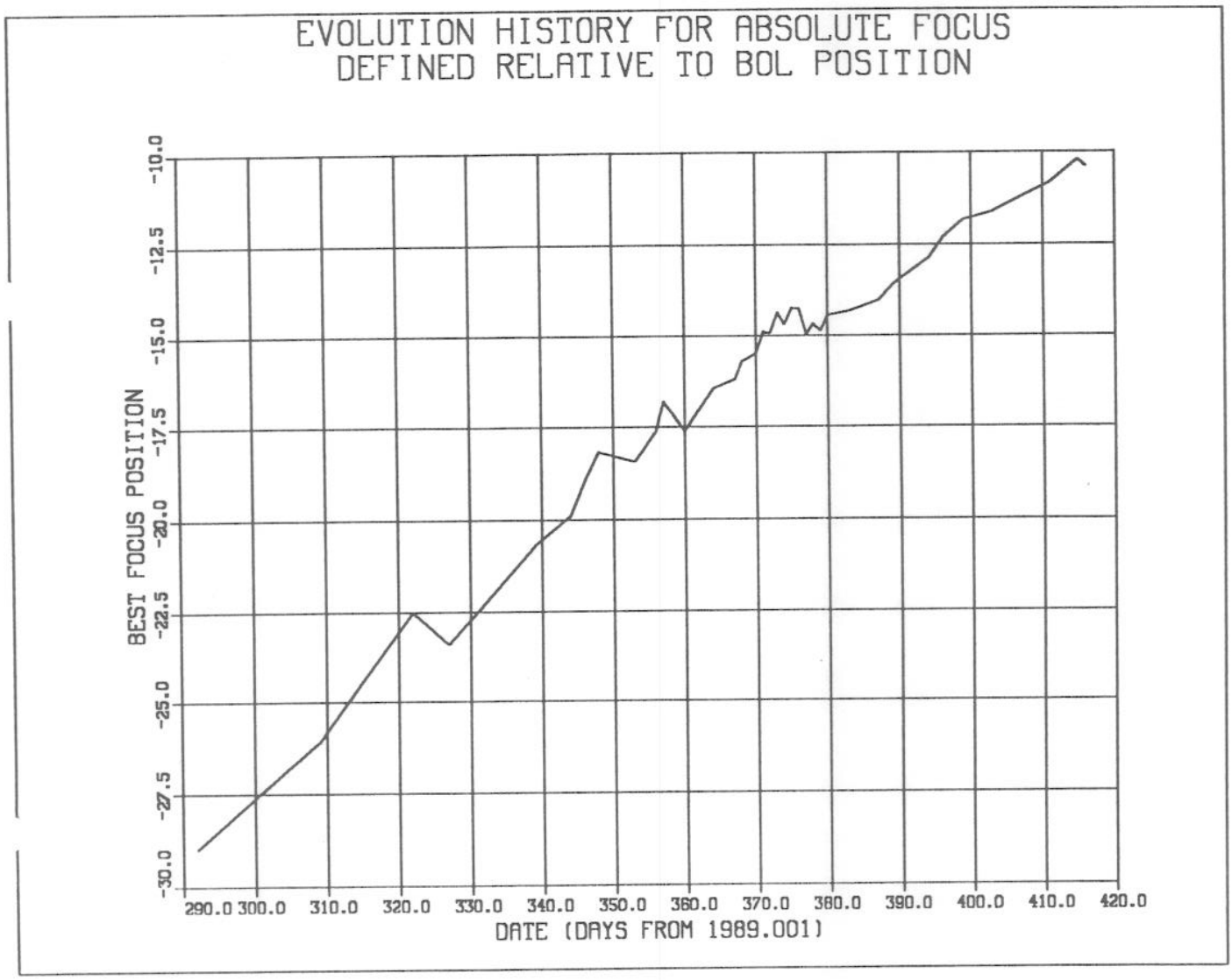
Focus Evolution

- **Monitored twice per week using 4 hours of IDT telemetry**
- **Graph gives distance from actual focus position to "best" focus**
- **9 moves of +1 made between 1989.346 and 1990.002**
- **Moves of +1 have no effect**
- **New strategy is to move from +1 to -1 based on least squares fit to the preceding 30 days of data**



Absolute Focus

- **Gradient dropped from 1 step/4.6 days down to 1 step/9.8 days**



IDT photometric performance

Type of stars processed:

- **S+C = photometric secondary standard and constant stars**

- **S = photometric secondary standard stars**

Normalised as % w.r.t. day 292 we have:

		Colour 1		Colour 2		Colour 3	
Date	stars	#obs.	%	#obs.	%	#obs.	%
1989.292	S+C	397	0.00	405	0.00	198	0.00
1989.301	S+C	295	-0.64	352	+1.61	85	+0.78
1989.344	S+C	572	-4.18	655	-3.31	464	-2.00
1990.003	S+C	678	-9.09	819	-1.61	447	-2.97
1990.018	S	363	-7.34	180	-4.63	48	-3.37
1990.022	S+C	2622	-8.61	1127	-4.02	631	-2.45
1990.031	S+C	976	-6.62	517	-5.43	265	-2.52
1990.038	S+C	267	-8.29	570	-4.48	319	-4.55
1990.046	S+C	399	-12.91	743	-5.14	432	-2.06

Remark - IDT piloting accuracy should have improved after day 1989.023 (uplink of grid rotation)

Linear Fit gives following degradations:

- **Col 1: -0.088 %/day**
- **Col 2: -0.055 %/day**
- **Col 3: -0.031 %/day**
- **Mean: -0.057%/day; 20.7%/year**
- **Utrecht analysis indicates -0.058%/day**
- **Predicted rate in SP1111 $11.3 (M Grenon) seems to be about -0.03%/day with a colour dependency similar to above i.e. with blue degrading faster than red**

Geometric Distortion Uplink

- **Uplink done on 1990.023 at 0653**
- **Values uplinked with 70.3125 mas resolution via a TCIDT02 command containing:**
  - $\Delta\gamma$ = **31.289 arcsecs (delta from 58 degrees)**
  - μ_p = **5.1421875 arcmins (positive rotation of grid)**
  - μ_f = **5.9343750 arcmins**
- **Verified on day 1990.023 via offset calibrations**
- **RTAD (Kalman innovations) better by factor 2.5**
- **Transverse offset residuals after uplink:**

```
        +------+------+------+        +------->G
Pfov:   !-0.09 !-0.16 !-0.24 !        !
Ffov:   !-0.49 !-0.42 !-0.59 !        !
        +------+------+------+        v
        ! 0.06 ! 0.07 ! 0.25 !        H
        !-0.21 !-0.07 ! 0.05 !
        +------+------+------+
        !-0.14 ! 0.06 ! 0.10 !
        ! 0.14 ! 0.35 ! 0.86 !
        +------+------+------+
```

- **Longitudinal offsets:**

```
        +------+------+------+        +------->G
Pfov:   ! 0.08 !-0.03 !-0.44 !        !
Ffov:   ! 0.02 !-0.05 !-0.17 !        !
        +------+------+------+        v
        ! 0.09 !-0.14 !-0.61 !        H
        ! 0.06 !-0.11 !-0.66 !
        +------+------+------+
        ! 0.01 !-0.27 !-0.86 !
        ! 0.41 !-0.34 !-1.60 !
        +------+------+------+
```

- **Combined bias:**

```
        +------+------+------+        +------->G
Pfov:   ! 0.12 ! 0.16 ! 0.50 !        !
Ffov:   ! 0.49 ! 0.42 ! 0.61 !        !
        +------+------+------+        v
        ! 0.11 ! 0.16 ! 0.66 !        H
        ! 0.22 ! 0.13 ! 0.66 !
        +------+------+------+
        ! 0.14 ! 0.28 ! 0.87 !        All values in arcsec
        ! 0.43 ! 0.49 ! 1.82 !
        +------+------+------+
```

- **Mean bias is 0.46 arcseconds**

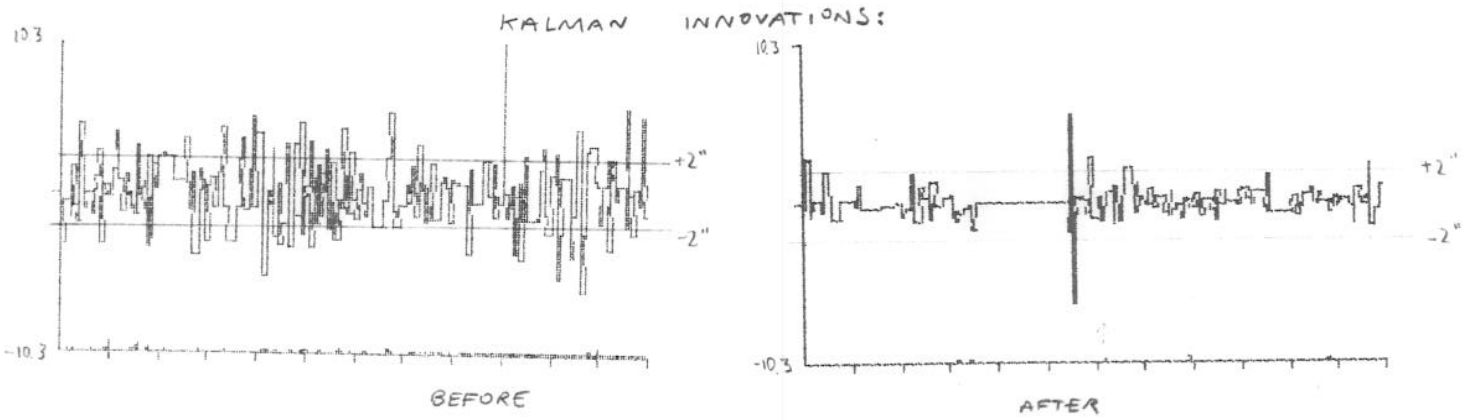
Scale Factor

- **Final effect to be compensated for is grid scaling factor**
- **Found to be 1.00054 by the DRC**
- **Incorporated into CCCM on day 1990.033 (changed origin and mesh-size but only by a small amount)**
- **Used to modify SM slit positions used on-board (20/02/90 - DAY 051)**

  1st impression - innovations seem lower
- **Should improve RTAD and IDT piloting**
- **Is it necessary to use several hours of IDT data collecting observations on dummy stars in order to verify that the piloting is improved?**

In addition,

- **On-ground slit spacing value changed to 1.207468 arcsecs**
- **M1 estimates improved, mean M1 = 0.73**
- **M2 estimates improved, mean M2 = 0.26**
- **October 1989 refocusing telemetry was re-reduced**
- **New (better) focus curves now used in ESOC**

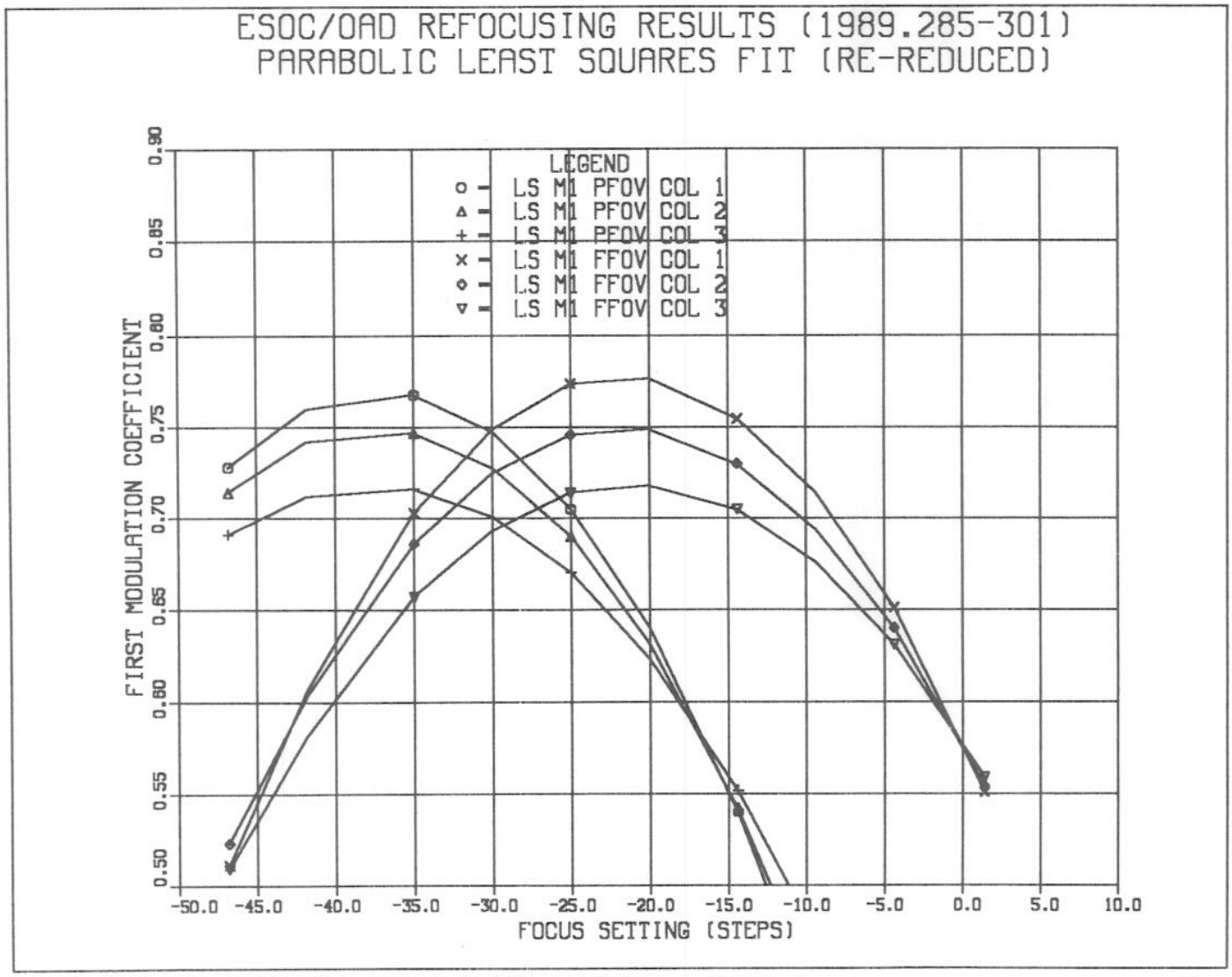


Refitted Focus Curves

- **Focus curves now used in ESOC:**
  - **the quality of the fit is greatly improved - mainly due to the compensation for drift over the calibration period**
  - **we obtain the following 6 sets of coefficients for M1 as a function of focus offset, f**

