Minutes of the Second Meeting
of the
HIPPARCOS SCIENCE TEAM
ESTEC, 1 - 2nd June 1981

Attendance

HST:	Dr. M.A.C. Perryman (ESA), Chairman	
	Dr. C. Coleman	
	Prof. F. Donati	
	Dr. E. Høg	
	Prof. C. Jaschek	
	Prof. J. Kovalevsky (part time)	
	Dr. L. Lindegren	
	Mr. C.A. Murray	
	Mr. R.S. Le Poole	
	Dr. M.S. Saîsse	
	Dr. H.G. Walter	
	Prof. C.G. Wynne	
ESA:	Mr. L. Emiliani	(part time)
	Mr. R. Bonnefoy	"
	Mr. M. Schuyer	"
	Dr. H. Olthof	"

1. Adoption of the Agenda

The Agenda as shown in Annex I was adopted.

2. Minutes of the Previous Meeting

The minutes of the meeting of 28-29 April 1981 were approved.

3. Introduction / Matters Arising

Prof. Donati and Prof. Jaschek were welcomed to their first HST meeting.

Kovalevsky had communicated to Dr. Bertotti the outcome of the discussion held at the First HST Meeting on Dr. Bertotti's proposal to observe earth-bound laser stations with HIPPARCOS.

Further inputs to the ITT specifications had been communicated to the Project Team by Coleman, Kovalevsky, Lindegren, Saîsse and Wynne.

4. Project Status Report

Emiliani summarized the status of the Phase B ITT and confirmed the scheduled release date of 1 July 1981.

Bonnefoy announced the recent placing of a study contract on the grid manufacture with the Swiss firm Centre Electronique Horloger, Neuchatel; their proposed technique employing computer-controlled electron beam etching.

Schuyer presented the results of the Project Team's investigation into:

- extension of the HIPPARCOS lifetime by 6 months (Annex II). Sizing of consumable items represented no major impacts on the satellite. Emiliani confirmed the Project's intention not to extend such 'consumables' beyond the presently foreseen design margin. Reliability, in any event, could only be stated in terms of the baseline mission duration.
  Jaschek raised the question of resuscitating the satellite after a 'down time' to extend the baseline for proper motion determinations. Emiliani stated that this could not be set down as a requirement.

- star mapper exploitation (Tycho experiment). The Project's investigations so far were presented (Annex III). Emiliani invited the HST to forward their favoured 'star mapper configuration' for further consideration (see Item 8).

5. Presentation of the Phase B1 ITT

Revisions of Sections 6.1, 6.2.9 and 6.2.10 (drawn up by the Project Team following the detailed comments given at the First HST Meeting) were distributed. Detailed discussions of these sections constituted a large part of the meeting.

6. Calibration

The HST presented their photometric calibration requirements. Jaschek stressed the importance of knowing the detailed properties of the HIPPARCOS photometric system. A synthesis of these requirements would be drawn up by the Project Team to be consistent with the Phase A specifications.

7. Invitation for Proposals

Ambiguities, inconsistencies and inadequacies of the distributed text were high-lighted. No substantial changes to the overall Invitation, nor to the underlying approach to the data management aspects were proposed.

Dr. Olthof presented the Agency's policy regarding distribution of this Invitation to non-Member States. The HST expressed their collective disappointment in the proposed decision to release the Invitation only to Member States in the first instance. Kovalevsky stressed that the tasks of the Input Catalogue Consortium could not proceed efficiently with this 'staggered' response. Le Poole argued that if the HST felt that a 6 month delay in receiving responses could easily be accommodated, the deadline for Member State responses would have been relaxed also. Perryman would convey these arguments to the relevant atuhorities. A short delay in the release of the Invitation for Proposals to accommodate the recommendation of the SPC would be accepted.

7. Any Other Business

Proposal Selection Committee - Names were put forward by HST members of scientists capable to aid in screening of the proposals. Perryman asked that any further suggestions be forwarded so that a suitable Committee of 10-12 persons could be put forward to the AWG in due course.

