14 00064857D

20 Oct 75 PROA6f

S^3 SOLID STATE STELLAR CAMERA

~~SECRET~~/HEXAGON

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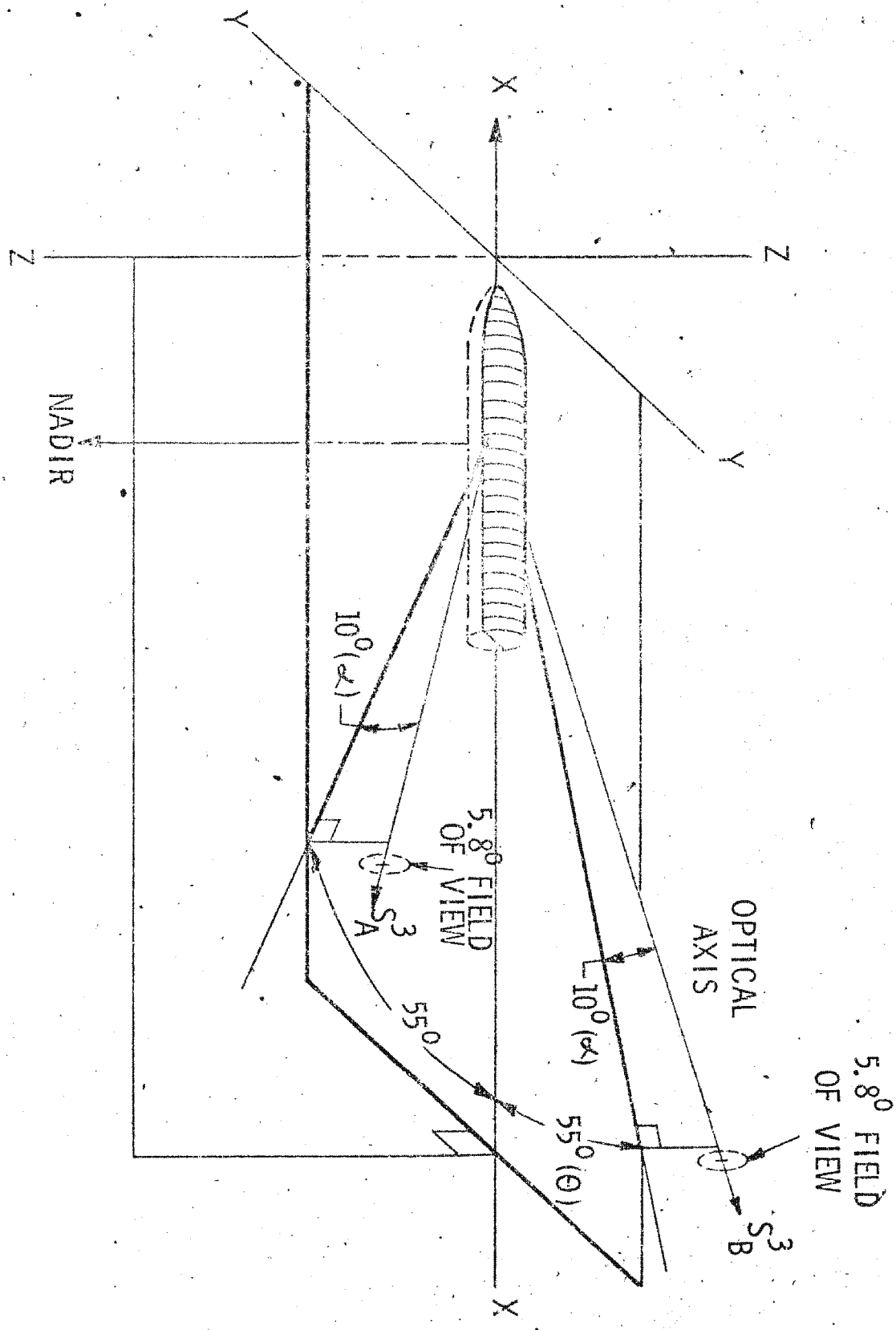
- CONCLUSIONS
- RISK ASSESSMENT
- FUNDS REQUIRED
- S? STUDY ACCOMPLISHMENT
- ACCOMPLISHED

BACKGROUND

- DMA/SP-6 STUDIES ON METRIC PAN IDENTIFIED:
  - IMPROVED INTERNAL GEOMETRY KNOWLEDGE
  - IMPROVED GEOGRAPHIC REFERENCE
  - IMPROVED ATTITUDE REFERENCE
- CHANGES IN PROCESS
  - NAVPAC (SV-13)
  - 1° SCAN ANGLE DOTS (SV-14)
  - FIDUCIAL X-HAIRS (SV-14)
  - OB CALIBRATION (SV-14)
- REMAINING REQUIREMENT IS TO DETERMINE THE ATTITUDE TO 5-10 ARC SECONDS