$$M1(f) = A + B.f + C.f^{**}2$$

Fov.	Col.	-------A----------	B----------	C----------
P	1	7.41101365E-01	-7.21051487E-03	-4.47930403E-04
P	2	7.22299742E-01	-6.56690064E-03	-3.94722652E-04
P	3	6.95948214E-01	-5.28535296E-03	-3.13455533E-04
F	1	7.55627737E-01	6.18434021E-03	-4.24534802E-04
F	2	7.30971644E-01	5.23519342E-03	-3.63295760E-04
F	3	6.98509161E-01	5.02213910E-03	-3.15731762E-04



Payload Monitoring (PAYMON)

- New VAX computer installed as HDCS in early January; much more powerful than old computer
- Payload Monitoring now running continuously
- Attempts 1 IDT/ 1 SM observation per minute during AOS periods
- Priority of star selection:

  1. large amplitude variables
  2. photometric standard and constant stars
  3. other single stars
  4. the brighter the star, the higher the priority

- On average, 850 good observations/day on IDT
- Slightly less, approx. 600/day for star mapper observations
- Regular post-processing of the results:

  - 1/week long term report generated and put on the DRC tapes
  - 1/month report on large amplitude variables generated and sent to INCA

- Ad-hoc monitoring done on request:

  - minor planet observations
  - stars of special interest (e.g. Sirius on March 8th)
  - investigations of anomalies

Monitoring of RTAD convergence via PAYMON

- Payload monitoring probably best way that ESOC can provide data that indicates when good IDT data is being received

- One star/minute of IDT monitored

- Marked for quality (I0 and M1):

  0, GOOD, delta I0 < 1 mag
  1, SUSPECT, delta I0 < 2 mag
  2, BAD, delta I0 < 3 mag
  3, CATASTROPHIC, delta I0 > 3 mag
  NB: (faint stars have more relaxed limits)

- 1 mag is approx. 40% of nominal signal which is at about 17 arcseconds according to IFOV profile

- Once per week ESOC could produce log of all monitoring and send to DRC. Records (1 line/star) would contain (as minimum):

  - UTC of observation
  - INCA id of star
  - FOV identifier
  - Quality indicator (0..3)
  - Observed I0, M1, M2
  - INCA H-mag and Observed H-mag

- This file provides most comprehensive information on quality of the IDT observations

- Possible problems:

  1. No guarantee PAYMON always running on HDCS
  2. Until early 1990, this was not the case; only 1 star approx every 5 minutes and some missing orbits
  3. Can only tell when RTAD within about 17 arcseconds
  4. Can get 'bad' observations when RTAD converged (e.g. veiling glare); and 'good' observations when diverged (e.g. pure luck)

Example of PAYMON file for variable stars

UTC	INCA	B	B-V	#	QUAL		IØ	M1	M2	Hest	Hpred
1990:050:00.05.51.688	703	11.874	1.770	384	0	1	159.375	0.590	0.074	11.857	9.475
1990:050:02.13.51.689	703	11.874	1.770	384	0	1	187.500	0.295	0.043	11.695	9.474
1990:050:06.22.51.330	65166	11.532	2.630	384	0	1	5577.438	0.669	0.154	8.067	8.772
1990:050:21.25.06.759	25412	14.028	1.770	640	0	1	744.375	0.612	0.205	10.183	11.598
1990:050:21.45.54.761	25412	14.027	1.770	1680	0	1	782.857	0.566	0.073	10.016	11.598
1990:050:23.33.15.291	25412	14.025	1.770	1408	0	1	756.818	0.651	0.067	10.142	11.596
1990:050:23.53.52.621	25412	14.025	1.770	768	0	1	762.500	0.536	0.120	10.138	11.595
1990:051:00.14.10.750	5746	8.914	1.770	1024	1	1	5230.782	0.622	0.147	8.095	7.195
1990:051:00.34.52.346	5746	8.914	1.770	1280	0	1	4968.750	0.669	0.209	8.130	7.194
1990:051:01.41.17.392	25412	14.022	1.770	1408	0	1	824.148	0.569	0.112	10.049	11.593
1990:051:02.22.17.109	5746	8.912	1.770	384	0	1	4748.250	0.673	0.220	8.160	7.192
1990:051:02.42.58.699	5746	8.911	1.770	2560	3	1	5115.853	0.619	0.145	8.038	7.192
1990:051:06.38.17.063	5746	8.906	1.770	256	1	1	4970.391	0.707	0.161	8.060	7.187
1990:051:08.46.19.226	5746	8.904	1.770	256	0	1	4599.891	0.646	0.192	8.036	7.184
1990:051:11.45.07.745	69816	12.320	1.770	256	0	1	4153.969	0.537	0.023	8.337	9.880

Example of PAYMON file for variable stars

ANNEX X
UTRECHT

Table 1: Geometric calibrations

Date	Basic angle - 58°	Scale factor		Rotation	
		preceding	following	preceding	following
05-Nov-89	31254.4 (.2)	-871	-870	-2425	-2799
09-Dec-89	31252.1 (.3)	-864	-858	-2421	-2793
15-Jan-90	31250.1 (.3)	-861	-854	-2427	-2783
22-Jan-90	31248.7 (.3)	-863	-854	-2427	-2784
29-Jan-90	31248.7 (.3)	-864	-855	-2427	-2785

(.5)

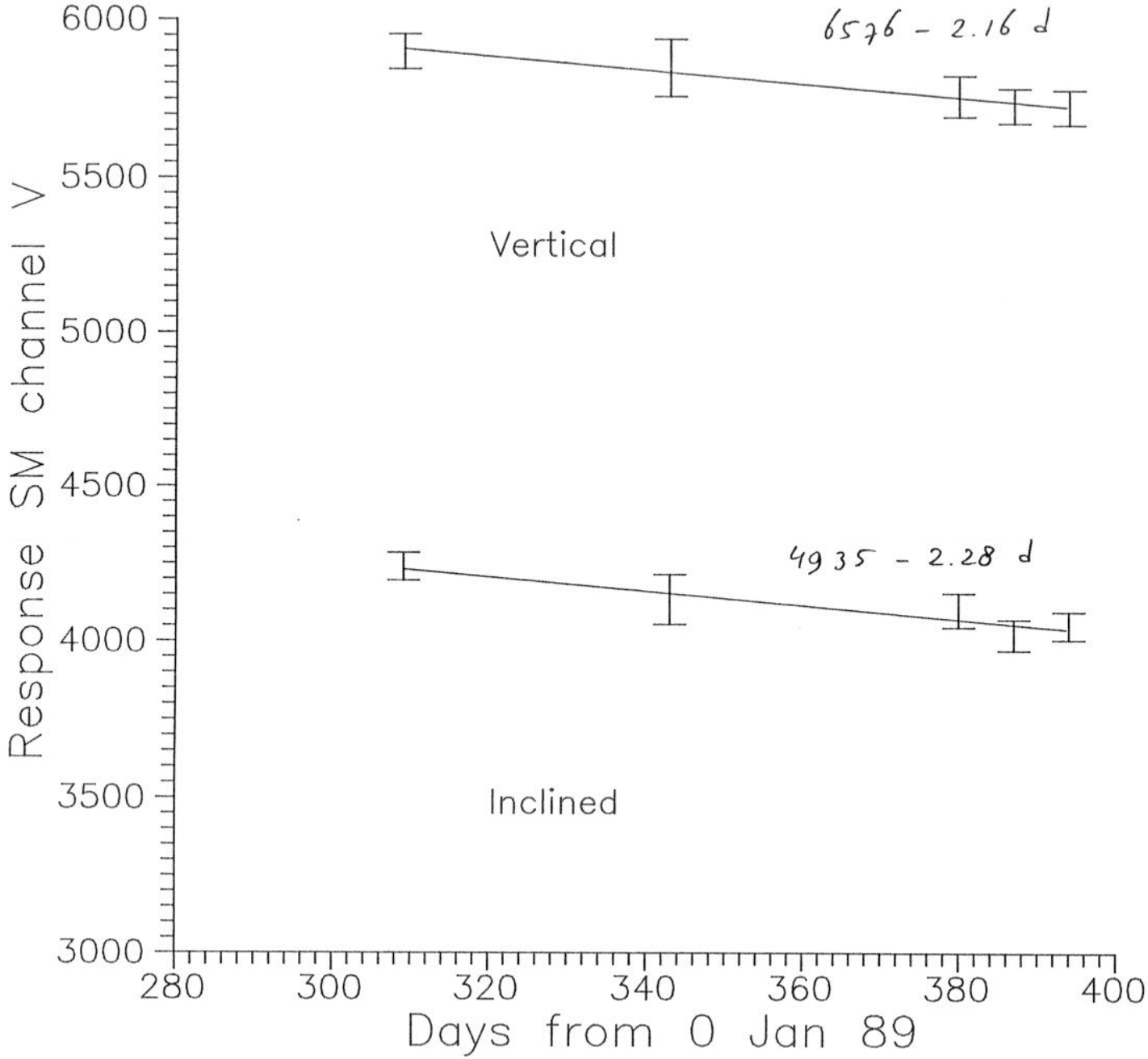
Table 2: Photometry IDT

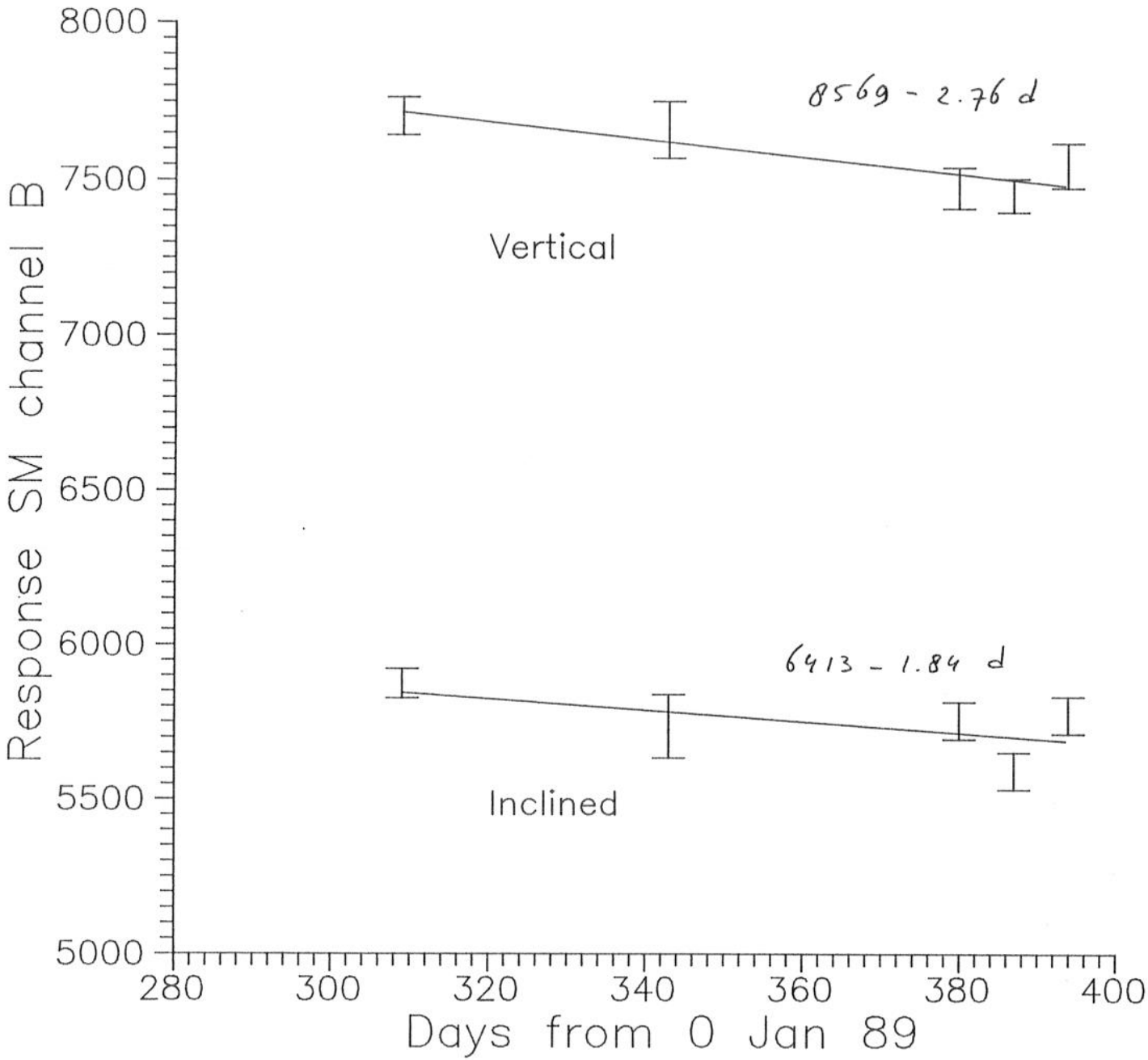
Date	Response	M_1		M_2	
	($m_H = 9$)	preceding	following	preceding	following
05-Nov-89	2200 (7)	0.742	0.693	0.253	0.241
09-Dec-89	2160 (5)	0.723	0.722	0.250	0.254
15-Jan-90	2110 (5)	0.703	0.738	0.241	0.261
22-Jan-90	2130 (5)	0.709	0.735	0.244	0.257
29-Jan-90	2115 (5)	0.715	0.734	0.243	0.259