Tycho Experiment - Høg proposed that full exploitation of both star mappers (equipped with B, V filters or similar) should be sought. The option of reducing the star mapper sampling frequency to 600 Hz to reduce the data rate was considered to be quite acceptable.
Jaschek endorsed this proposal by summarizing the immense rewards of a simultaneous B, V photometric survey conducted in this way. Jaschek would write a note on the photometric impacts of flying the Tycho Experiment. Coleman reported that, regarding the photomultiplier tubes alone, there was some evidence that 'cold redundancy' was not necessarily an advantage. Coleman proposed that each photomultiplier tube be equipped with both B and V filters (one filter covering each slit system). Simultaneity and redundancy could both be accommodated in this way. The appeal of this approach was immediately appreciated.

Of the options studied by the Project Team, HST recommended that further action be taken in support of the 'full exploitation' configuration. Such a study might address the possibility of incorporating e.g. additional power supplies to maintain redundancy. As an alternative approach to the problem of redundancy, HST recommended further study of the configuration proposed by Coleman.

HIPPARCOS Colloquium - Response to Perryman's proposal to organize a colloquium after selection of the 'scientific consortia' and before the deadline for receipt of observing proposals was positive.

Jaschek volunteered to investigate the feasibility of holding such a meeting in Strasbourg around the first week of April 1982. A deadline for the receipt of proposals of 1 June 1982 (rather than 1 May 1982) was considered to be more consistent with the purposes of organizing such a colloquium.

9. Next Meeting

Emiliani asked that HST members intending to become directly connected with hardware consortia advise the Project of these intentions. Active participation in further HST meetings during the B1 competative phase for such persons was considered undesirable. A 'core team' of unassociated members would continue to meet as required.

Emiliani, on behalf of the Project Team, thanked the HST for their invaluable contributions in formulating the Phase B1 requirements according to the Project time schedule.

ANNEX I

Second Meeting

of the

HIPPARCOS SCIENCE TEAM

ESTEC

1-2 June 1981

AGENDA

Adoption of the Agenda

Approval of the Minutes of the Previous Meeting

Matters/actions arising

Project Status Report

Discussion of ITT Sections 6.1, 6.2.9, & 6.2.10

Calibration Requirements

Invitation for Proposals

AOB

ANNEX II

Date.....

EXTENSION OF HIPPARCOS RESOURCES FROM 3 YEARS TO 3.5 YEARS OPERATIONAL LIFE (ACTION FROM HST MEETING, 81.04.28)

TECHNICAL ASSESSMENT, GENERAL APPROACH

THE ITT REQUIREMENTS SPECIFY A PERIOD OF 2 MONTHS FROM LAUNCH TO INITIATION OF THE SCIENTIFIC OPERATION OF HIPPARCOS.

IN-ORBIT LIFETIMES TO CONSIDER ARE THUS:

- ITT REQUIREMENTS 3 YEARS + 2 MONTHS (PHASE A ASSUMPTION: 3 YEARS)
- EXTENDED DURATION 3 YEARS + 8 MONTHS

BY RESOURCES, WE MEAN CONSUMABLES (I.E. PROPELLANTS), AND EQUIPMENT FOR WHICH A PROGRESSIVE DEGRADATION CAN BE PREDICTED WITH SOME ACCURACY, I.E.

- SOLAR ARRAY (POWER OUTPUT DECREASE, MAINLY DUE TO IONISING RADIATION)
- BATTERIES (ELECTROCHEMICAL DEGRATION, DEPENDING ON OPERATING CONDITIONS)

NOTES
- IT IS REMINDED THAT, FROM A HARDWARE RELIABILITY STANDPOINT, THE REQUIRED LIFETIME FOR THE HIPPARCOS SCIENTIFIC OPERATIONS IS 2.5 YEARS.
- THE DIMENSIONING OF RESOURCES IN THE PHASE A REPORT WAS FOR AN OPERATIONAL LIFE OF 3 YEARS.

ANNEX II

Date.....

1. PROPELLANT FOR THE REACTION CONTROLS

- PROPELLANT FOR EAST-WEST STATION-KEEPING WAS ALREADY ESTIMATED FOR A LIFE IN-ORBIT OF 4 YEARS (4.4 KG OF NITROGEN). THIS REQUIREMENT IS THUS NOT CONSIDERED ANY FURTHER IN THE ASSESSMENT OF EXTENDED LIFETIME IMPACTS.
- AN INTERMITTENT ATTITUDE CONTROL OF THE SATELLITE IS ASSUMED, TOGETHER WITH THE USE OF NITROGEN AS A PROPELLANT (WORST CASE ASSUMPTION).
- SATELLITE INERTIAS, FROM THE ESTEC FEASIBILITY STUDY, WERE 152 265 AND 298 M^2 KG RESPECTIVELY ALONG THE X, Y AND Z AXES, CORRESPONDING TO A LAUNCH MASS OF 737 KG. A SCALING UP TO THE ITT REQUIREMENTS LIMIT LAUNCH MASS OF 875 KG IS EFFECTED.
- THE RESULTING PROPELLANT MASSES (FOR ATTITUDE CONTROL) ARE:

