



**METRIC PAN**  
(copy sent to SSF)

~~TOP SECRET~~

HANDLE VIA BYEMAN CONTROL  
CHANNELS ONLY

HEXAGON METRIC PAN ISSUE

STATUS BRIEFING TO THE

DEFENSE MAPPING AGENCY

17 OCTOBER 1974 -

Lt Col Daniel B. Hutchison  
National Reconnaissance Office

HEXAGON

~~TOP SECRET~~

~~TOP SECRET~~

HANDLE VIA BYEMAN CONTROL  
SYSTEM ONLY

BACKGROUND

- 73-74: *74 74* REQUIREMENTS VS CAPABILITY BEYOND 12 HMC
- JAN ~~73~~-JUN ~~73~~: METRIC PAN OPTIONS
- JUL ~~73~~: *74* EXCOM REAFFIRMED NO NRP FUNDING FOR HMC PAST SV-16
- 26 AUG 74: NRO REQUIREMENT FOR METRIC PAN EVALUATION
- 13 SEP 74: SAFSP MESSAGE TO DMA, DNRO
- 27 SEP 74: SAFSP BRIEF DNRO
- 17 OCT 74: NRO BRIEF DMA

----- DEADLINE 15 DEC 1974 -----

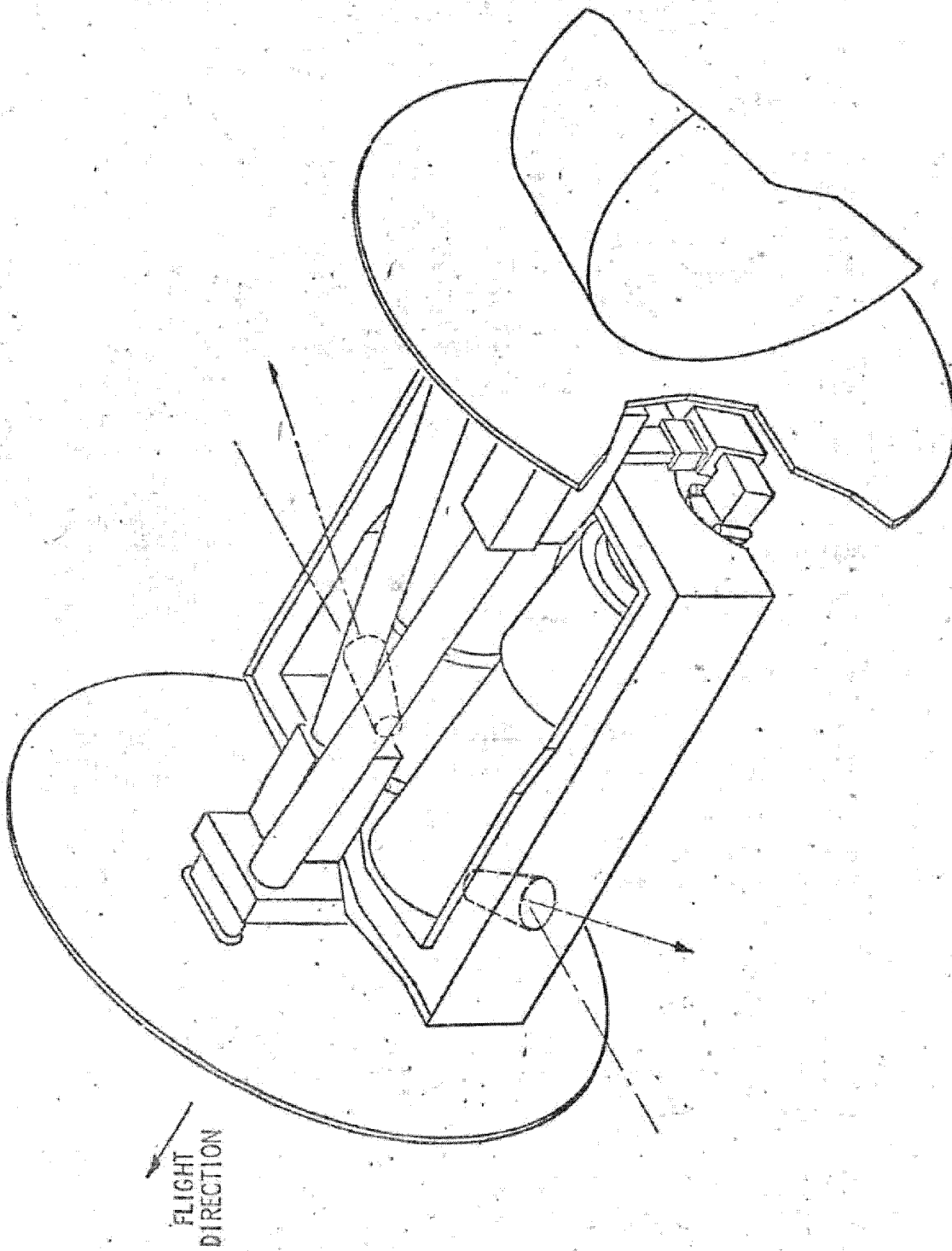
~~TOP SECRET~~

METRIC - PAN PRELIMINARY INVESTIGATIONS

- 6 ARRAY SILICON DETECTOR
- SOLID STATE STELLAR DETECTOR - CCD
- IMAGE DISSECTOR
- PHOTOMULTIPLIER PAIR
- INDEPENDENT FILM PATH STELLAR CAMERA
- INTER-OP IMAGING STELLAR CAMERA

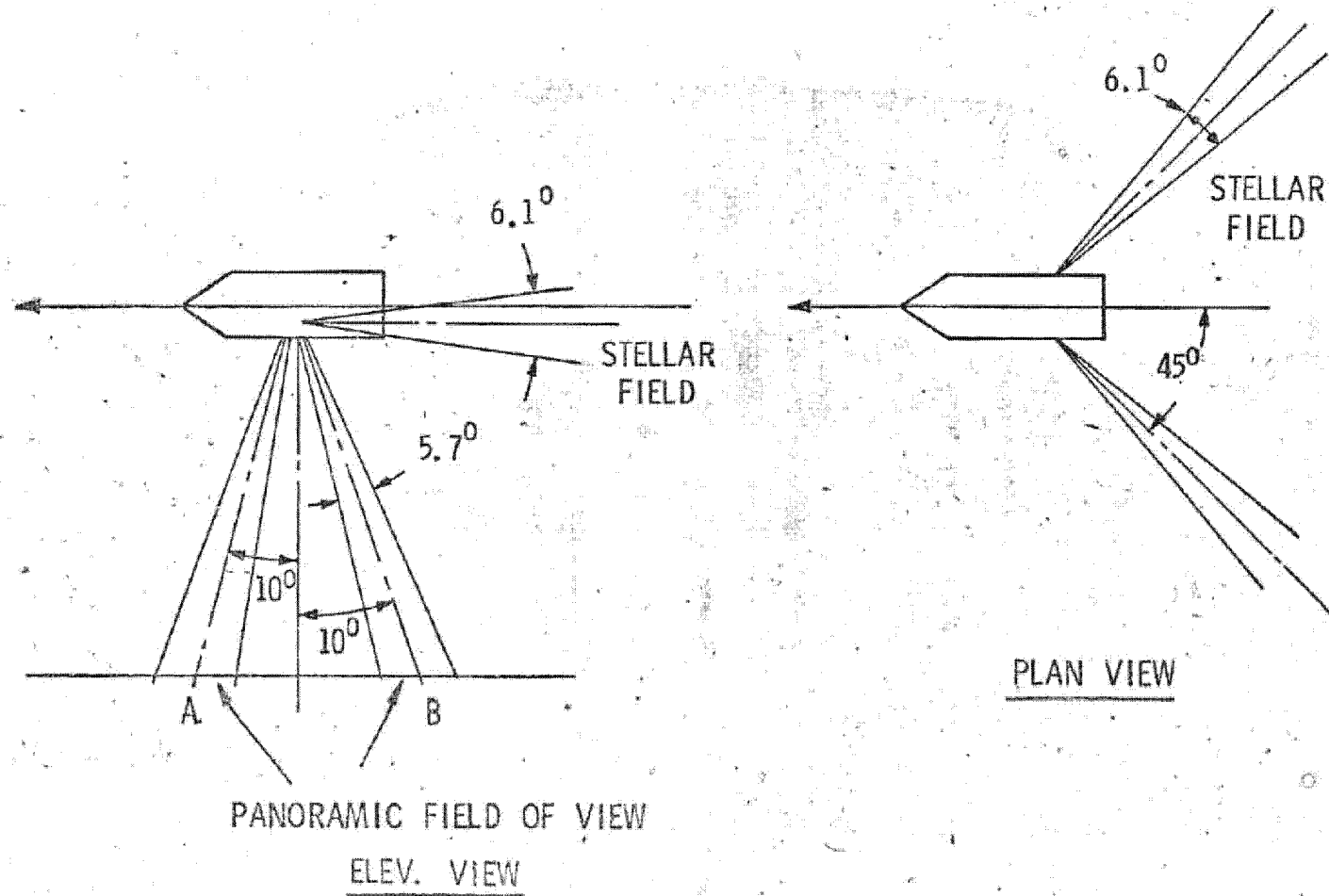
S<sup>3</sup> ATTITUDE CAMERA ARRANGEMENT