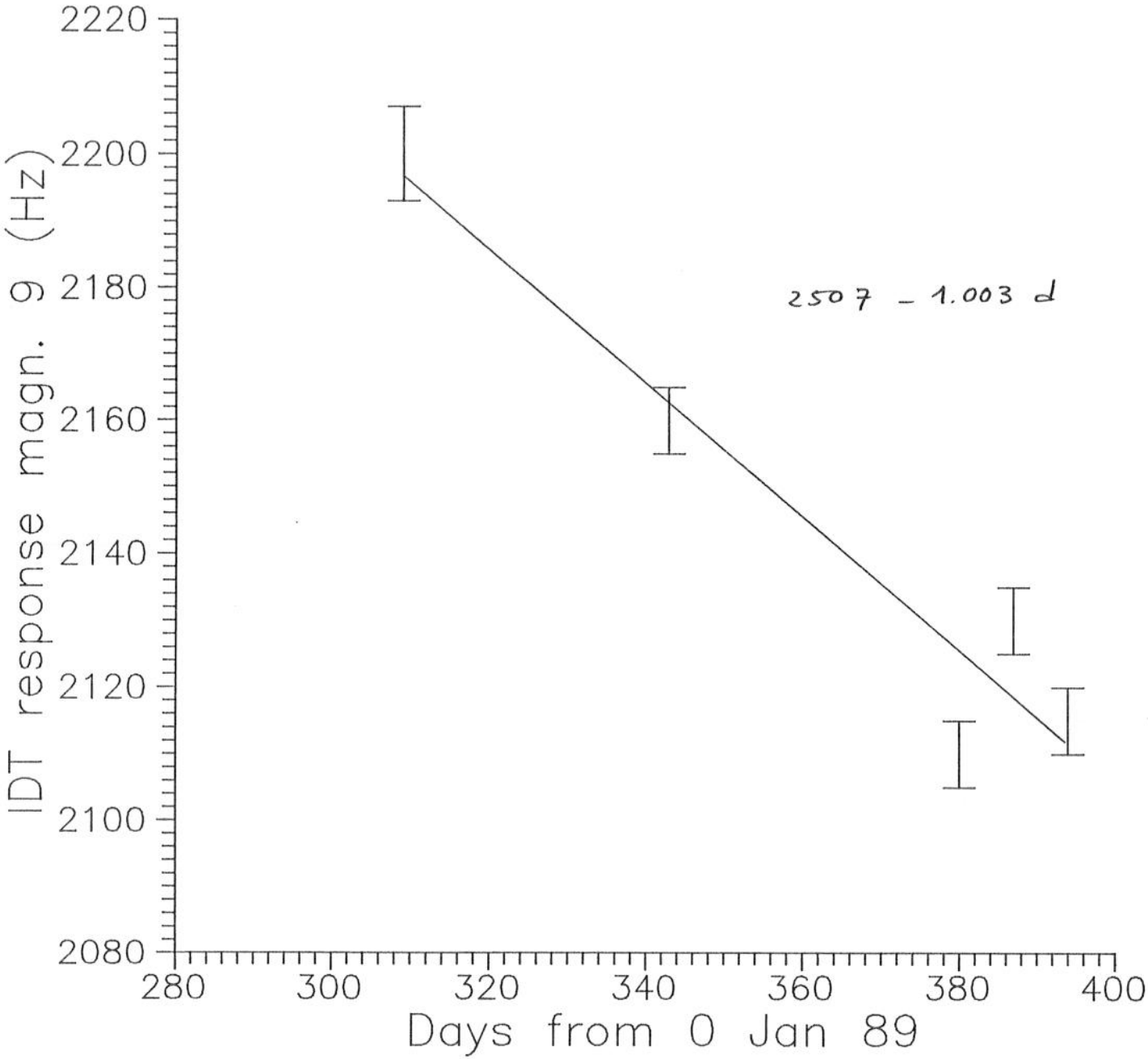
(.001)

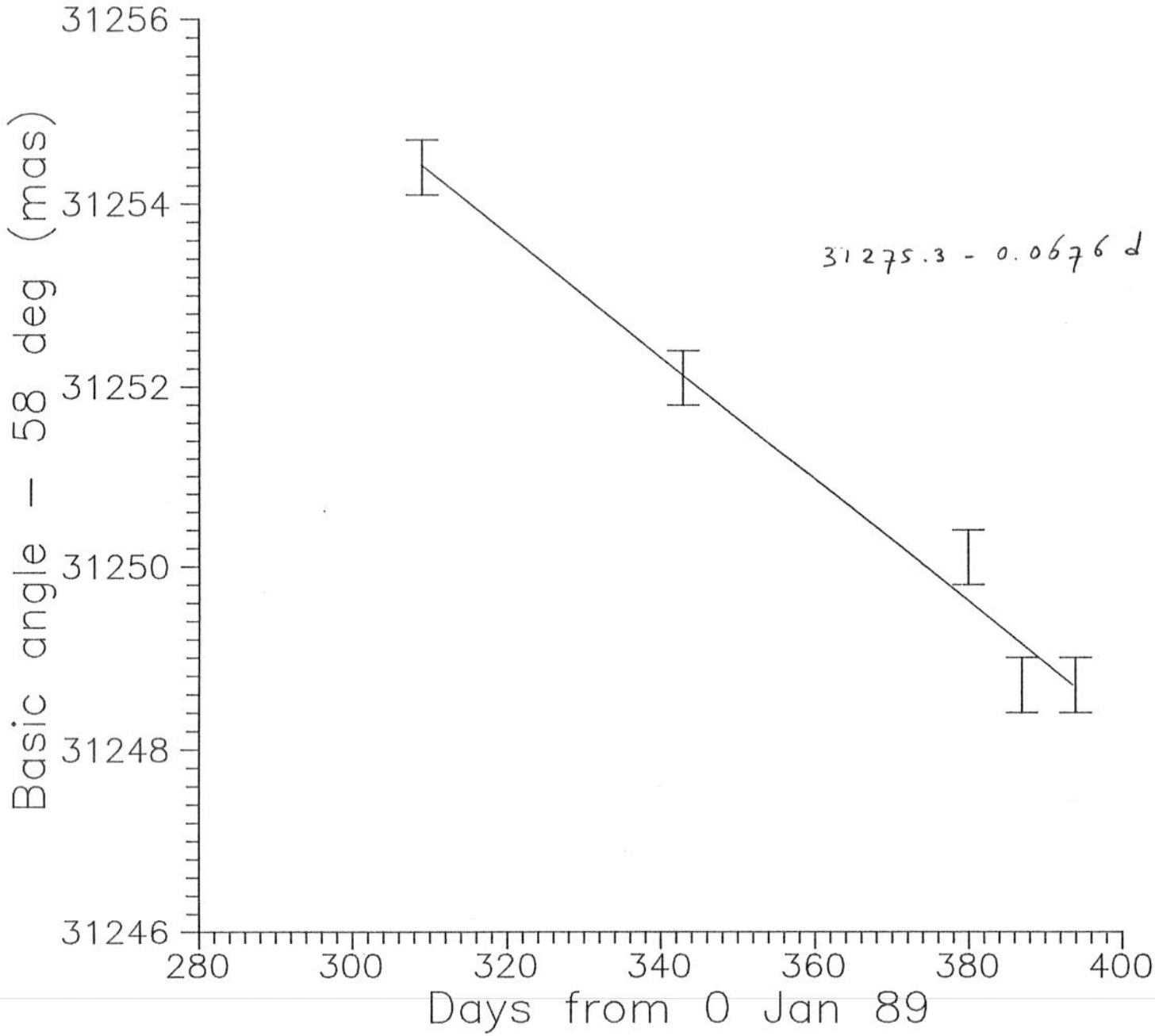
Table 3: Photometry SM

Date	Vertical		Inclined	
	B	V	B	V
05-Nov-89	7704 (60)	5900 (55)	5874 (48)	4240 (45)
09-Dec-89	7662 (90)	5850 (90)	5736 (102)	4135 (80)
15-Jan-90	7476 (66)	5760 (65)	5754 (60)	4100 (55)
22-Jan-90	7452 (54)	5730 (55)	5592 (60)	4020 (50)
29-Jan-90	7548 (72)	5725 (55)	5772 (60)	4050 (45)


6576 - 2.16 d
Vertical
4935 - 2.28 d
Inclined
Response SM channel V
6000
5500
5000
4500
4000
3500
3000
280
300
320
340
360
380
400
Days from 0 Jan 89


8000
7500
7000
6500
6000
5500
5000
Response SM channel B
8569 - 2.76 d
Vertical
6413 - 1.84 d
Inclined
280
300
320
340
360
380
400
Days from 0 Jan 89

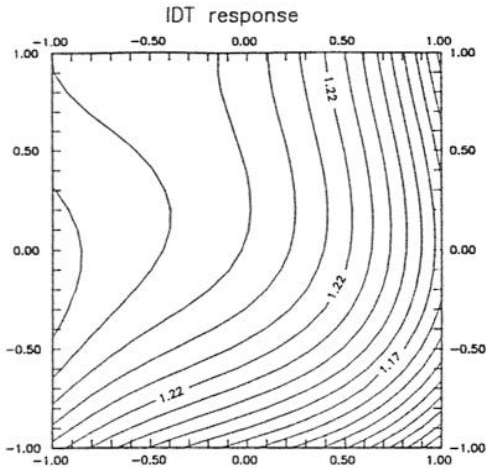

2220
2200
2180
2160
2140
2120
2100
2080
IDT response magn. 9 (Hz)
280
300
320
340
360
380
400
Days from 0 Jan 89
2507 - 1.003 d


31256
31254
31252
31250
31248
31246
Basic angle - 58 deg (mas)
280
300
320
340
360
380
400
Days from 0 Jan 89
31275.3 - 0.0676 d