3 YEARS	($\pm$ 2 MO.)	10.22 KG
3.5 YEARS	($\pm$ 2 MO.)	11.83 KG

THE EXTENDED LIFETIME THUS REQUIRES IN ADDITION 1.6 KG OF PROPELLANT (N_2).

Date.....

2. SOLAR ARRAY

- ADDITIONAL DEGRADATION IN-ORBIT, FROM 3 YEARS + 2 MONTHS TO 3 YEARS + 8 MONTHS REPRESENTS 1.3% OF EOL OUTPUT. AN EQUIVALENT INCREASE OF THE BOL OUTPUT IS REQUIRED, AS THE SATELLITE IS DESIGNED TO HAVE A CONSTANT REVOLVING SCANNING ANGLE THROUGHOUT ITS MISSION.
- FROM THE PHASE A VALUES (BOL POWER AT 36° ASPECT ANGLE: 334 WATTS), THE POWER MUST BE INCREASED BY 4.3 WATTS (AT 36°); THE MASS INCREASE ABOVE 35 KG IS OF THE ORDER OF 0.5 KG.
- THE AREA INCREASE IS OF THE ORDER OF 60 CM^2.

3. BATTERY

- DUE TO ECLIPSE PERIODS NEAR THE EQUINOXES, THE HIPPARCOS SATELLITE UNDERGOES
  - FOR 3 YEARS ($\pm$ 2 MO.) LIFE, ABOUT 264 CHARGE-DISCHARGE CYCLES
  - FOR 3.5 YEARS (+ 2 MO.) LIFE, ABOUT 308 " " "
- ALTHOUGH THE NUMBER OF CHARGE-DISCHARGE CYCLES EXPRESSING THE BATTERY LIFETIME DECREASES FOR AN INCREASING DEPTH-OF-DISCHARGE (D.O.D.), THE VALUE OF 60% D.O.D. ADOPTED FOR HIPPARCOS - AND THE IMPLEMENTATION OF A PERIODIC BATTERY RECONDITIONING (AS IN THE PHASE A STUDY), ENSURES AN ADEQUATE LIFE EXPECTANCY.