28461

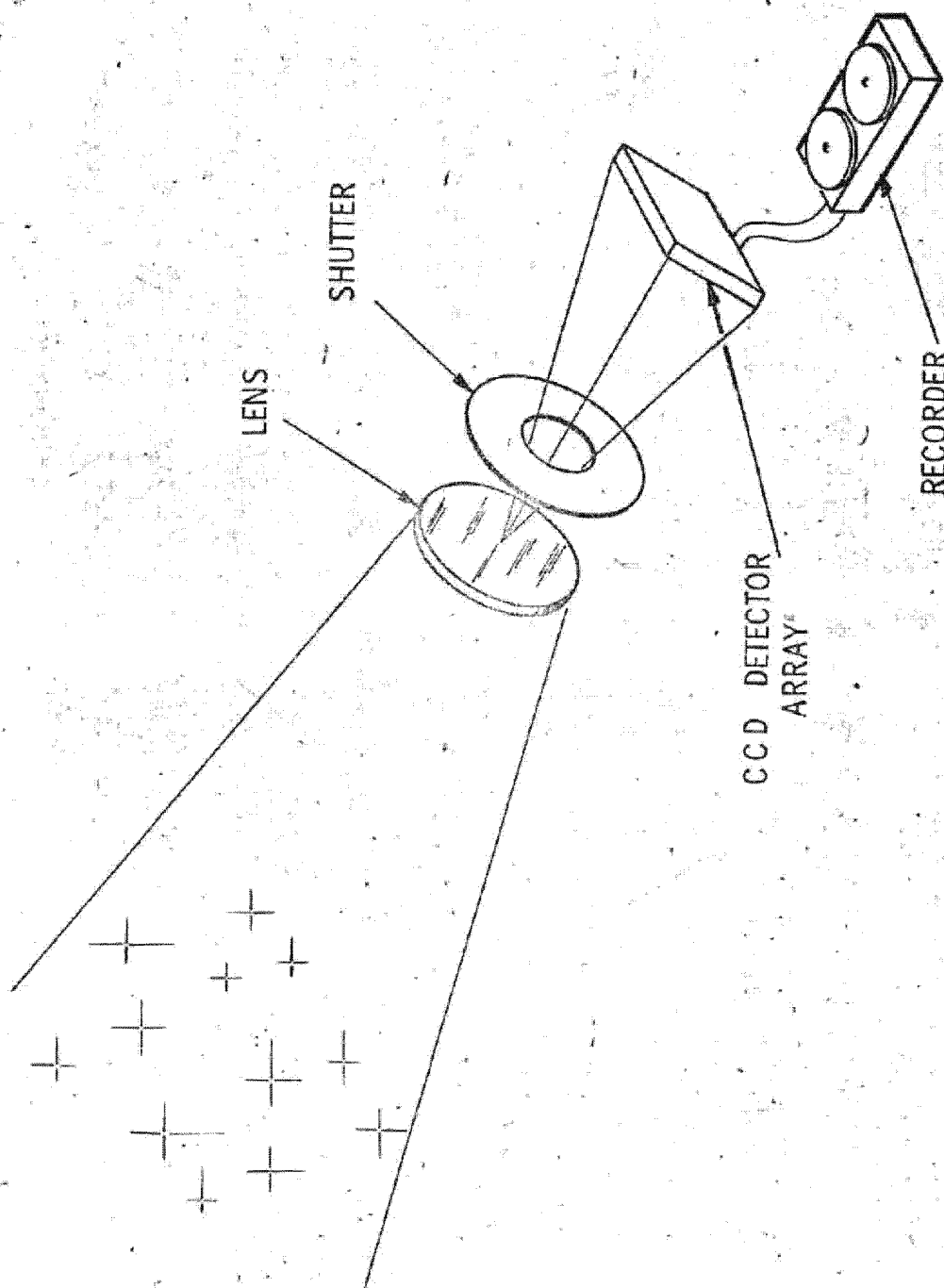


6/26/74 TTR

# P-E SOLID STATE STELLAR ATTITUDE SYSTEM

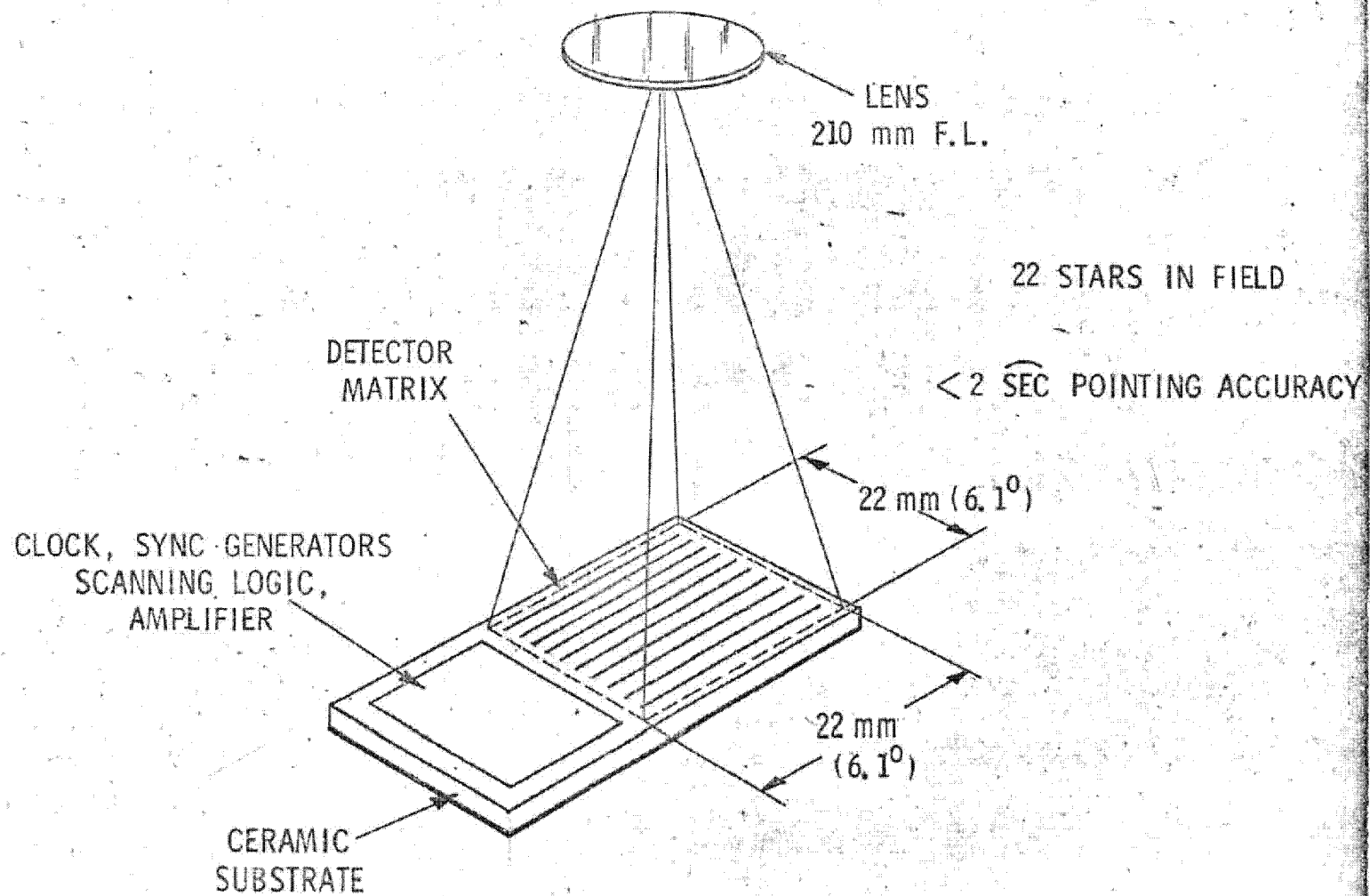


9/23/74 TJG

S<sup>3</sup> ATTITUDE SYSTEM

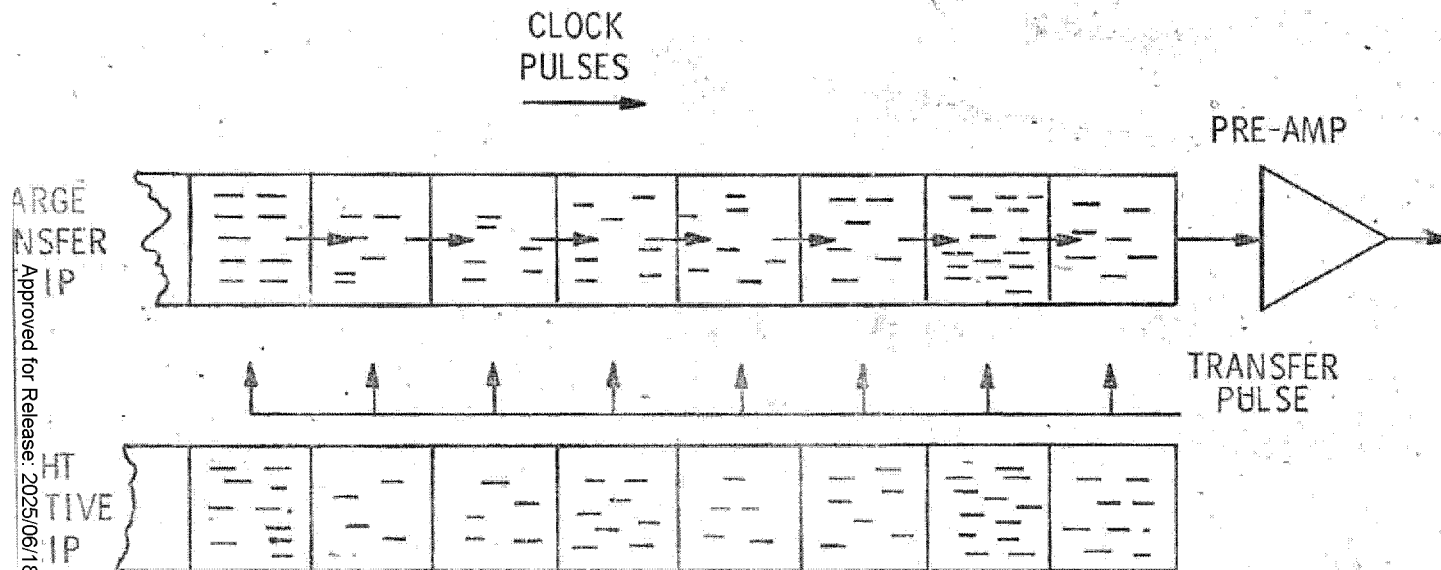
6/26/74 TJG

## SOLID STATE CAMERA SCHEMATIC



9/23/74 TJG

# CHARGE COUPLED DEVICE (CCD)



## CHARACTERISTICS

ELEMENT SIZE  $13 \times 16 \mu m$  (1 x 1728)  
 SENSITIVITY  $1.2 \times 10^{-14}$  W/ELEMENT @ S/N 10:1  
 IN 0.5 TO  $1 \mu$  BAND FOR  
 INTEGRATION TIME OF 50 MSEC

9/23/74 TJG

RISK AREAS

CHIP DEV/QUAL/PROD

SIGNAL TO NOISE RATIO

CALIBRATION/STABILITY

TCA QUAL & VIB MODES

| SUMMARY - RISK ASSESSMENT |         |                  |          |             |
|---------------------------|---------|------------------|----------|-------------|
| PRESENT SYSTEM            | COST    |                  | SCHEDULE | PERFORMANCE |
|                           | TOTAL   | RISK             |          |             |
|                           | \$19.4M | LOW              | LOW      | NONE        |
|                           | (6.0M)  |                  |          |             |
| METRIC-PAN                | 22.1M   | MODERATE TO HIGH | MODERATE | HIGH        |
|                           |         |                  |          | LOW         |

RECOMMENDATIONS

- \* BUY TWO ADDITIONAL MCS FOR I7 & I8  
UNLESS CURRENT PERFORMANCE IS CONSIDERED INADEQUATE - THEN
- \* DEFINE REQUIREMENTS
- \* PERFORM 6 MONTH CONFIGURATION STUDY FOR METRIC PAN SYSTEM

