23092-66 held at BD944

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NAVY SATELLITE PROGRAM C

DECEMBER 2, 1966

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BYE-51900-69 Cy #1

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SECURITY

This document contains information affecting the national defense of the United States within the meaning of the Espionage Laws, Title 18, U.S.C., Sections 793 and 794. The transmission or the revelation of its contents in any manner to an unauthorized person is prohibited by law.

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BASIC POPPY SYSTEM CONCEPTS

1. Long Life
   a. Simple ELINT experiments in the Satellites
   b. Low Power consumption and redundant circuitry utilized.
2. Unity Probability of Intercept (Every time the satellites are illuminated by the Main Lobe they transpond, pulse for pulse).
3. System transponds Analog data to the ground stations.
4. Offers choice of many bands of frequency coverage, giving the emitters' frequency to <10 to 20% accuracy in the spectrum below 1000 mc and to between 4% and 15% above 1000 mc.
5. Collection and storage on Magnetic Tape at the ground station.
6. All data reduction is on the ground.
7. Preliminary processing at stations.
8. Stations report by message, the High-Priority ELINT targets heard, using simple analysis equipment.
9. Final Data processing at NSA.

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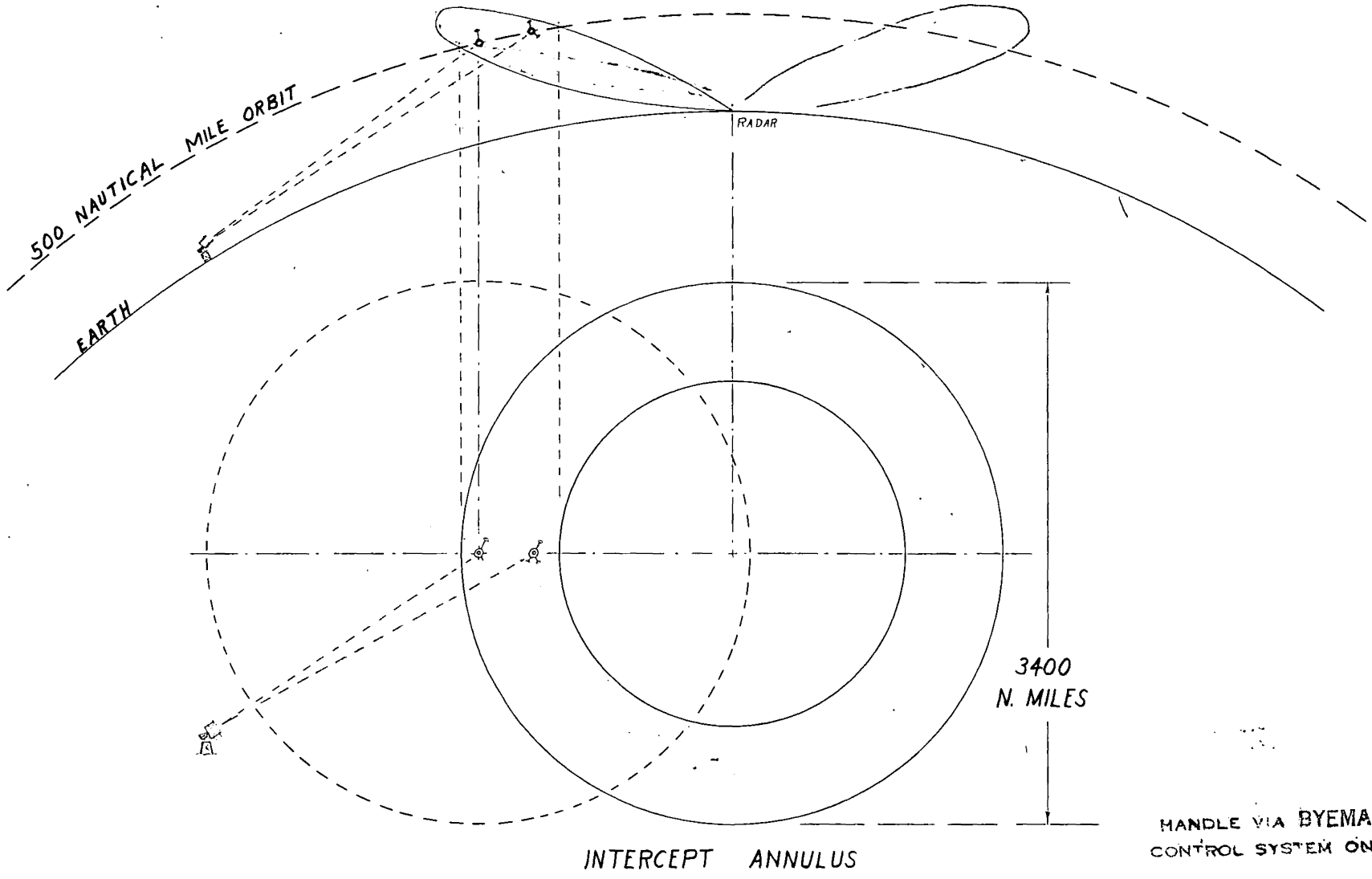
INTERCEPT SYSTEM CONCEPT