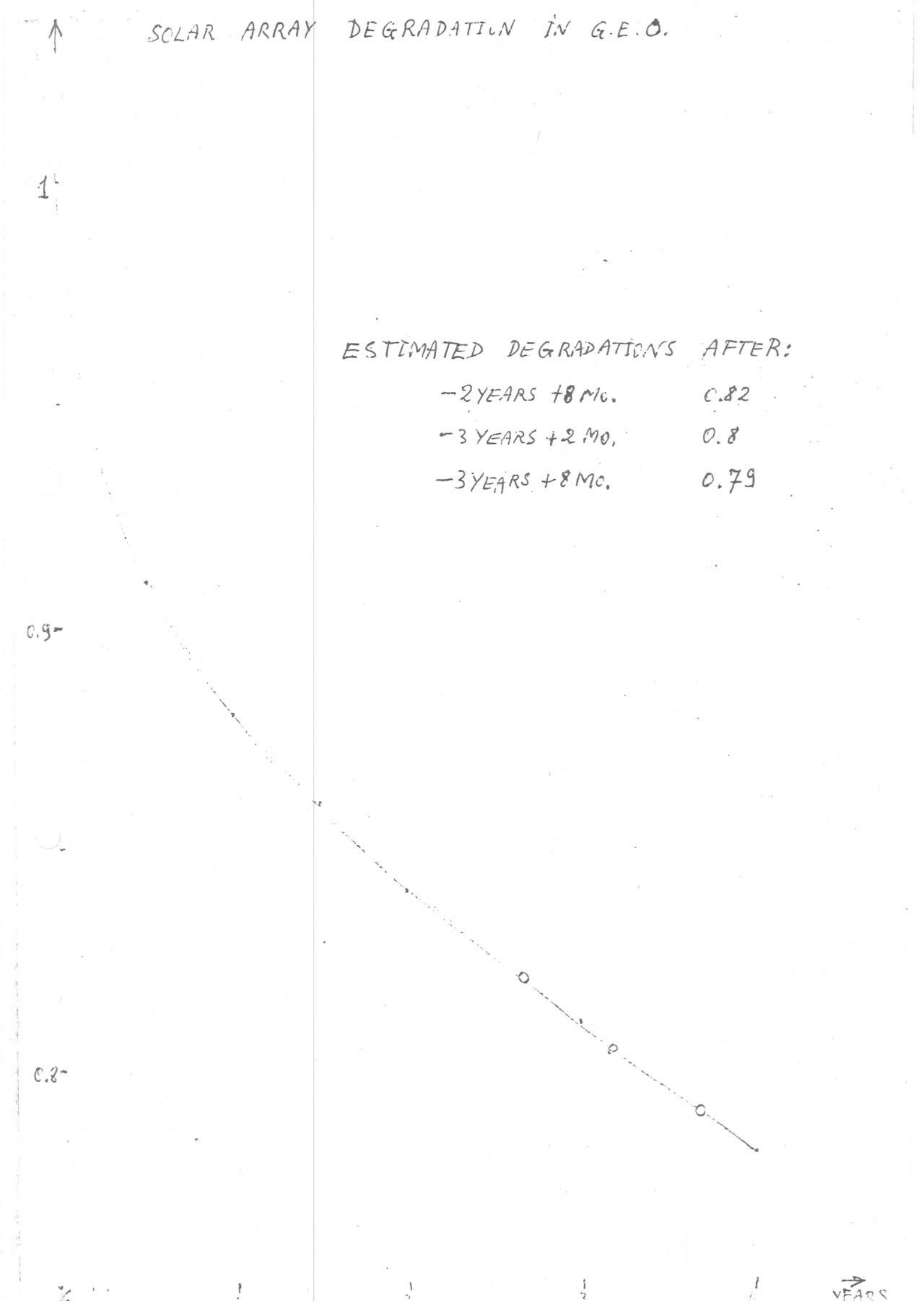
Date .....

4. CONCLUSIONS

- EXTENSION OF HIPPARCOS RESOURCES TO COMPLY WITH A DESIGN LIFE OF 3.5 YEARS (+ 2 MO.) INSTEAD OF THE 3 YEARS (+ 2 MO.) REQUIRED IN THE ITT, ONLY CAUSES MARGINAL MASS INCREASES, AS COMPARED WITH THE TOTAL SATELLITE MASS MARGIN OF 133 KG. DESIGN MARGINS ARE PRESENT FOR THE REQUIRED RESOURCES, WHICH GO BEYOND THE EXTENSION OF LIFE CONSIDERED.

- IT IS NOT INTENDED THOUGH TO INCREASE THE RESOURCES DIMENSIONING TO 3.5 YEARS (+ 2 MO.) FOR THE ITT, AS THE PROVISION OF EXTENDED RESOURCES IS POTENTIALLY AVAILABLE.

  THE ACTUAL AVAILABILITY OF SUCH RESOURCES WILL HOWEVER DEPEND ON THE EVOLUTION OF THE DESIGN MARGINS.


SOLAR ARRAY DEGRADATION IN G.E.O.
1
ESTIMATED DEGRADATIONS AFTER:
-2 YEARS +8 Mo. 0.82
-3 YEARS +2 Mo. 0.8
-3 YEARS +8 Mo. 0.79
0.9
0.8
YEARS

ANNEX III

Date.....

HIPPARCOS / TYCHO PROPOSALS. TECHNICAL ASSESSMENT

OPTIONS ASSESSED

- ONE STAR MAPPER ON - MODERATE EXPLOITATION
- ONE STAR MAPPER ON - FULL EXPLOITATION
- TWO STAR MAPPERS ON - FULL EXPLOITATION

TECHNICAL AREAS OF IMPACT

1. COMMUNICATIONS
2. ONBOARD DATA HANDLING
3. AOCS AND IDT PILOTING
4. OTHER SYSTEM IMPACTS

Date.....