~~TOP SECRET~~

HANDLE VIA BYEMAN CONTROL  
CHANNELS ONLY

HEXAGON MAPPING MISSION

| HEXAGON SV-               | 9      | 10     | 11     | 12     | 13     | 14     | 15     | 16     | 17     | 18     |
|---------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 1/YR '78                  | OCT'74 | APR'75 | OCT'75 | APR'76 | OCT'76 | APR'77 | OCT'77 | OCT'78 | OCT'79 | OCT'80 |
| 1/YR '76                  | OCT'74 | APR'75 | OCT'75 | OCT'76 | OCT'77 | OCT'78 | OCT'79 | OCT'80 | OCT'81 | OCT'82 |
|                           |        |        | 75     | 76     | 77     | 78     | 79     | 80     | 81     | 82     |
| MAPPING CAMERAS           | *      | *      | *      | *      | *      | *      | *      | *      |        |        |
| 101/205' H <sup>(1)</sup> |        |        |        |        |        |        |        |        |        |        |
| 95' V                     |        |        |        |        |        |        |        |        |        |        |

GEODETIC PACKAGE  
MX<sup>(2)</sup> 85' H  
75' V

OPTION A: 2 MORE MAPPING CAMERAS \$20M  
OPTION B: METRIC PAN CAPABILITY \$24M

NOTE:

- (1) VALUES ARE 90% CEP FOR HORIZONTAL; 90% LINEAR FOR VERTICAL.
- (2) GEODETIC PACKAGE REDUCES ORBIT ERRORS TO 30' INTRACK, 30' ACROSSTRACK AND 30' VERTICAL (1σ) VS CURRENT 90, 60, 30 WITH DOPPLER BEACON SYSTEM



Approved for Release: 2025/06/18 C05137309

~~TOP SECRET~~

HEXAGON

Approved for Release: 2025/06/18 C05137309  
TOP SECRET

C05137309

~~TOP SECRET~~

HANDLE VIA BYEMAN CONTROL  
CHANNELS ONLY

OPTIONS

1. NO MORE MAPPING CAPABILITY *after SV-16*  
SATISFY 97% CAT I TARGETS AT 205'  
50% CAT I TARGETS AT 85'  
70% AREA REQUIREMENT (PRI 1-4)  
49% AREA REQUIREMENT (PRI 1-5)
2. TWO MORE MAPPING CAMERAS *(17 and 18)*  
SATISFY 97% CAT I TARGETS AT 205'  
65% CAT I TARGETS AT 85'  
76% AREA REQUIREMENT (PRI 1-4)  
60% AREA REQUIREMENT (PRI 1-5)
3. METRIC PAN *(17 and 18)*  
SATISFY 100% CAT I TARGETS AT 205'  
100% CAT I TARGETS AT 85'  
APPROACH 98% AREA REQUIREMENT (PRI 1-5)
4. MAPPING-DEDICATED SATELLITE
5. MAPPING CAMERAS  
HIGH (\$10M/FLIGHT) RECURRING COST
6. METRIC PAN  
RELATIVELY LOW RECURRING COST; BECOMES PART  
OF BASELINE PAN CAMERA