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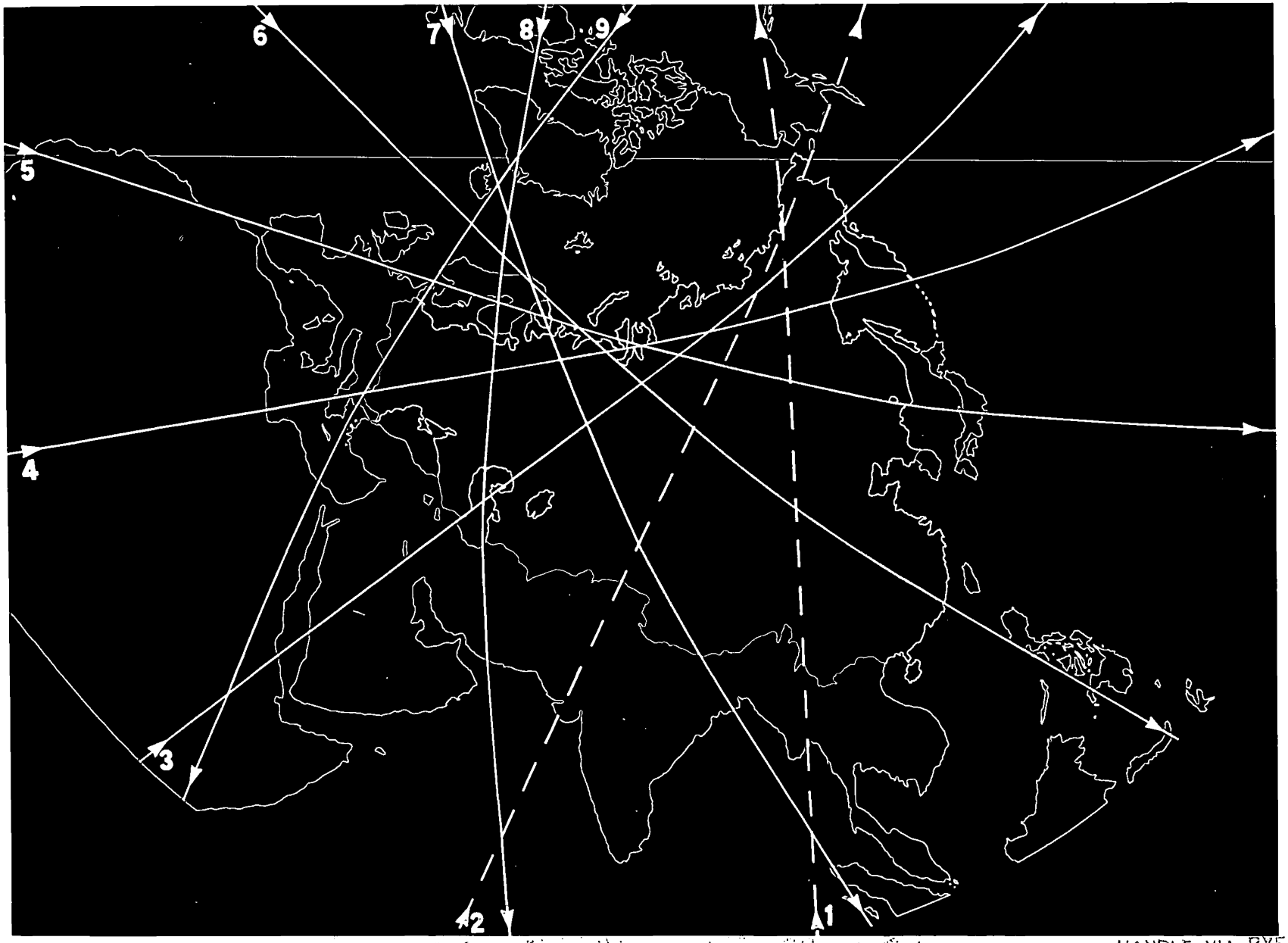