1.0 COMMUNICATIONS CAPABILITY FOR HIPPARCOS

THE ASSESSMENT ASSUMES RECENTLY REVISED HIPPARCOS UP- AND DOWN-LINK BUDGETS, ACCOUNTING FOR UPDATED GROUND STATION PERFORMANCE, ETC.

UPLINK (TELECOMMAND CAPABILITY)

- WITH AN 'EIRP' OF THE GROUND TRANSMITTER OF 88.5 DBM, A CARRIER FREQUENCY OF 2.11 GHZ, AND A COMMAND BIT RATE OF 700 BPS, THE AVAILABLE MARGIN IS 8.7 DB.
- THE MAXIMUM ALLOWABLE BIT RATE OF 1.5 K BPS ACCORDING TO THE ESA TC STANDARD, STILL WOULD LEAVE A MARGIN OF 5.4 DB (INCREASE OF THE ESA TC STANDARD LIMIT TO 2 K BPS IS FORESEEN). MARGINS ARE QUITE ACCEPTABLE.

DOWNLINK (TELEMETRY CAPABILITY)

- WITH AN ONBOARD TRANSMITTER POWER OF 5 WATTS, A CARRIER FREQUENCY OF 2.29 GHZ, A GROUND STATION PERFORMANCE OF 27.35 DB ^{0}K, AND A TELEMETRY BIT RATE OF 24 K BPS USING CONVOLUTIONAL CODING (NOT EXPLICITLY MENTIONED IN THE FEASIBILITY STUDY), A MARGIN OF 2.6 DB IS LEFT IN 'WORST CASE' CONDITIONS.

Date.....

1.1 COMMUNICATIONS ASPECTS FOR HIPPARCOS / TYCHO

BASELINE REQUIREMENTS (HIPPARCOS FEASIBILITY STUDY)

- 'PROGRAMME' STARS DATA ARE UPLINKED FOR PERIODS OF 320 SECS, REPRESENTING 256 WORDS OF 16 BITS; TRANSMISSION OF 1 TRAIN OF COMMANDS (AT 1.5 K BPS RATE) TAKES 2.73 SECS.
- TOTAL TELEMETRY BIT RATE IS 12.8 K BPS (LEAVING A MARGIN, 'WORST CASE', OF 5.4 DB, ASSUMING REVISED DOWNLINK BUDGET PARAMETERS, AND CONVOLUTIONAL CODING)
- FOR AN AVERAGE CROSSING RATE OF 1 STAR/25 SECS., AND A PHOTOMETRIC SAMPLING FREQUENCY OF 1200 HZ, THE STAR MAPPER DATA RATE IS 384 WORDS OF 8 BITS/STAR, I.E. AN AVERAGE OF 123 BPS (INCLUDED IN THE 'HOUSEKEEPING' ALLOCATION OF 1.6 K BPS)

Date.....

1.1 COMMUNICATIONS ASPECTS FOR HIPPARCOS / TYCHO (CONT.)

MODERATE EXPLOITATION (HØG, 81.04.10)

- DATA ARE TELEMETERED FOR A PERIOD 3 X CROSSING TIME=STAR (I.E. 0.48 SECS.)
- LEAVING THE SAMPLING FREQUENCY UNCHANGED, AN AVERAGE CROSSING RATE OF 1 STAR/5 SECS. LEADS TO AN INCREASE OF 1.84 K BPS IN TELEMETRY, I.E. A TOTAL OF 14.6 K BPS.
- 'WORST CASE' LINK BUDGET MARGIN IS 4.8 DB.
- WOULD CONVOLUTIONAL CODING NOT BE IMPLEMENTED, THE MARGIN WOULD BE NEGATIVE. CONVOLUTIONAL CODING IS THEREFORE MANDATORY.
- UPLINK OF 'PROGRAMME' STAR DATA FOR PERIOD OF 160 SECS. IS NO LINK BUDGET PROBLEM.

Date.....