CANCEL HEXAGON

AFTER SV-18

CONTINUE HEXAGON

~~TOP SECRET~~

HEXAGON

~~TOP SECRET~~

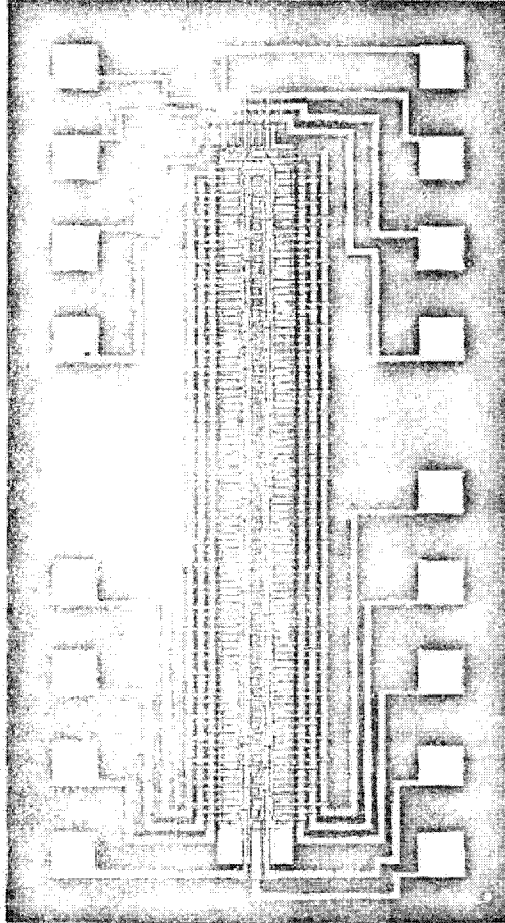
HANDLE VIA BYEMAN CONTROL  
SYSTEM ONLY

CONCLUSION

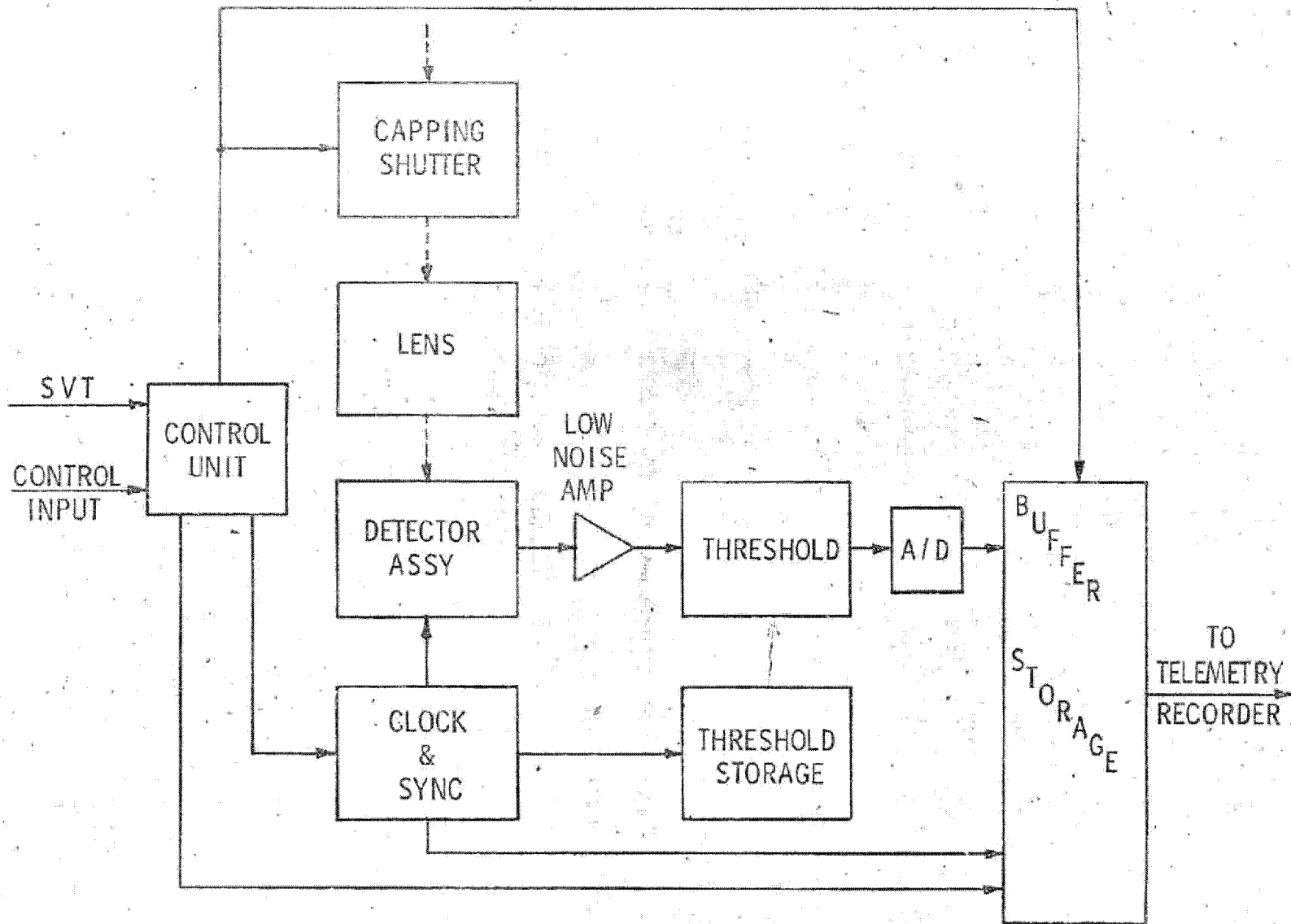
- DMA HAS OPTIONS UNTIL 15 DECEMBER 1974
- NRO STAFF IS AVAILABLE FOR ANY HELP REQUESTED
- (OPINION) REQUIREMENTS IS THE REAL ISSUE (ORIGINAL BUY OF  
12 WAS WELL CONSIDERED)