ATTITUDE REFERENCE CONCEPTS

- o STAR TRACKERS - REQUIRED EXTENSIVE INTEGRATION TO GYROS
  - ACCURACY
- o STELLAR INDEX CAMERAS - FILM PATH COMPLEXITY
- o STELLAR INDEX ON ENDEAVOR - UNDESIRABLE IMPACT ON PRIMARY VEHICLE



12/12/74 WEK

PREVIOUS RISK AREAS

CALIBRATION/STABILITY

TCA QUAL & VIB MODES

SIGNAL TO NOISE RATIO

CHIP DEV/QUAL/PROD

STUDY OBJECTIVES

- o PURCHASE AND TEST SOLID STATE DEVICES
- o DEVELOPE ERROR BUDGET BASED ON
  - LABORATORY TESTS
  - TOA THERMAL/VIBRATION TESTS
  - DETAILED ANALYSIS
- o DEMONSTRATE SCANNING TECHNIQUE
- o PRELIMINARY DESIGN
  - FOCAL PLANE
  - MECHANICAL
  - ELECTRONIC
  - OPTICAL

STUDY SCHEDULE

- BEGAN SEPT 74
- COMPLETION FOR JULY 75 DECISION FOR SV-17 & 18
- DIRECTION TO CONSIDER FOR BLOCK IV ONLY
- REVISED COMPLETION DATE OF 31 DEC 75
- FOCAL PLANE RECONNAISSANCE DELAYED TO SPRING 76

~~SECRET~~/HEXAGON

STUDY PROGRESS TO DATE

- DETECTOR TESTING
  - TESTED LINEAR 1728 x 1 CCD's
  - TESTED LINEAR 1800 x 1 PHOTO-DIODES
  - TESTING 244 x 190 AREA ARRAY
  - SUCCESSFULLY COOLED DETECTORS TO -10° C
  - [illegible] AND ACCURACY MEASUREMENTS
  - [illegible] PROGRAM UNDERWAY
- ERROR [illegible] ANALYSIS
  - TCA THERMAL TESTS COMPLETED
  - TCA VIBRATION MEASURED
  - DETAILED ANALYSIS PERFORMED
  - PRELIMINARY REPORT PUBLISHED

STUDY PROGRESS (continued)

- PERFORMED SV-9 STELLAR EXPERIMENT
- COMPLETED PRELIMINARY DESIGN
- OPTIMIZING DESIGN FOR AREA ARRAY
  - CHEAPER
  - LIGHTER
  - SMALLER