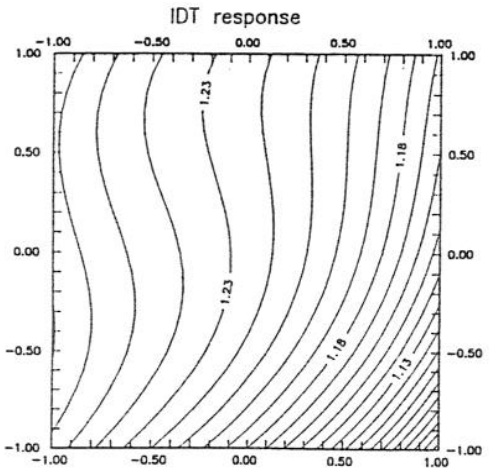
199
5-Nov-89

277
9-Dec-89

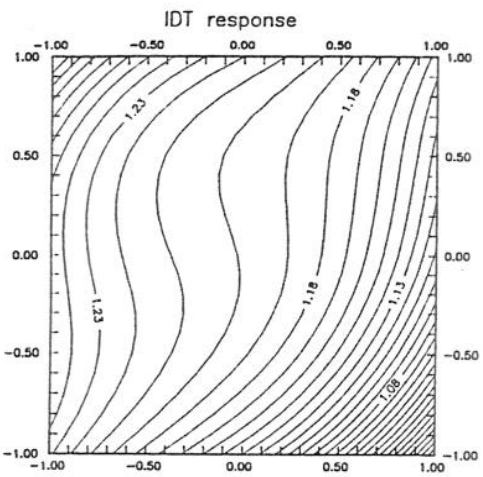
359
15-Jan-90



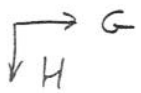
1.249



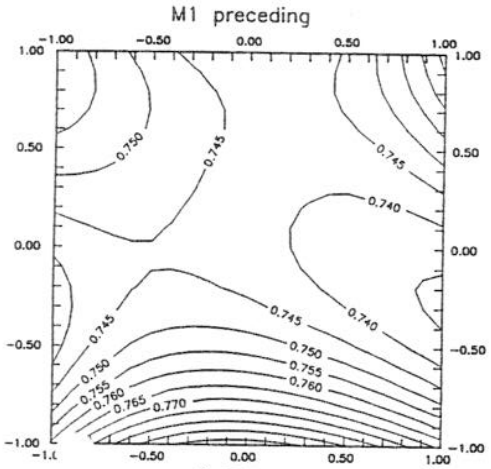
1.228



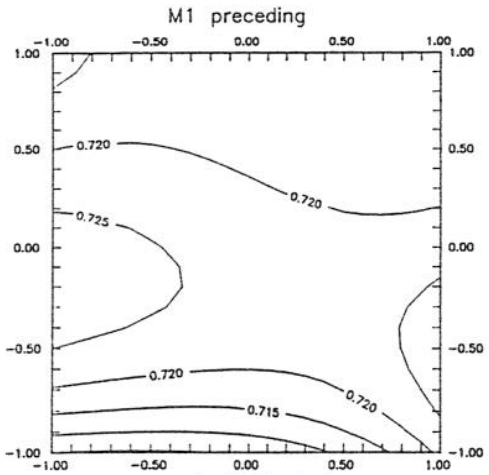
1.199



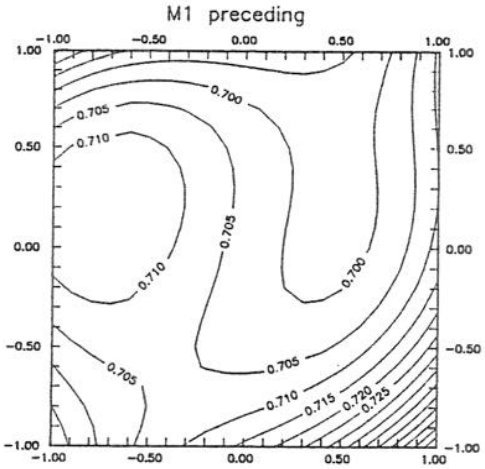
B-V = 0.5



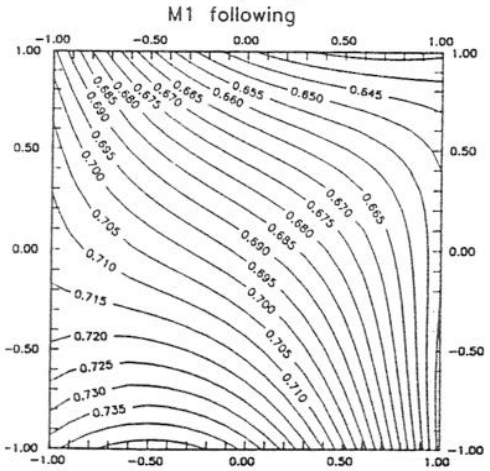
0.742, 0.253



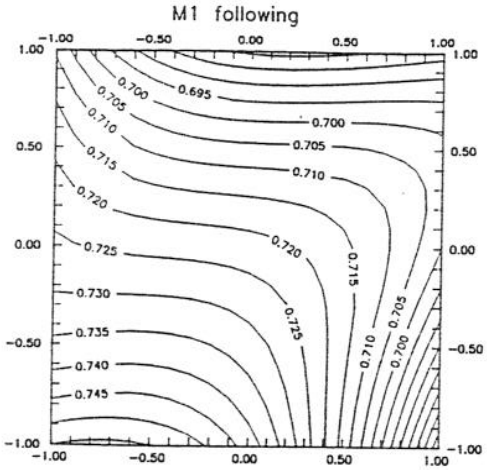
0.723, 0.250



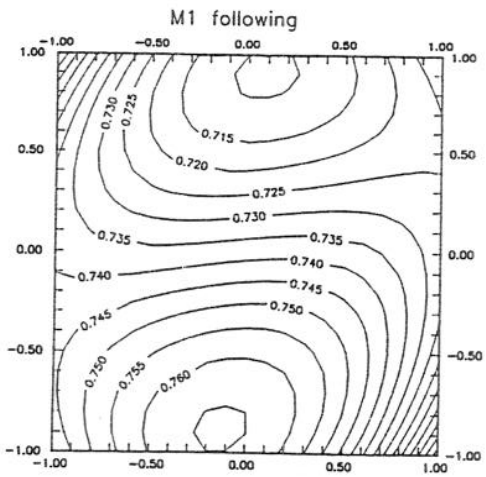
0.703, 0.241



0.693, 0.261



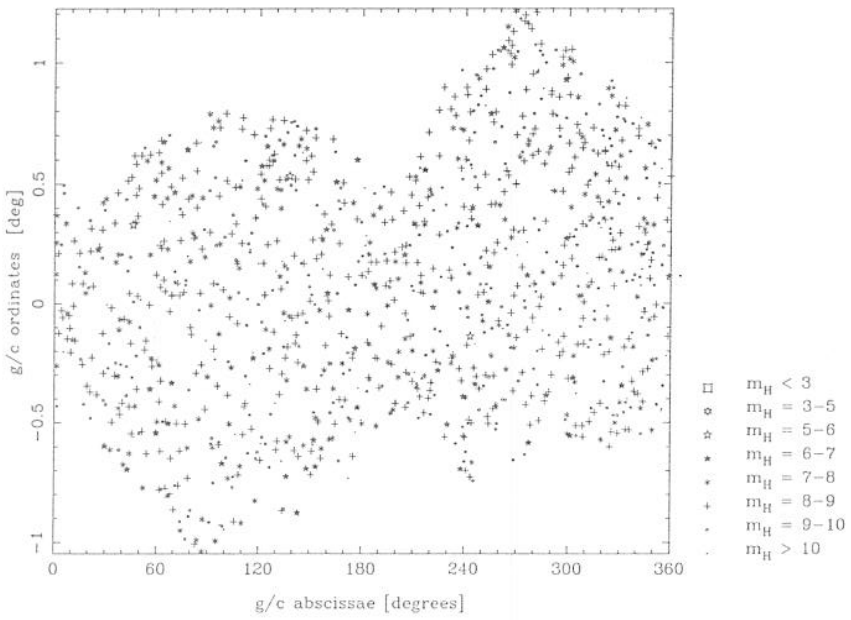
0.722, 0.254



0.738, 0.261

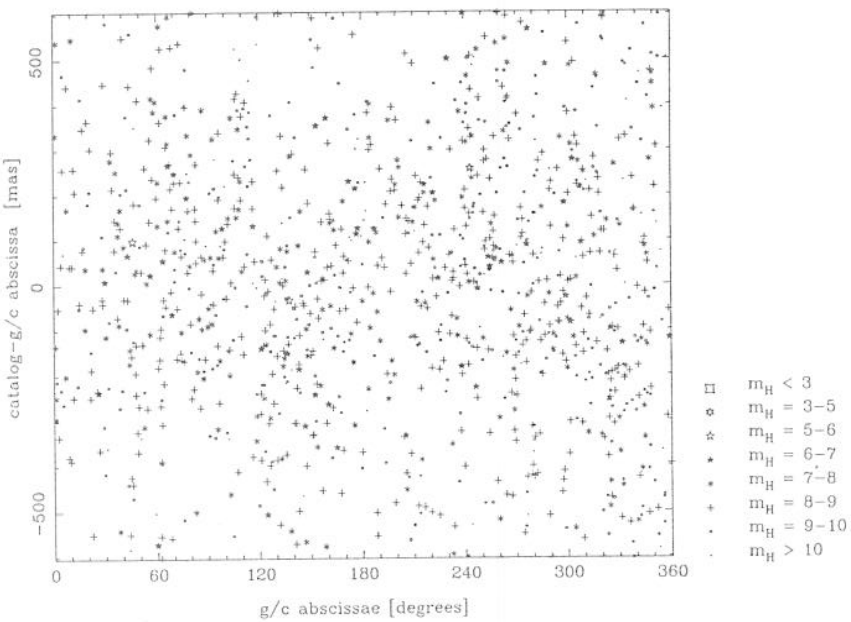
ANNEX XI

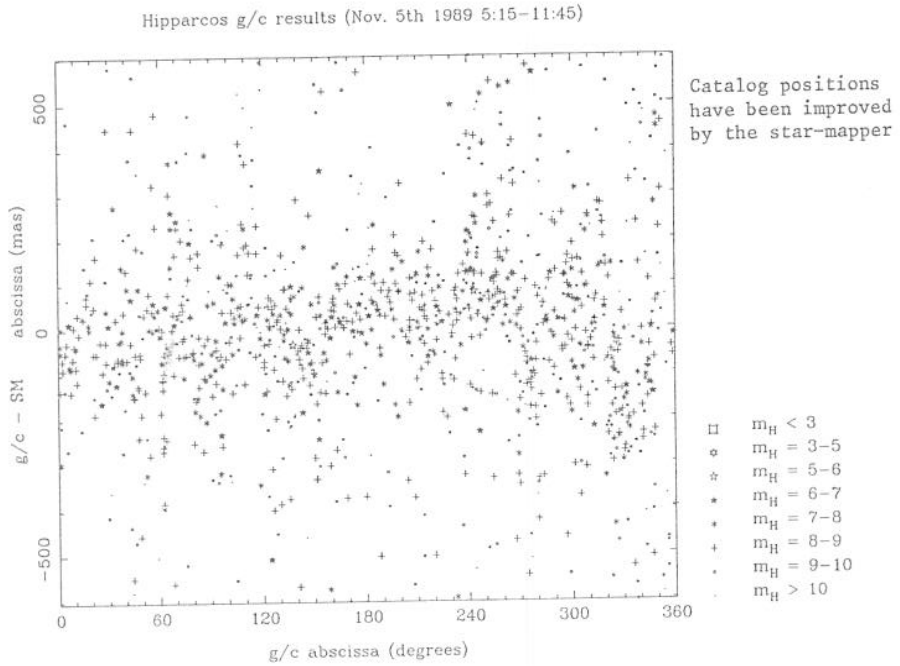
Hipparcos g/c results (Tape 3)



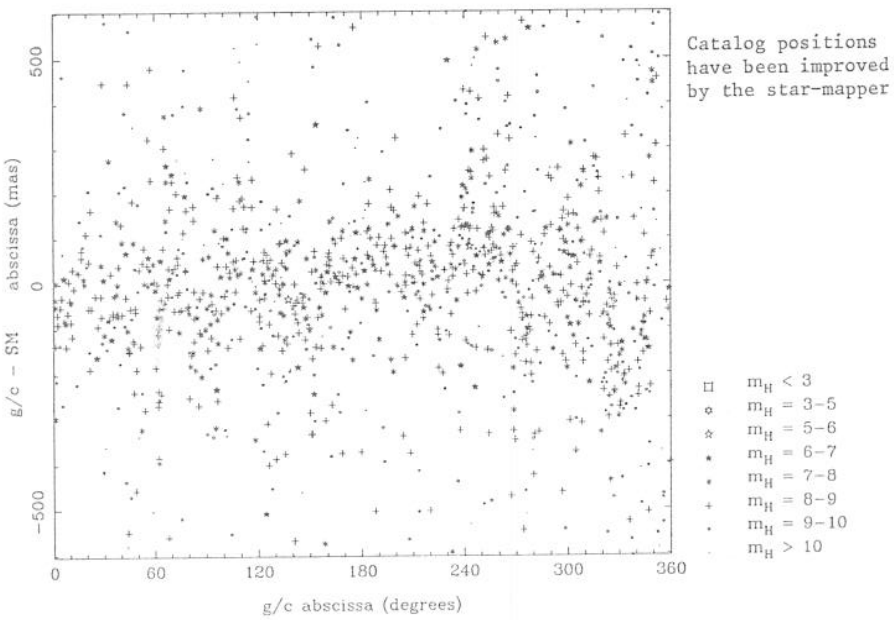
ANNEX XI

Hipparcos g/c results (Tape 3)