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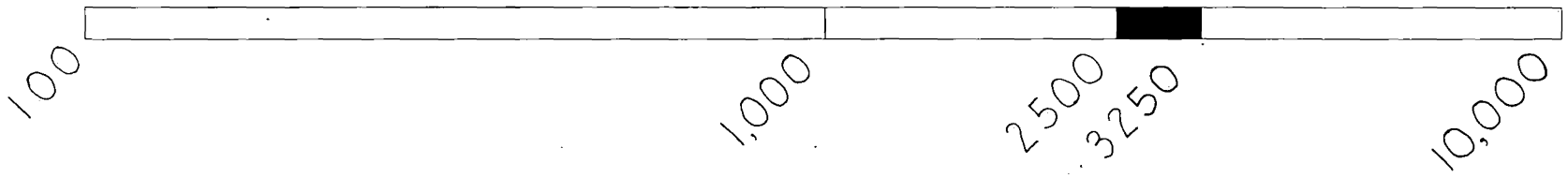

DYNO I BAND COVERAGE

LAUNCHED JUNE 1960

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DYNO I SPECIFICATIONS

Orbit:

Launched 22 June 1960 from Cape Canaveral with TRANSIT IIA

330 X 565 nautical Mile Orbit altitude 66.7° Inclination

As a Navy Program Prior to the establishment of the NRO

Satellite:

20 Inch Diameter

42 pounds in weight.

90 days Useful Intelligence Collection Lifetime.