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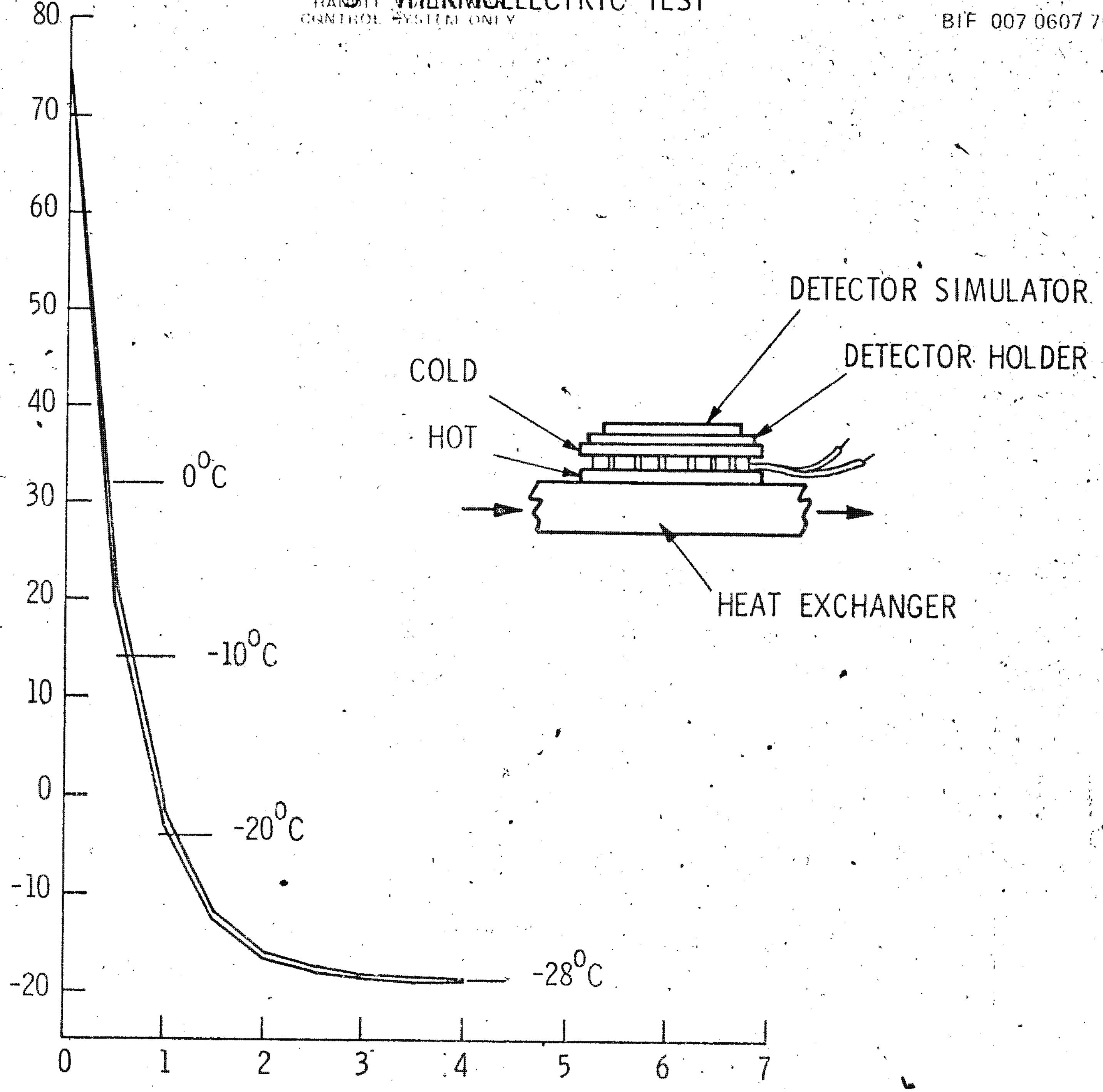
S^3 THERMOELECTRIC TEST