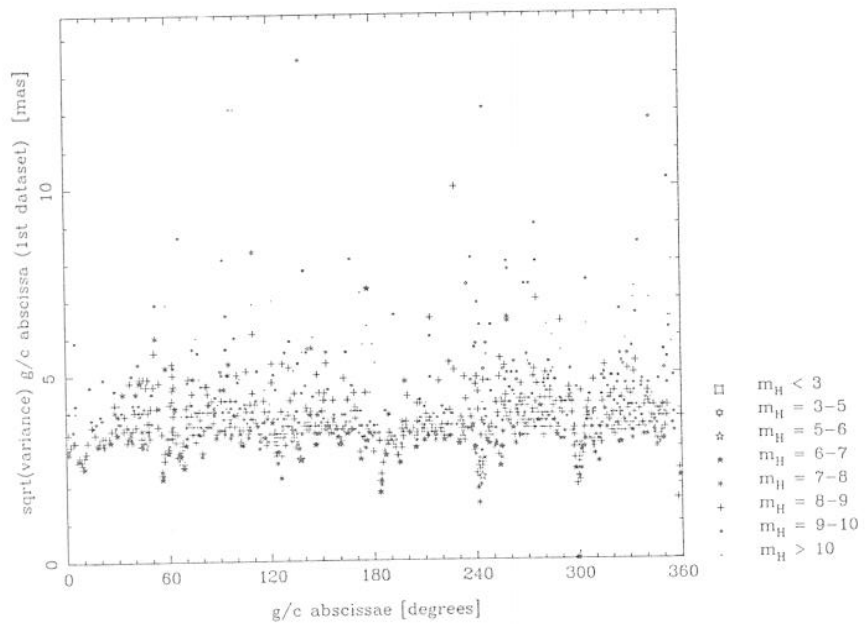


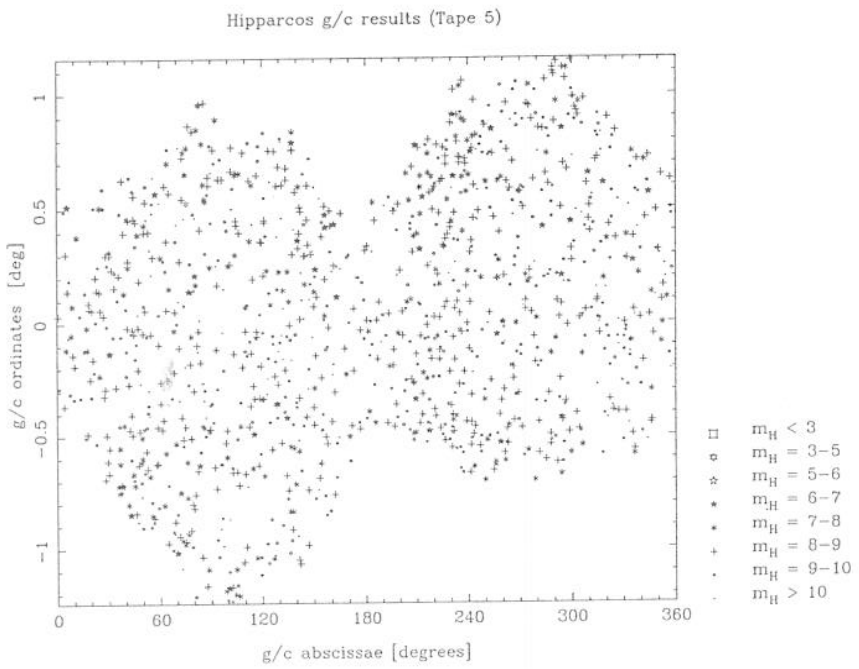

Hipparcos g/c results (Nov. 5th 1989 5:15–11:45)
Catalog positions
have been improved
by the star-mapper
g/c − SM abscissa (mas)
500
0
−500
0
60
120
180
240
300
360
g/c abscissa (degrees)
m_H < 3
m_H = 3–5
m_H = 5–6
m_H = 6–7
m_H = 7–8
m_H = 8–9
m_H = 9–10
m_H > 10

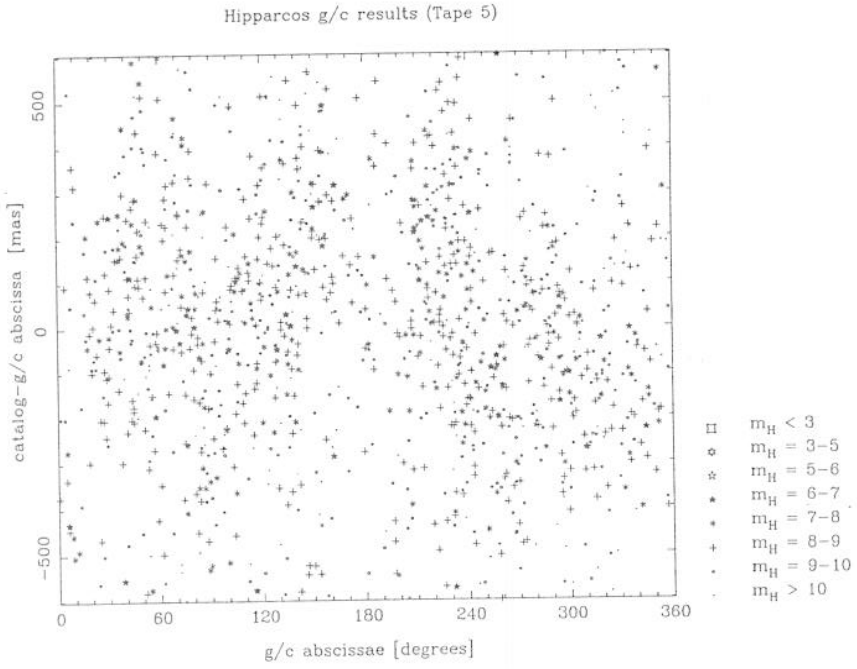
Hipparcos g/c results (Nov. 5th 1989 5:15–11:45)

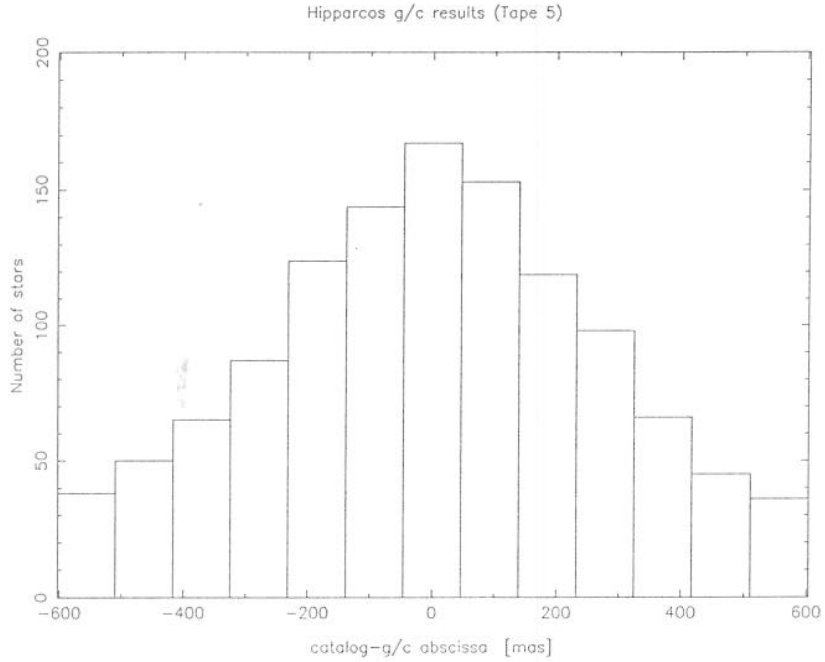


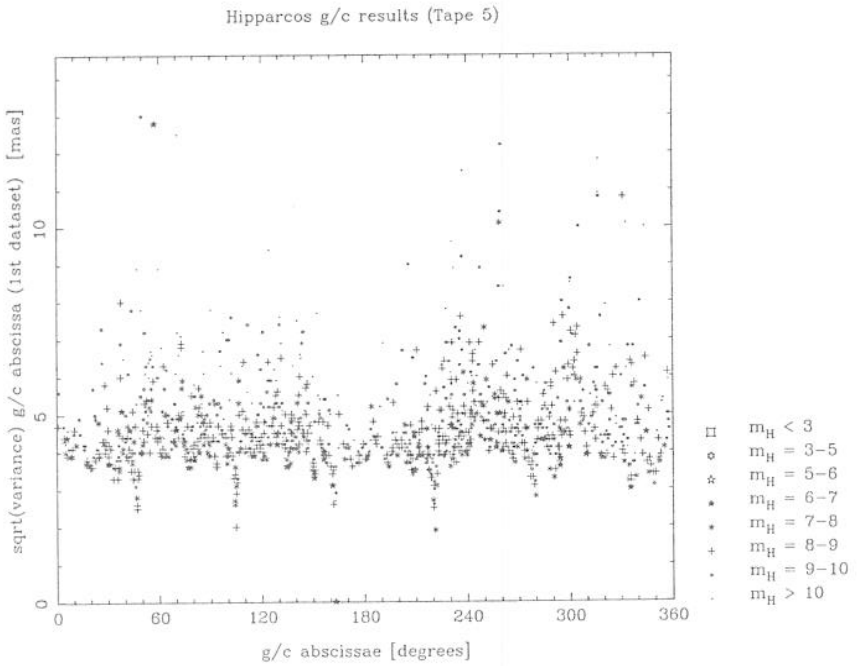
Hipparcos g/c results (Tape 3)

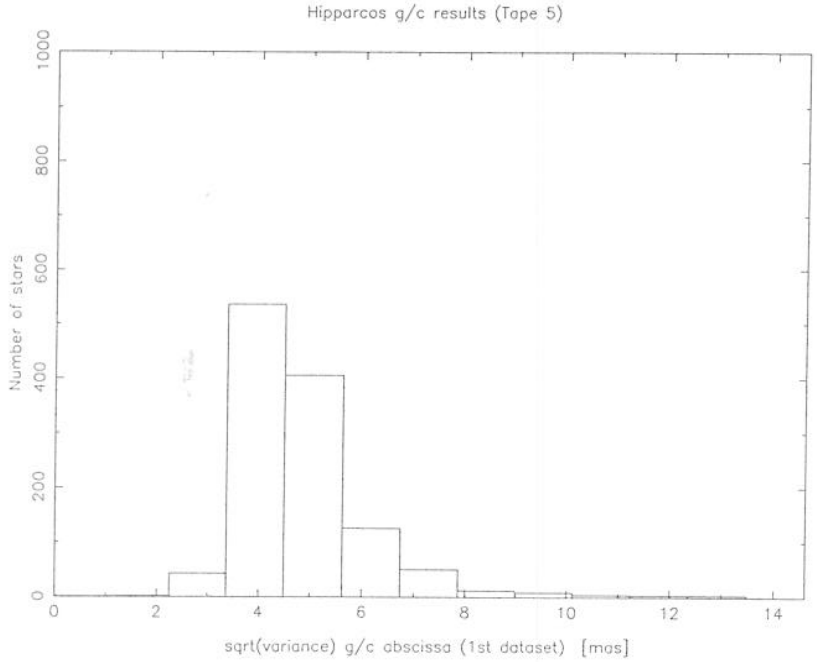


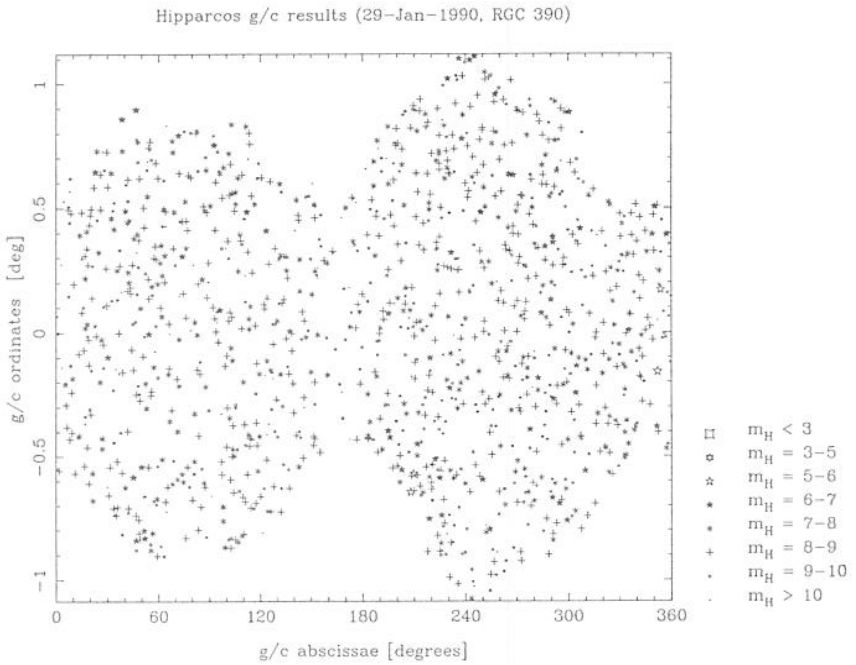

Hipparcos g/c results (Tape 5)
g/c ordinates [deg]
1
0.5
0
−0.5
−1
0
60
120
180
240
300
360
g/c abscissae [degrees]
m_H < 3
m_H = 3–5
m_H = 5–6
m_H = 6–7
m_H = 7–8
m_H = 8–9
m_H = 9–10
m_H > 10