~~TOP SECRET~~

CCD ARRAY

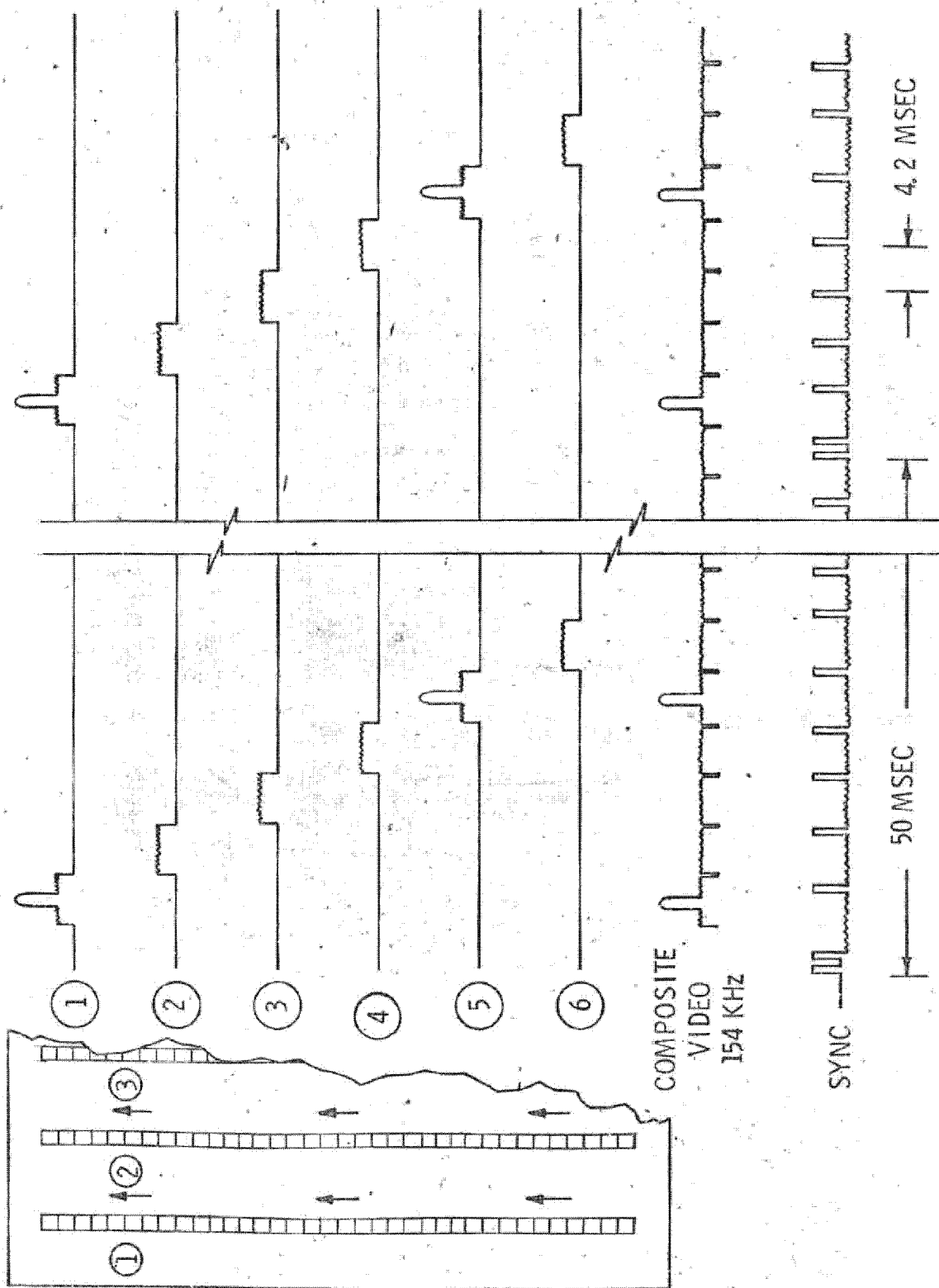


6/26/74 TJG

S<sup>3</sup> CAMERA BLOCK DIAGRAM

9/23/74

SCANNING SEQUENCE AND WAVEFORMS



9/23/74 TJG