1.1 COMMUNICATIONS ASPECTS FOR HIPPARCOS / TYCHOS (CONT.)

FULL STAR MAPPER EXPLOITATION

- THE USE OF CONVOLUTIONAL CODING FOR TELEMETERED DATA IS IMPOSED.
- AT 1200 HZ SAMPLING, TELEMETRY OF THE FULL STAR MAPPER DATA REQUIRES 9.6 K BPS (1 STAR MAPPER).
- STAR MAPPER SAMPLING FREQUENCY CAN BE LOWERED TO 600 HZ WITH LITTLE IMPACT ON ACCURACY.
- 'WORST CASE' MARGINS IN DB, AND TOTAL TM RATES IN KBPS, ARE AS FOLLOWS:

SAMPLING RATE	600 HZ	1200 HZ
1 STAR MAPPER	+ 4.0 (17.6)	+ 2.9 (22.4)
2 STAR MAPPERS	+ 2.9 (22.6)	+ ~~5.3~~ 1.4 (32)

- LINK BUDGET MARGINS FOR THE ABOVE CASES ARE ACCEPTABLE.
- FULL STAR MAPPER DATA TRANMISSION DOES NOT CAUSE ANY CHANGE ON THE PRESENT BASELINE (PF616) UPLINK REQUIREMENTS.

Date .....

2.0 ONBOARD DATA HANDLING ASPECTS

- FOR FULL STAR MAPPER DATA TRANSMISSION, COMPRESSION OF THE RATE IS ACHIEVED IN A SIMPLER WAY THROUGH REDUCTION OF THE SAMPLING FREQUENCY (E.G., 600 HZ INSTEAD OF 1200 HZ) THAN THROUGH CODING OF SOME STAR DATA WITH 4 BITS INSTEAD OF 8.
- WITH PRESENT STAR MAPPER DESIGN, A MODERATE REDUCTION OF THE SAMPLING FREQUENCY (E.G., TO 600 HZ) DOES NOT SIGNIFICANTLY DEGRADE THE ACCURACY.
- THE ONBOARD DATA HANDLING IS COMPLICATED, IF MORE CATEGORIES OF STAR DATA MUST BE PROCESSED:
  - 'PROGRAMME' STARS (BASELINE)
  - 'PROGRAMME' STARS FOR STAR MAPPER OBSERVATION (BASELINE)
  - OTHER STARS TO BE OBSERVED IN STAR MAPPER (NEW)

Date.....

3.0 AOCS AND IDT PILOTING

RELEVANT REQUIREMENTS IN THE HIPPARCOS FEASIBILITY STUDY AND ITT

- STABILITY OF VIEWING DIRECTION (TRANSVERSE MOTIONS) $\pm$ 10.8'
- OFF-LINE STAR MAPPER ACCURACY (B = 10) $\approx$ 0.1"
- STAR MAPPER ACCURACY FOR IDT PILOTING $\approx$ 1"

3.1 STABILITY REQUIREMENTS FOR TYCHO

- SPIN AXIS REVOLVING RATE OF 27' / GREAT CIRCLE SCAN IS ASSUMED.
- A TRANSVERSE STAR MAPPER FOV OF 20' DOES NOT ENSURE COMPLETE COVERAGE OF THE CELESTIAL SPHERE.
- KEEPING THE PRESENT STABILITY REQUIREMENTS (SEE ABOVE), A MINIMUM TRANSVERSE STAR MAPPER FOV OF 48.6' WOULD BE NECESSARY TO GUARANTEE A COMPLETE SKY COVERAGE.
- TIGHTENING THE HIPPARCOS ATTITUDE STABILITY REQUIREMENTS TO $\pm$ 1' (INSTEAD OF $\pm$ 7' ASSUMED IN PHASE A) HAS NO IMPACT ON PROPELLANT CONSUMPTION, BUT REDUCES LIMIT CYCLE DURATION (IN CASE OF INTERMITTENT CONTROL) FROM 940 SECS. (PHASE A ASSUMPTIONS) TO 350 SECS.
- EVEN WITH $\pm$ 1' ATTITUDE STABILITY, A MINIMUM TRANSVERSE FOV OF 35' APPEARS NECESSARY FOR COMPLETE SKY COVERAGE.