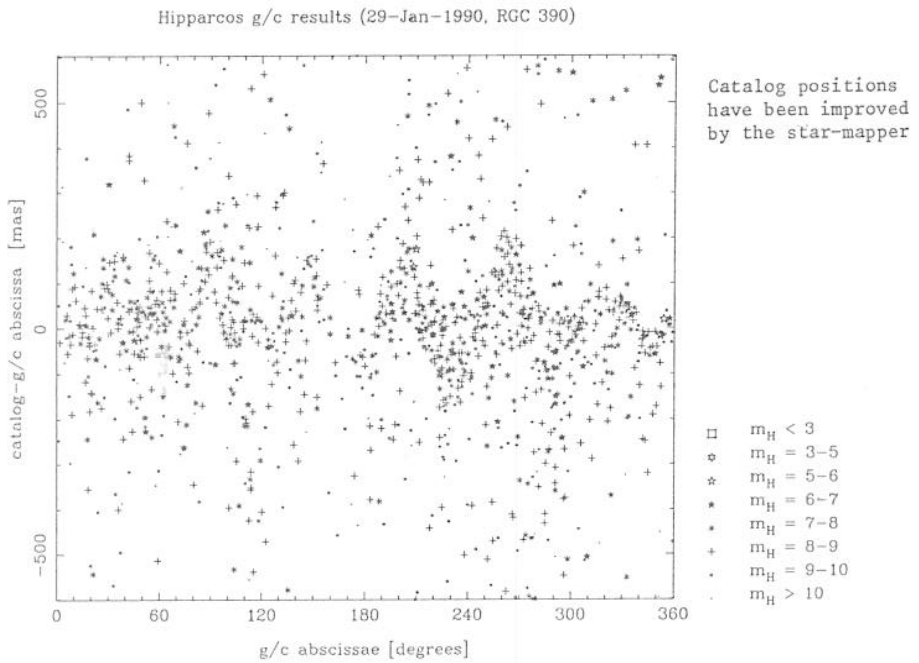

Hipparcos g/c results (Tape 5)
catalog−g/c abscissa [mas]
500
0
−500
0
60
120
180
240
300
360
g/c abscissae [degrees]
m_H < 3
m_H = 3–5
m_H = 5–6
m_H = 6–7
m_H = 7–8
m_H = 8–9
m_H = 9–10
m_H > 10

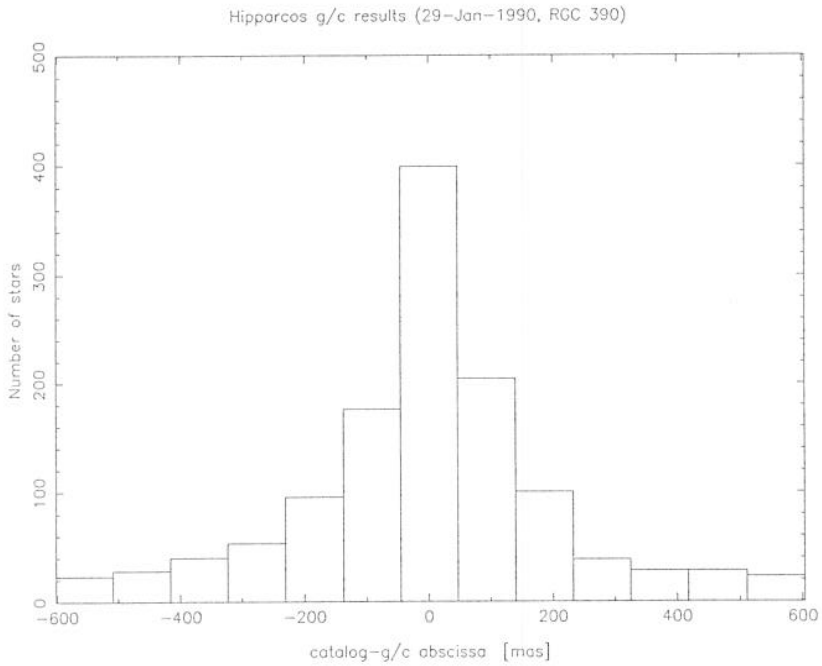

Hipparcos g/c results (Tape 5)
Number of stars
0
50
100
150
200
−600
−400
−200
0
200
400
600
catalog−g/c abscissa [mas]

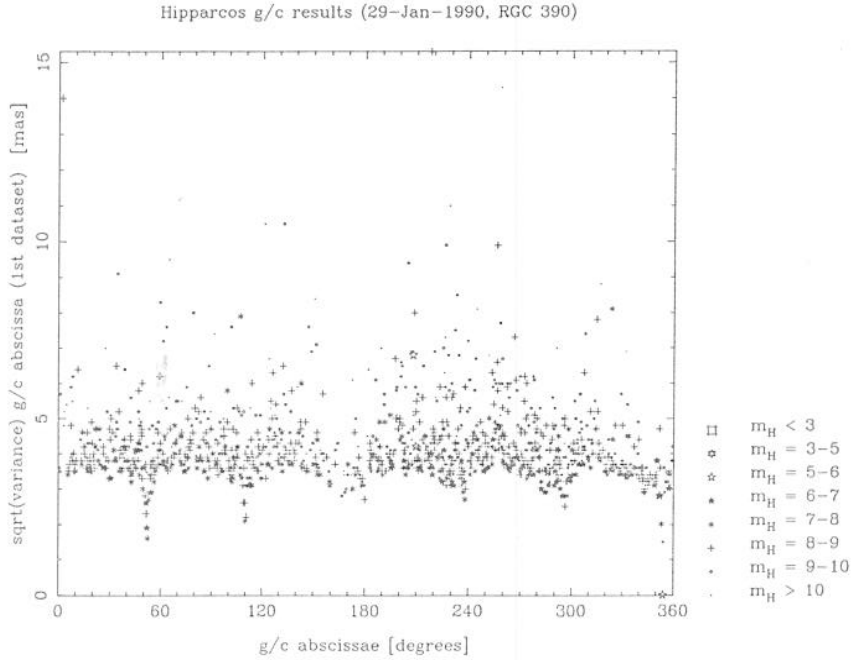

Hipparcos g/c results (Tape 5)
sqrt(variance) g/c abscissa (1st dataset) [mas]
0
5
10
0
60
120
180
240
300
360
g/c abscissae [degrees]
m_H < 3
m_H = 3−5
m_H = 5−6
m_H = 6−7
m_H = 7−8
m_H = 8−9
m_H = 9−10
m_H > 10

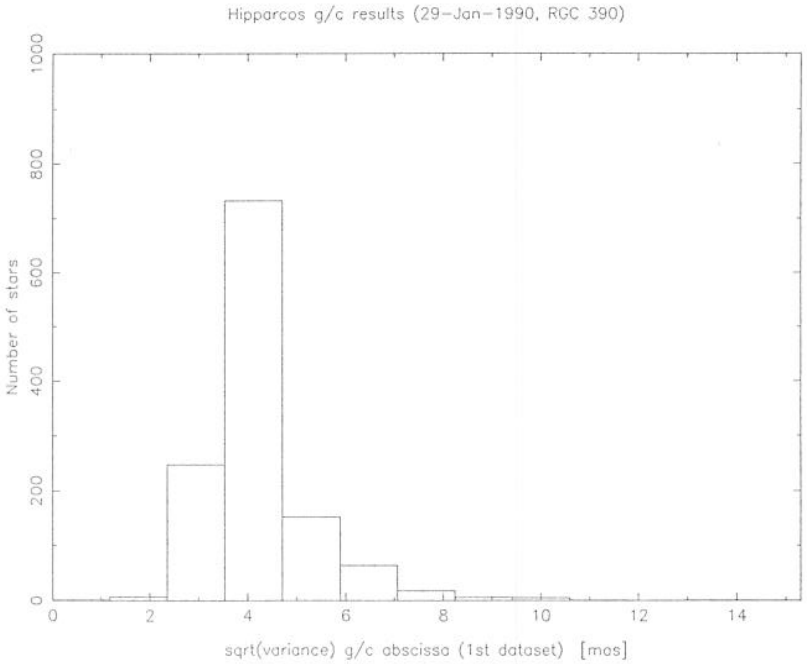

Hipparcos g/c results (Tape 5)
Number of stars
0
200
400
600
800
1000
0
2
4
6
8
10
12
14
sqrt(variance) g/c abscissa (1st dataset) [mas]


Hipparcos g/c results (29-Jan-1990, RGC 390)
g/c ordinates [deg]
1
0.5
0
-0.5
-1
0
60
120
180
240
300
360
g/c abscissae [degrees]
m_H < 3
m_H = 3-5
m_H = 5-6
m_H = 6-7
m_H = 7-8
m_H = 8-9
m_H = 9-10
m_H > 10

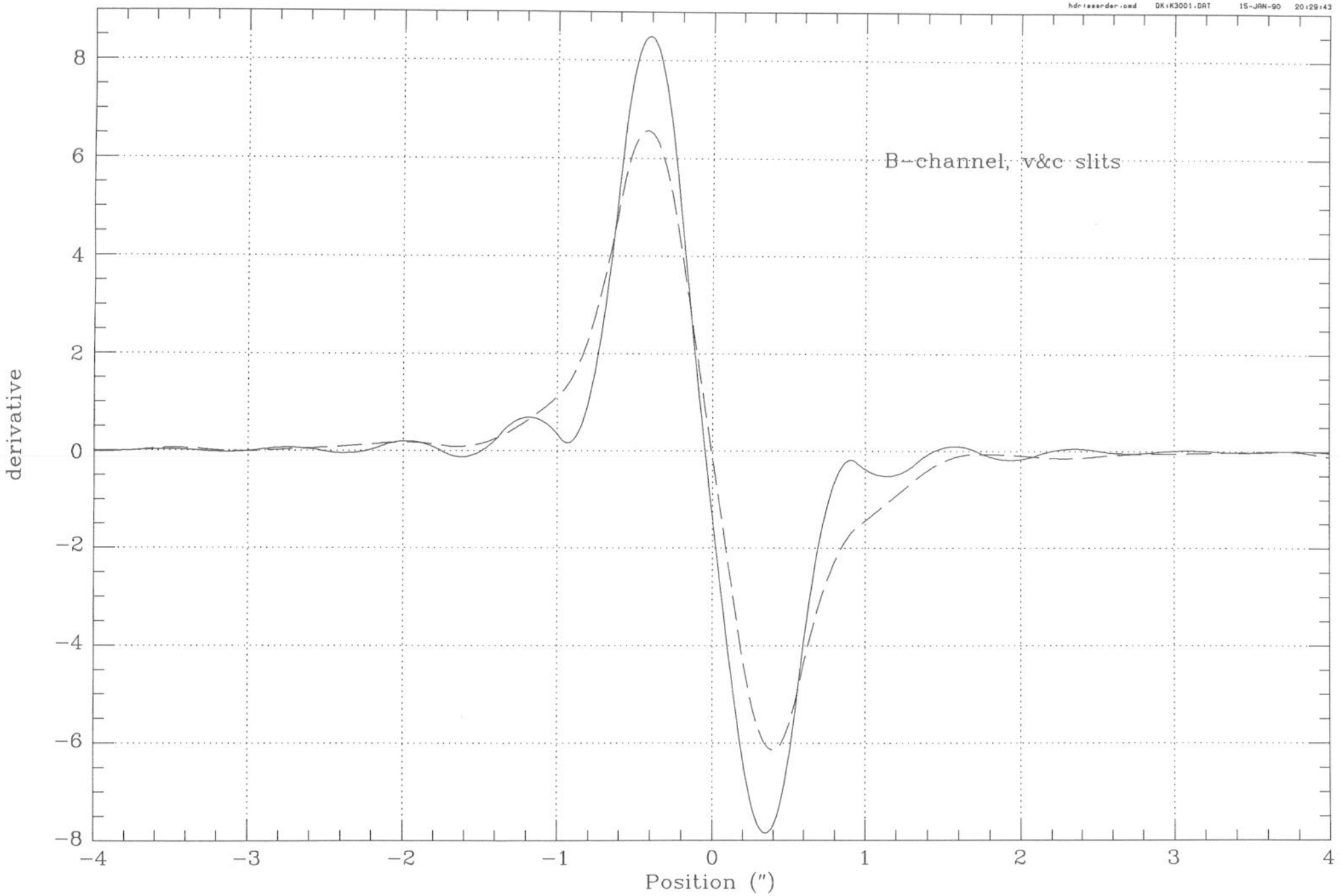

Hipparcos g/c results (29-Jan-1990, RGC 390)
catalog-g/c abscissa [mas]
500
0
-500
0
60
120
180
240
300
360
g/c abscissae [degrees]
Catalog positions
have been improved
by the star-mapper
m_H < 3
m_H = 3-5
m_H = 5-6
m_H = 6-7
m_H = 7-8
m_H = 8-9
m_H = 9-10
m_H > 10