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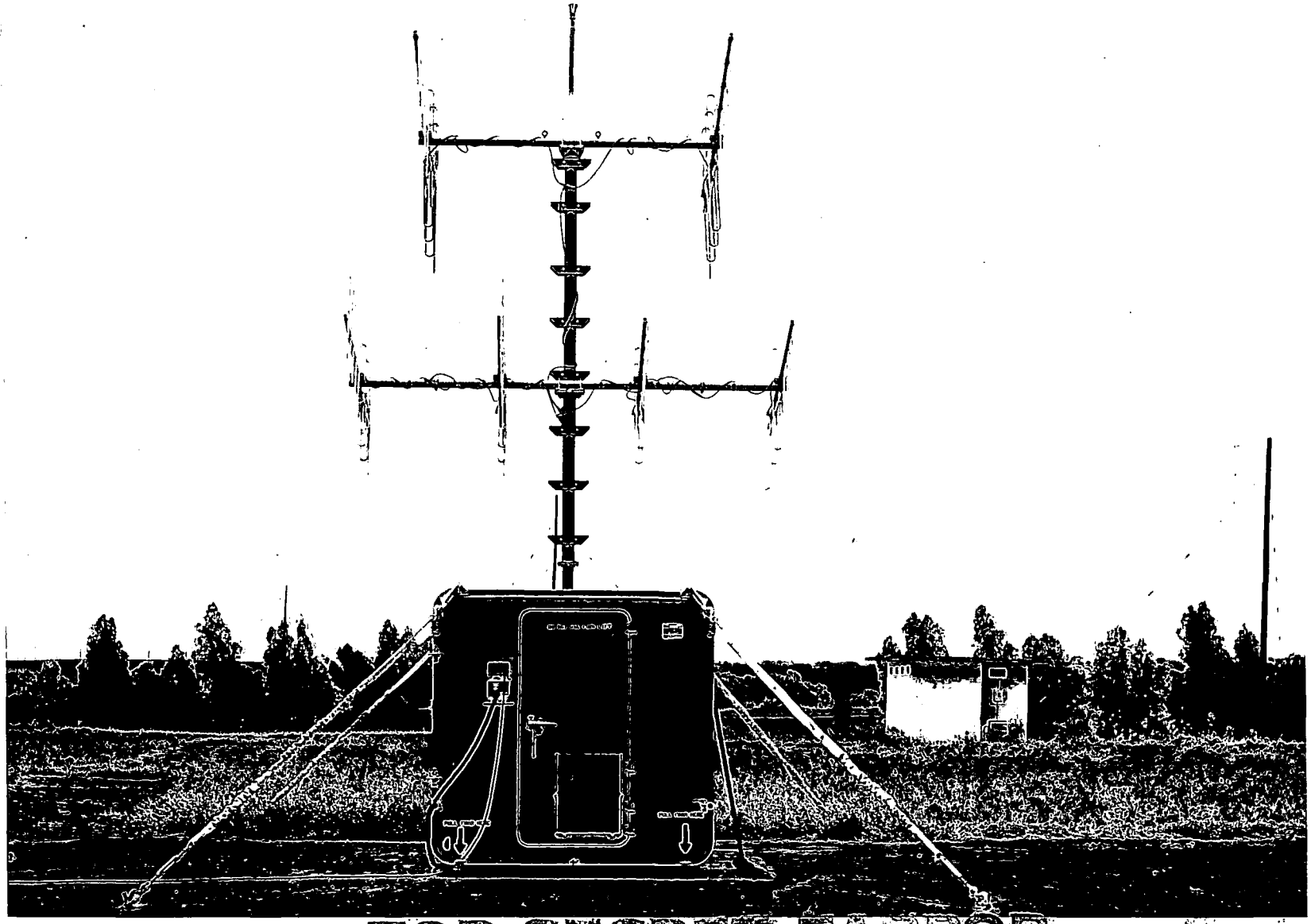

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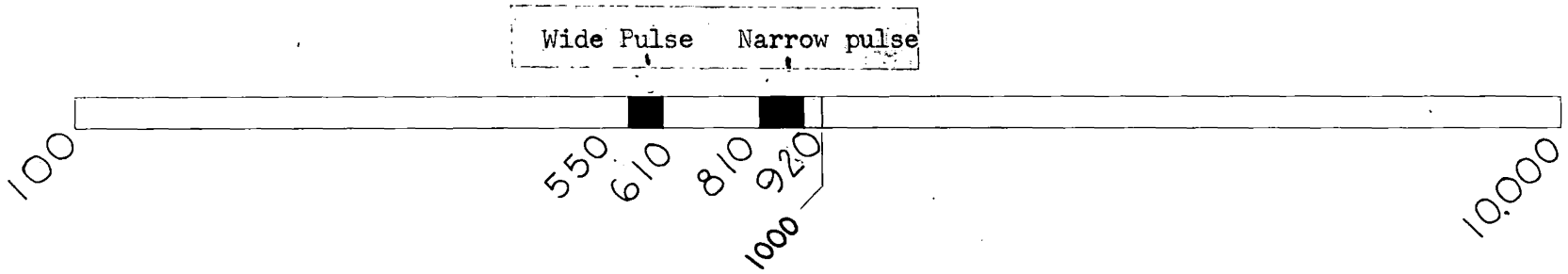