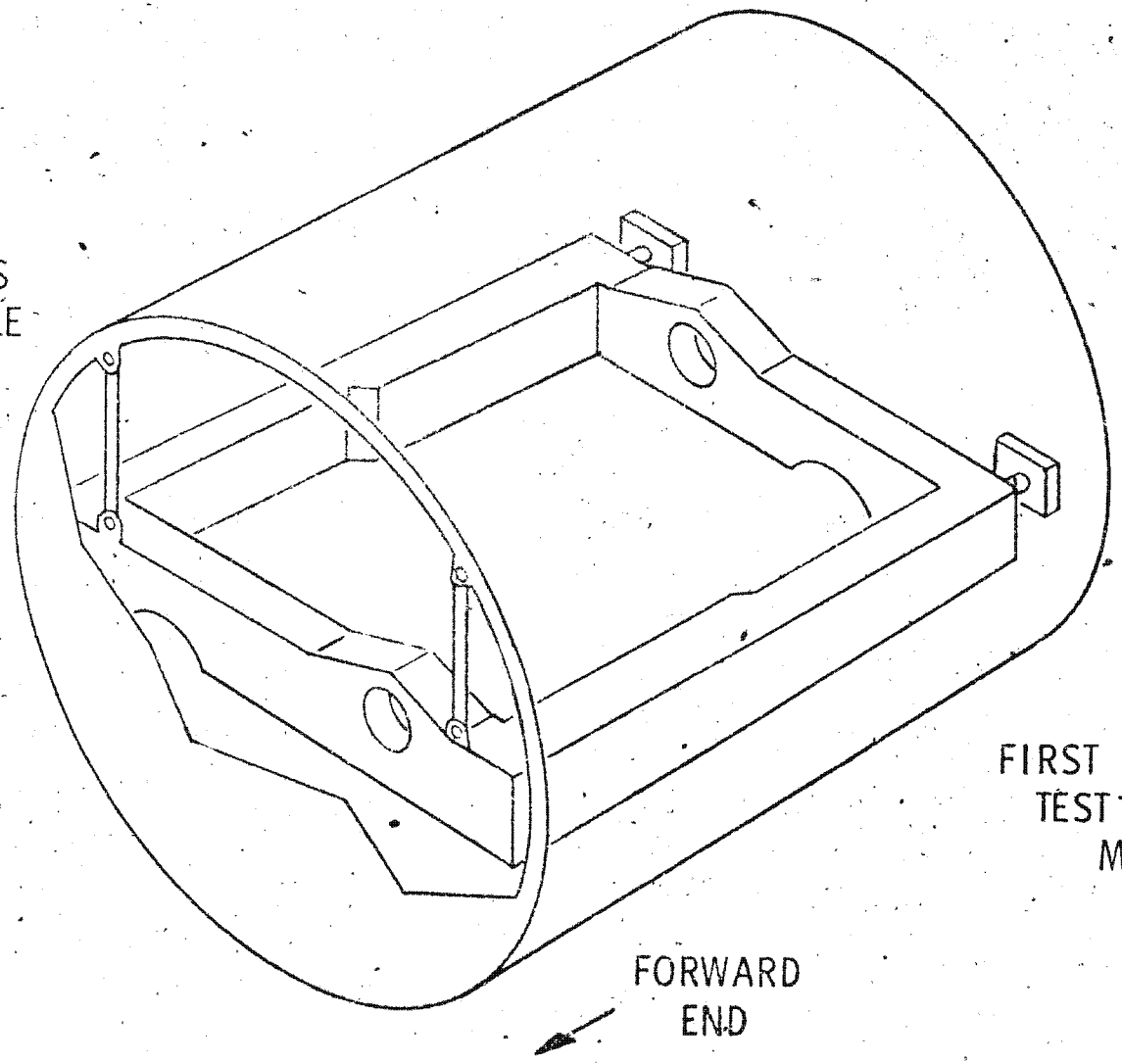
BIF 007 0607 75



ENVIRONMENT EFFECTS (CONT'D)