Hipparcos g/c results (29-Jan-1990, RGC 390)
Number of stars
0
100
200
300
400
500
-600
-400
-200
0
200
400
600
catalog-g/c abscissa [mas]

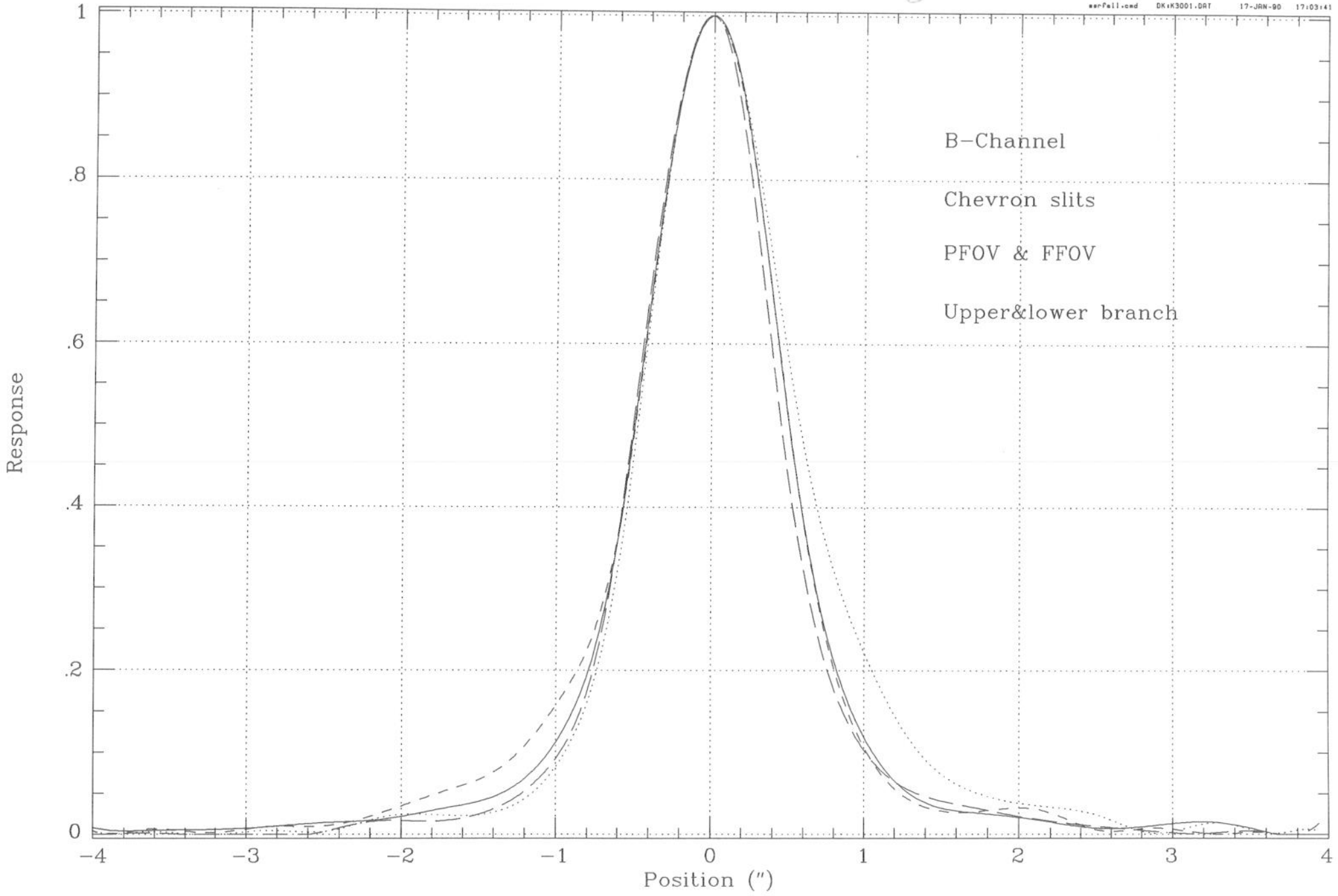

Hipparcos g/c results (29-Jan-1990, RGC 390)
sqrt(variance) g/c abscissa (1st dataset) [mas]
g/c abscissae [degrees]
0
5
10
15
0
60
120
180
240
300
360
m_H < 3
m_H = 3-5
m_H = 5-6
m_H = 6-7
m_H = 7-8
m_H = 8-9
m_H = 9-10
m_H > 10

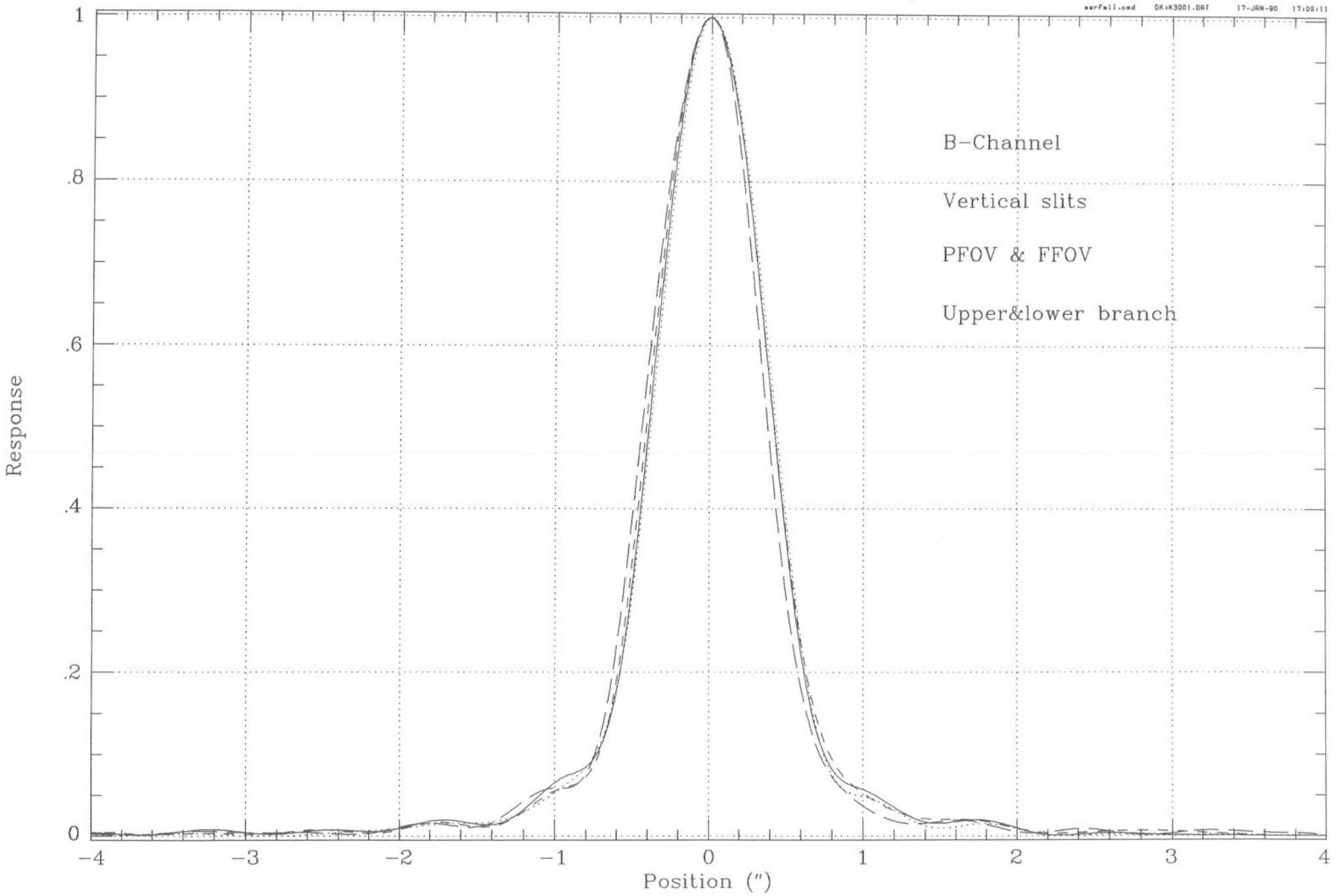

Hipparcos g/c results (29-Jan-1990, RGC 390)
Number of stars
sqrt(variance) g/c abscissa (1st dataset) [mas]
0
200
400
600
800
1000
0
2
4
6
8
10
12
14