DYNO II BAND COVERAGE

LAUNCHED JUNE 1961

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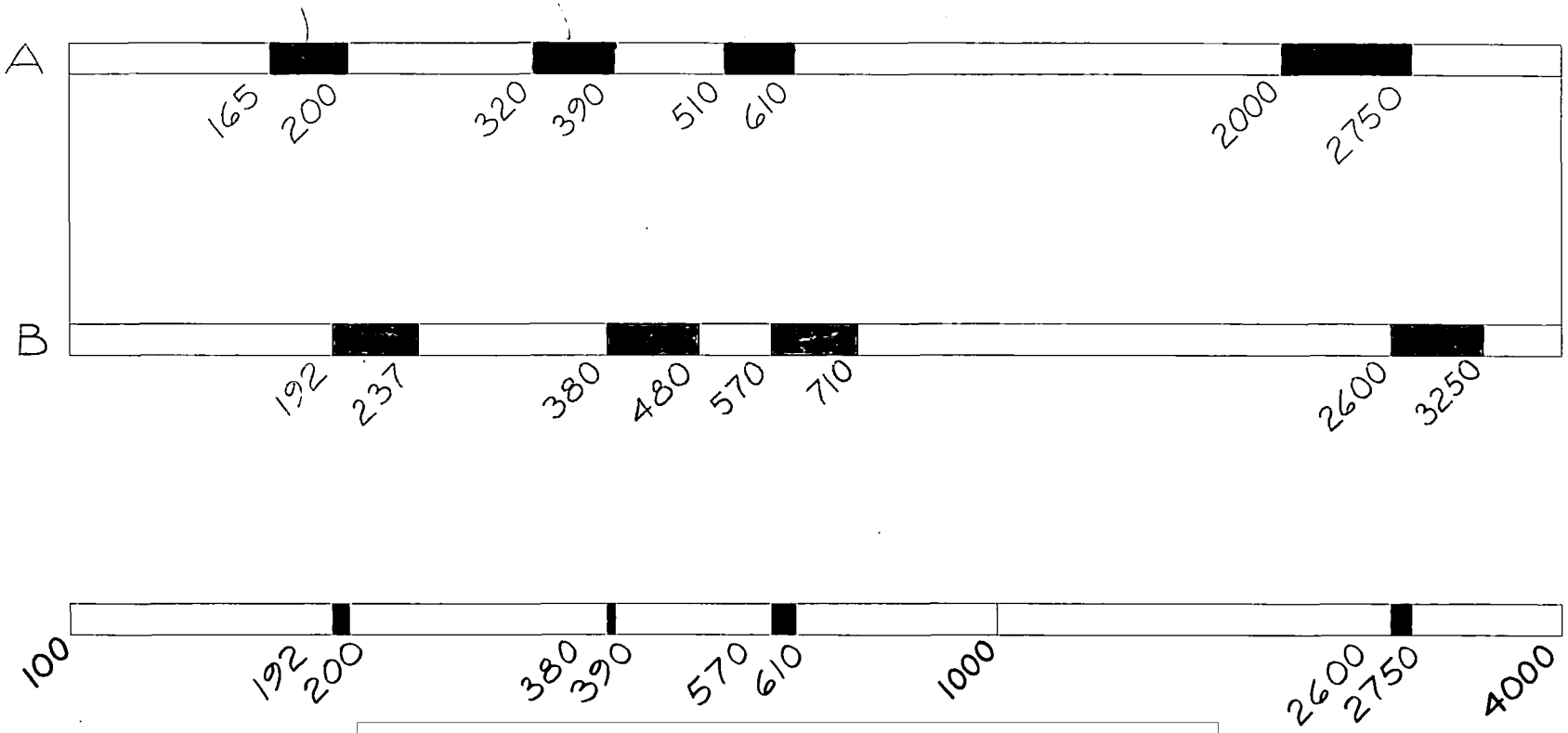
DYNO II SPECIFICATIONS

ORBIT:

Launched 29 June 1961 from Cape Canaveral with TRANSIT IVA
475 × 540 Nautical Mile Orbit altitude and 66.8° Inclination
As a Navy Program Prior to the Establishment of the NRO

SATELLITE:

20 inch Diameter
55 pounds
14 months of useful Intelligence-Collection Lifetime



7101 BAND COVERAGE

LAUNCHED - DEC 1962

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MISSION 7101 SPECIFICATIONS

ORBIT:

Two Satellites launched 13 December 1962 from Western Test Range
124 × 1500 n. mi. Altitude and 70.3° Inclination
First POPPY Launch sponsored by the NRO