VEHICLE DISTORTION

TCA TWISTS WHEN VEHICLE TWISTS



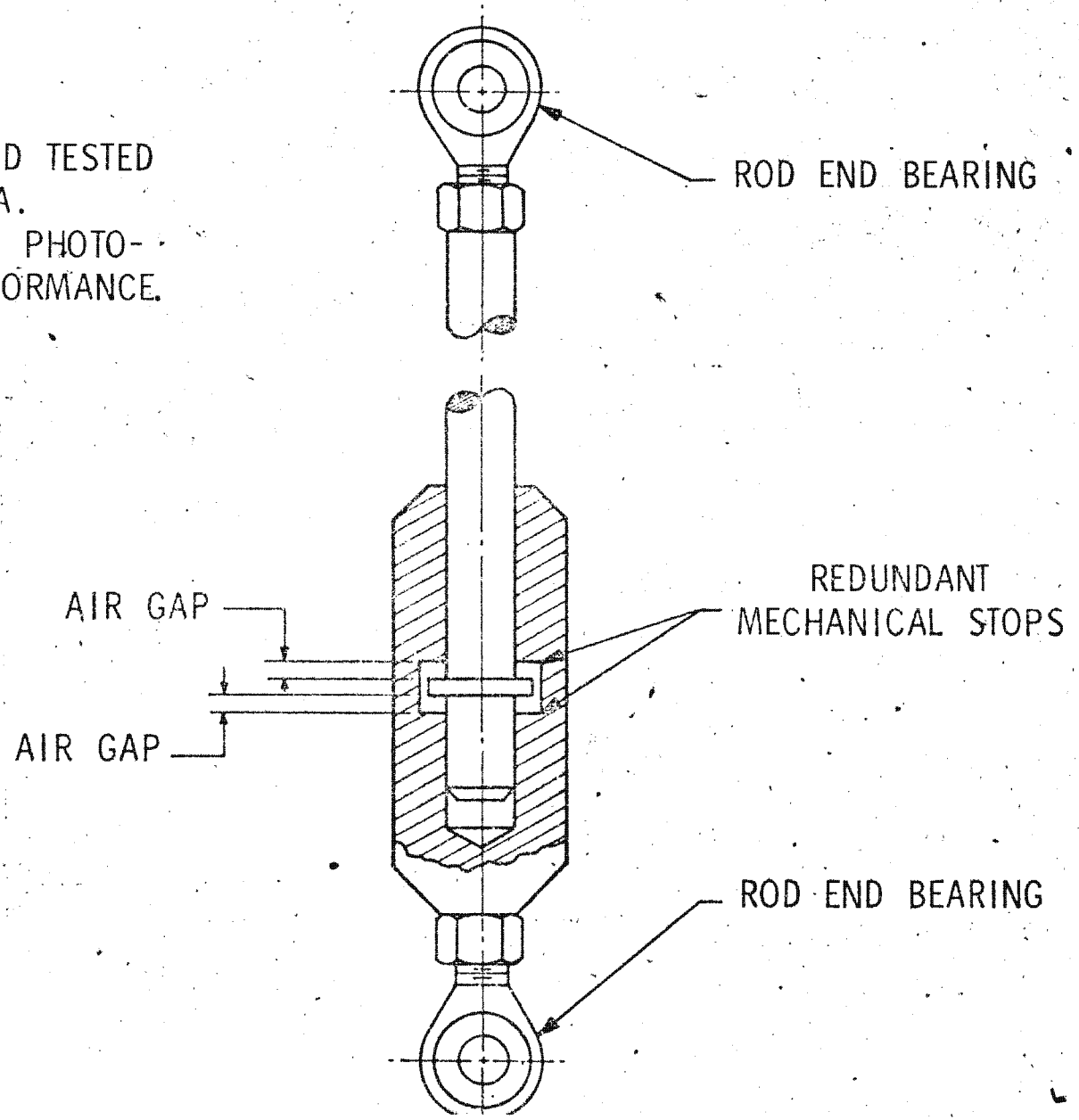
FIRST CHAMBER A TEST VERIFIED MOTION

FORWARD END

10/13/75 WEK

SCHEMATIC REPRESENTATION OF MODIFIED PITCH LINK

SIMULATED AND TESTED
IN CHAMBER A.
NO EFFECT ON PHOTO-
GRAPHIC PERFORMANCE.



SAFSP

10 LINE HYBRID FOCAL PLANE PROPOSALS

MARTIN-DENVER*		FAIRCHILD	RETICON
CCD	PHOTODIODE	CCD	PHOTODIODE
222K	271K	[illegible]	245K

* MARTIN HAS GIVEN A VERBAL QUOTE OF 90K FOR A 4 LINE ARRAY

BEST COPY AVAILABLE

STUDY EFFORT REMAINING

- SELECT OPTIMUM FOCAL PLANE CONFIGURATION
- FABRICATE FP ASSEMBLY
- REFINE ERROR ANALYSIS
- COMPLETE RELIABILITY TESTING
- PUBLISH FINAL REPORT

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REASONS FOR REVISING RISK ASSESSMENT

- FOCAL PLANE MOVED INTERNAL TO LENS
- BETTER COOLING ARRANGEMENT
- 10 LINE ARRAY REPLACED BY 4 LINE OR AREA ARRAY
- FWM PROCESSES FOR FOCAL PLANE
- ERROR CHARACTERIZATION INCOMPLETE
- SATISFACTORY RADIATION PERFORMANCE DEMONSTRATED
- ON ORBIT CALIBRATION CAPABILITY DEMONSTRATED
- COO PERFORMANCE HAS BEEN DEMONSTRATED
- ELECTRONICS HAVE BEEN BREADBOARDED

SAFSP

RISK ASSESSMENT

SCHEDULE	COST	PERFORMANCE	
		5 ARC SEC	10 ARC SEC
LOW */SV-17	LOW	SOME HOPE	LOW

* BASED ON A STRETCHED SCHEDULE WITH LAUNCH OF SV-17 IN 1980

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ROM ESTIMATES OF S^3 FUNDING REQUIREMENTS

FY-76	TT	77	78	79	80	81	TOTAL
6.5	2.0	5.9	4.0	3.2	2.3	0.26	24.16
1.24 (75 AND 76 COMMITMENT TO ITEK)							1.24
							25.40

- NEAR YEARS OK (76-77)
- OTHER YEARS COST WILL BE REFINED AFTER DESIGN COMPLETION (AUG 76)
- DOES NOT INCLUDE COST TO NRO DUE TO IMPACT ON ITEK

OTHER CONSIDERATIONS

- S^3 DECISION COULD PUT ITEK OUT OF GOVERNMENT BUSINESS
- S^3 DEVELOPMENT + SV-17 AND 18 COSTS ARE ABOUT THE SAME AS MAPPING CAMERAS FOR SV-17 AND 18
- SUBSEQUENT S^3 COSTS WOULD BE SIGNIFICANTLY LOWER THAN ITEK MAPPING CAMERAS
- DUE TO ITEK BUSINESS OUTLOOK WE ARE AT LEAST AS CONFIDENT IN S^3 COSTS AS WE ARE IN ITEK COSTS

CONCLUSIONS

- COST, SCHEDULE AND PERFORMANCE RISKS ARE ACCEPTABLE
- WE ARE PREPARED TO PROCEED ON AN S^3 DEVELOPMENT FOR SV-17 AND 18
- DECISION TO PROCEED SHOULD BE BASED ON OVERALL SITUATION