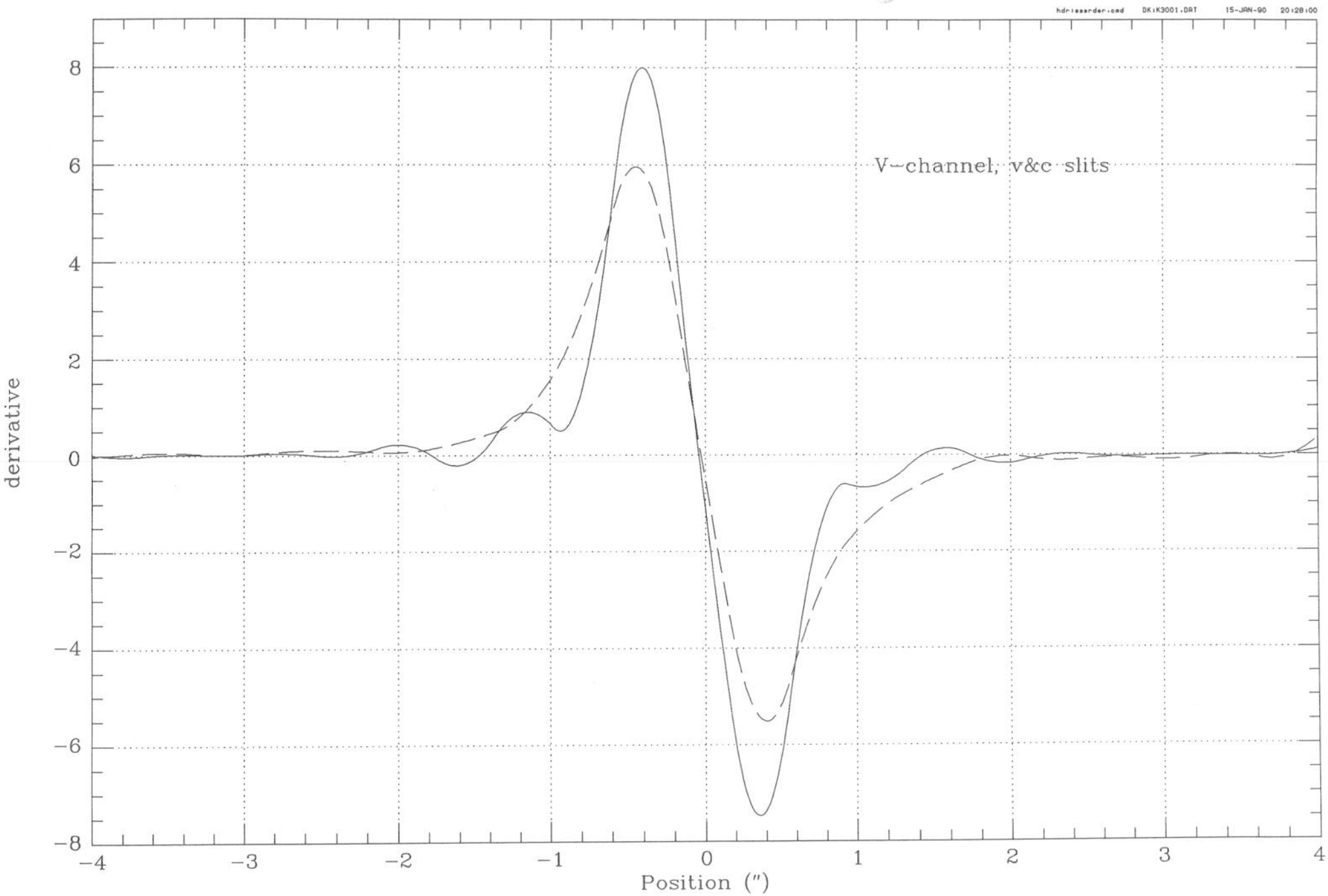
2nd it

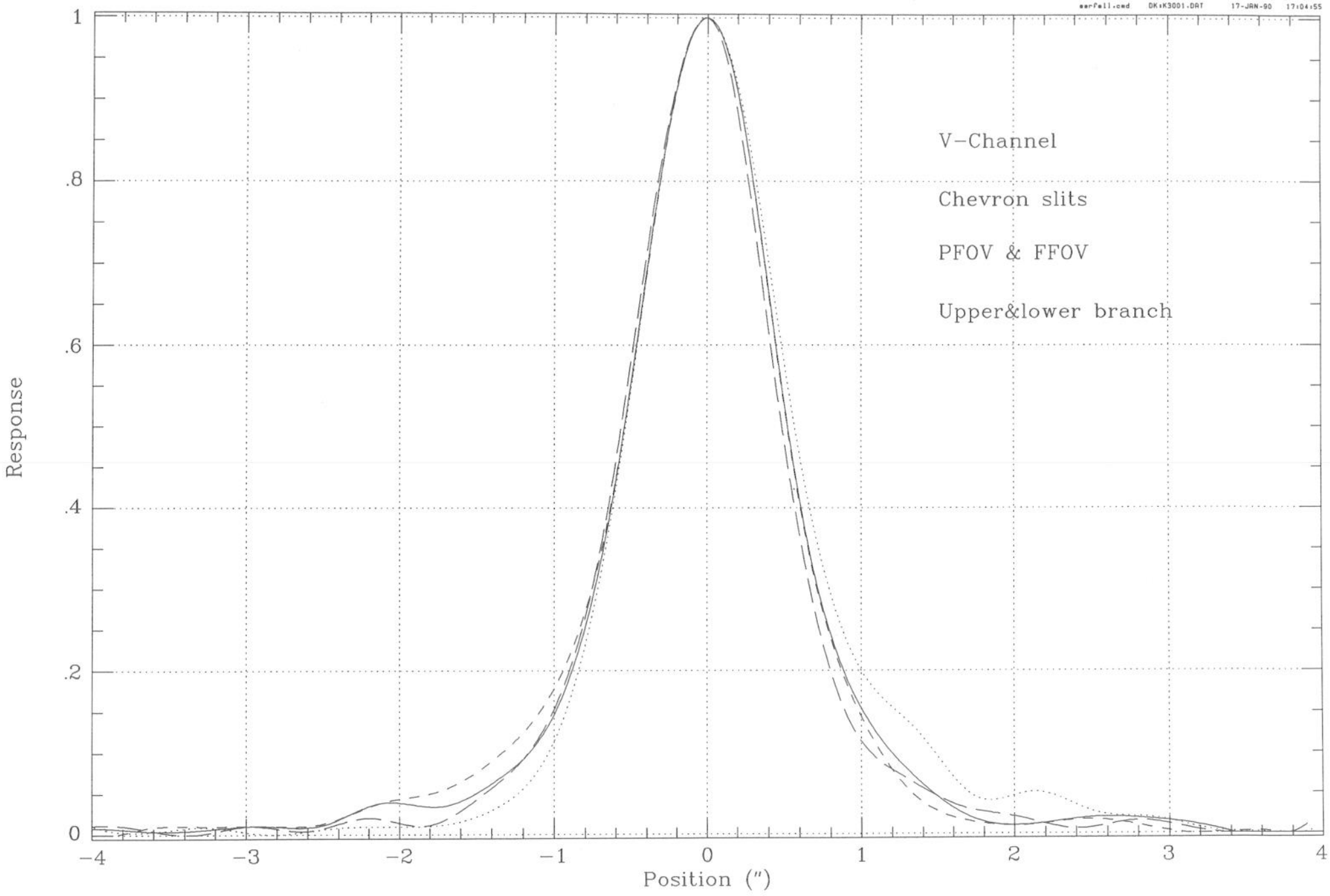


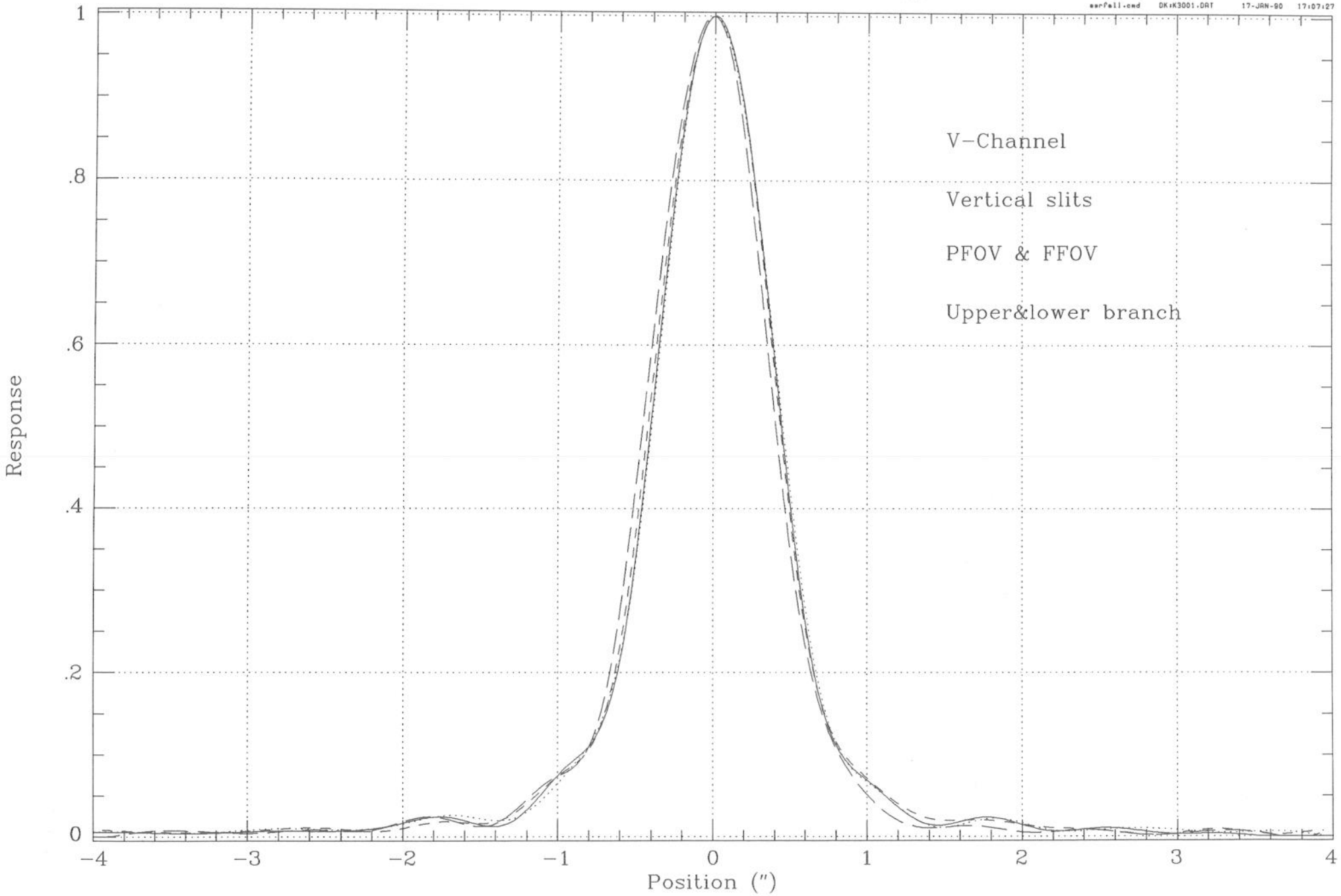
ANNEX XIII


scrfall.cmd DK:K3001.DAT 17-JAN-90 17:03:41
B-Channel
Chevron slits
PFOV & FFOV
Upper&lower branch
Response
Position (")
1
.8
.6
.4
.2
0
−4
−3
−2
−1
0
1
2
3
4


earfall.cmd DK:K3001.DAT 17-JAN-90 17:08:11
B-Channel
Vertical slits
PFOV & FFOV
Upper&lower branch
Response
Position (")
1
.8
.6
.4
.2
0
−4
−3
−2
−1
0
1
2
3
4


hdr:seander.cmd DK:K3001.DAT 15-JAN-90 20:28:00
V-channel, v&c slits
derivative
Position (")
8
6
4
2
0
-2
-4
-6
-8
-4
-3
-2
-1
0
1
2
3
4


aerfall.cmd DK:K3001.DAT 17-JAN-90 17:04:55
V-Channel
Chevron slits
PFOV & FFOV
Upper&lower branch
Response
Position (")
1
.8
.6
.4
.2
0
−4
−3
−2
−1
0
1
2
3
4


aerfall.cmd DK:K3001.DAT 17-JAN-90 17:07:27
V-Channel
Vertical slits
PFOV & FFOV
Upper&lower branch
Response
Position (")
1
.8
.6
.4
.2
0
−4
−3
−2
−1
0
1
2
3
4

FAST 4 ESA
Tape 5.

ANNEX XIV

RESULTAT DE PHI1-PHI2,CHAMP AVANT

1	-.210642E+02	.326448E+00
G	.114022E+03	.107094E+03
H	-.565932E+03	.106262E+03
G2	.609533E+04	.101989E+05
GH	-.815999E+05	.947302E+04
H2	.225360E+05	.103247E+05
G3	.239344E+07	.251113E+07
G2H	-.178251E+07	.236527E+07
GH2	.691119E+07	.232960E+07
H3	.439153E+07	.248880E+07
C	.478324E+00	.443998E+00
GC	.319238E+02	.146310E+03
HC	-.171321E+03	.141878E+03
G2C	-.198071E+05	.142598E+05
GHC	-.110964E+04	.125440E+05
H2C	.202175E+05	.132281E+05
G3C	.874435E+06	.354595E+07
G2HC	.396201E+07	.316722E+07
GH2C	.151375E+06	.302107E+07
H3C	-.226084E+07	.316004E+07

RMS= .711683E+00

RESULTATS DE PHI1-PHI2,CHAMP ARRIERE

1	-.224266E+02	.311865E+00
G	-.402570E+03	.100301E+03
H	-.331749E+03	.100944E+03
G2	.753808E+04	.956587E+04
GH	.434624E+05	.874057E+04
H2	.473036E+05	.949740E+04
G3	.402367E+06	.233320E+07
G2H	-.147452E+06	.215668E+07
GH2	.721525E+07	.217757E+07
H3	-.136268E+07	.236759E+07
C	.148529E+01	.437869E+00
GC	.790570E+02	.141763E+03
HC	-.106688E+03	.141546E+03
G2C	.180083E+04	.137336E+05
GHC	-.199286E+04	.125059E+05
H2C	.976283E+04	.132065E+05
G3C	-.222487E+07	.338587E+07
G2HC	.981247E+06	.313475E+07
GH2C	.189694E+07	.310134E+07
H3C	-.619799E+06	.331576E+07

RMS= .675378E+00

Criteria for proceeding for full mission reductions

M.A.C. Perryman, 19 February 1990, updated 26 February

The HST should agree on criteria to be fulfilled before the DRC proceed to their 'real' data reductions, i.e. before ESOC commences distribution of the complete data tapes.

Please consider these suggestions, and add your criteria if appropriate:

(a) an agreed INCA version (IC6 or IC7, plus annexes) to be implemented by DRC.

(b) an agreement on the magnitude and usage of certain parameters, such as:

- basic angle
- star mapper rotation
- modulation coefficients
- grid MSI implementation, confirmation of orientation, (location of defects?)
- star mapper SSR (including central position definition as the mid-point of the half-power points)

(c) successful completion of two or more comparison runs, e.g. the first Schrijver set (tape 5) currently being compared, and/or tapes 6 and 7: covering IDT, SM, attitude and GCR results.

(d) successful interpretation of photometric calibrations, and agreement and adoption of the optimum response representation:

1) between Utrecht, CERGA and RGO for the main mission photometry

2) between Utrecht, CERGA and RGO for the modulation coefficients

3) between Utrecht, CERGA, RGO and TDAC for the SM photometric response

(e) finalised data interfaces through the acceptance of a complete and new provisional data tape.

Associated with these criteria, it seems desirable to assign 'overview responsibilities' at the HST level during the early stages of the data analysis: there are many activities that need to be carried out during this phase of the data analysis, and some agreement on 'global' responsibilities may accelerate convergence, avoid duplication of effort, and avoid critical tasks being overlooked.

Following the main areas of activities, we might consider:

Schrijver	Instrument stability
Kovalevsky	Instrument calibration
Creze	PSF aspects
Turon	INCA updates, variable stars, minor planets
Murray	INCA publication
Grenon	Photometry (main mission) and evolution
Lindegren	Astrometry (main mission)
Grewing	Tycho photometry and links to Utrecht, RGO
Perryman	IDT comparisons
van Leeuwen	SM comparisons
Hoeg	SM geometry/photometry/attitude wrt main mission
Donati	Attitude
v.d. Marel/Le Poole	GCR comparisons

Other tasks need to be added to this list as the reductions proceed (e.g. double star treatment by the different groups; sphere solution, etc).

The identified person doesn't necessarily do all of the work, but does ensure (through links with the DRC leaders, the task leaders, or me) that someone, somewhere, is doing it.

(S)he ensures that the necessary information is made available, and that the others involved are kept informed.

S(he) flags difficulties or identifies unsatisfactory progress or inadequate information.

S(he) gives necessary reports at the HST meetings.

Annex XIV