3.0 AOCS AND IDT PILOTING (CONT.)

3.2 OFF-LINE STAR MAPPER ACCURACY

- ASSUMPTIONS: STAR MAPPER PATTERN AS IN PHASE A, TRANSVERSE FOV 20', PM DARK COUNT RATE 700 HZ, SKY BACKGROUND EQUIVALENT TO 130 STARS/SQ. DEG. (B = 10, B - V = 0.7). REVISED PHOTOELECTRON COUNT RATE (USING MATRA RESULTS)
- A SAFETY FACTOR OF 1.5 IS APPLIED TO COMPUTED ERRORS.
- THE FOLLOWING ERRORS $\sigma_\eta(\sigma_\xi)$, IN ARC SEC., RESULT FOR A B = 10 STAR:

B - V =	- 0.25	0.25	0.75	1.25
- NO FILTER	0.09 (0.16)	0.07 (0.13)	0.06 (0.11)	0.04 (0.08)
- BLUE FILTER	0.2 (0.35)	0.19 (0.34)	0.21 (0.38)	0.21 (0.38)
- VISIBLE FILTER	0.27 (0.48)	0.16 (0.3)	0.10 (0.19)	0.06 (0.11)

- ERRORS WITH FILTER INTERPOSITION APPEAR MARGINALLY ACCEPTABLE.

3.3 IDT PILOTING

- THE ACCURACY OF THE ONBOARD PROCESSED STAR MAPPER DATA, ALTHOUGH DEGRADED W.R.T. TO THAT OF OFF-LINE DATA, IS PROBABLY SUITABLE FOR IDT PILOTING.
- SIMULTANEOUS OPERATION OF THE 2 STAR MAPPERS, FOR PHOTOMETRY, CONTRADICTS THE PRINCIPLE OF 'COLD' REDUNDANCY OF THE PHOTOMULTIPLIERS.

Date.....

4.0 OTHER SYSTEM IMPACTS

- OPERATIONS: 'MODERATE' STAR MAPPER EXPLOITATION REQUIRES MORE FREQUENT UPLINK OF STAR DATA, WITH INCREASED VOLUME OF DATA TO BE PREPARED ON THE GROUND; 'FULL' STAR MAPPER DATA TELEMETRY REQUIRES SUBSTANTIALLY INCREASED STORAGE OF DATA ON THE GROUND, BUT REQUIRES NO CHANGE IN UPLINK OPERATIONS
- RELIABILITY:
  - ALTHOUGH INCREASED DATA RATES APPEAR FEASIBLE, DOWNLINK BUDGETS COULD BECOME LESS FAVOURABLE, IF ANOTHER SOLUTION THAN ANTENNA SWITCHING (PHASE A) IS PROPOSED, TO INCREASE RELIABILITY.
  - SIMULTANEOUS OPERATION OF 2 PM'S DECREASES RELIABILITY (SEE SECTION 3.3), AND COULD BE OVERCOME EITHER BY ADDITIONAL PM'S, OR ALTERNATE OPERATION OF BOTH STAR MAPPERS AT 6-MONTH INTERVALS.
- MASS, POWER, THERMAL CONTROL:
  - AN ADDITIONAL PM REQUIRES 0.8 KG; 6 - 8 WATTS EXTRA, SECONDARY STRUCTURES, POWER LOSSES, HAVE NOT BEEN CONSIDERED.

Date .....

CONCLUSIONS

- PRESENT EVALUATIONS OF THE HIPPARCOS COMMUNICATIONS CAPABILITY INDICATE THAT HIPPARCOS STAR MAPPER TELEMETRY COULD BE EFFECTED AT A HIGHER RATE THAN ASSUMED IN PHASE A, POSSIBLY ALLOWING TRANSMISSION OF CONTINUOUS STAR MAPPER DATA. THIS POSSIBILITY DESERVES HOWEVER FURTHER ASSESSMENT, IN THE LIGHT OF THE PHASE B DESIGN.
- OPERATIONAL IMPLICATIONS OF THE EXTENDED USE OF THE STAR MAPPER NEED ALSO FURTHER DETAILED ASSESSMENT.
- GIVEN THE TELEMETRY CAPABILITY, THE 'FULL' EXPLOITATION OF THE STAR MAPPER APPEARS SIMPLER TO IMPLEMENT THAN ITS 'MODERATE' EXPLOITATION.
- WOULD A COMPLETE SKY COVERAGE BE REQUIRED, FURTHER TRADEOFFS BETWEEN ATTITUDE STABILITY REQUIREMENTS AND STAR MAPPER TRANSVERSE FOV NEED TO BE PERFORMED.
- OFF-LINE ACCURACY DEGRADATION DUE TO SPECTRAL FILTERING IS AT THE LIMIT OF ACCEPTABILITY WITH THE PRESENT CONFIGURATION.
- IF PHOTOMETRY IS REQUIRED, FURTHER RELIABILITY TRADEOFFS MUST BE DONE.