SATELLITE:	7101A	7101B
Diameter	20 inches	20 inches
Weight	55 pounds	55 pounds

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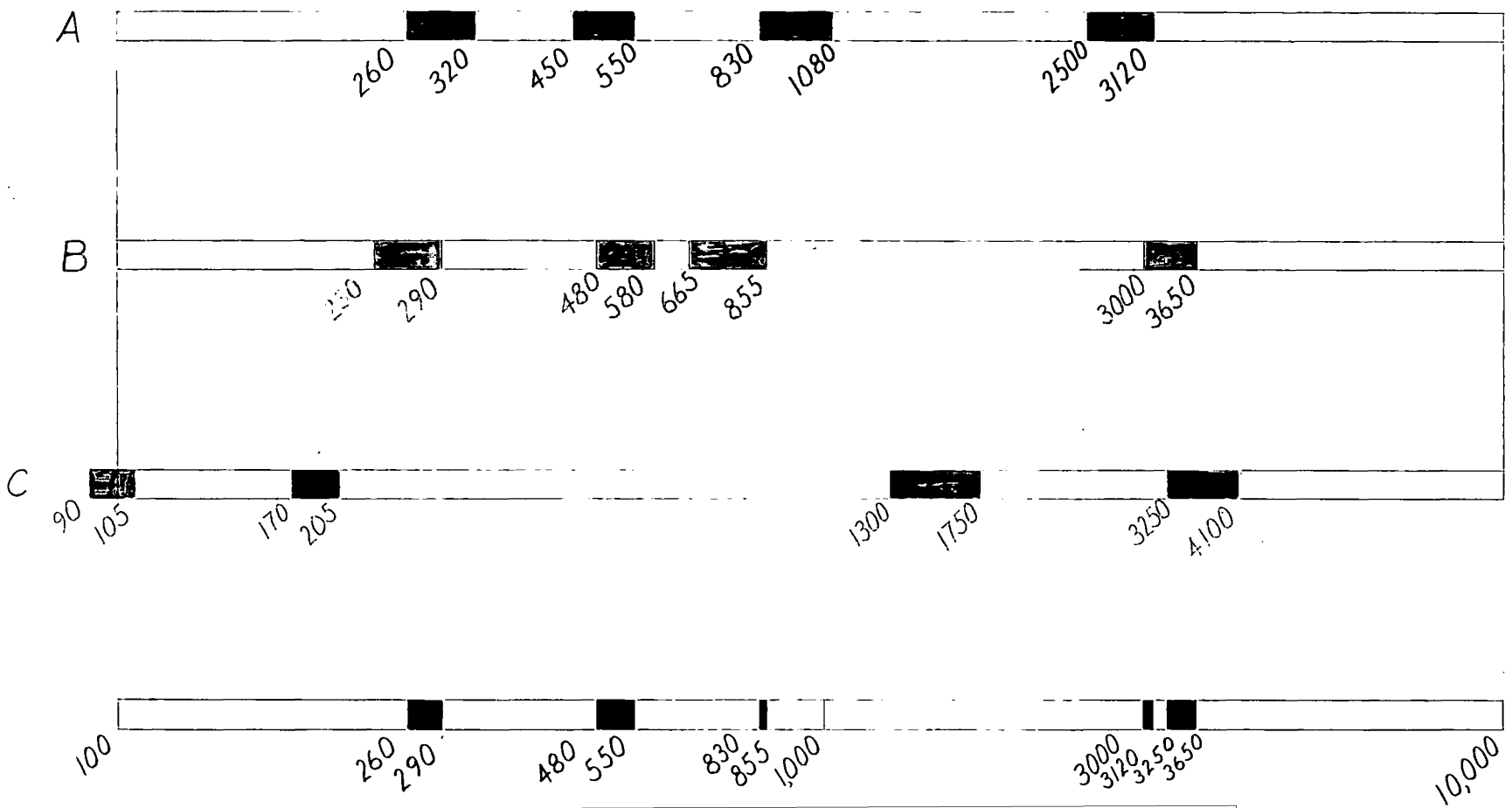

7102 BAND COVERAGE
LAUNCHED JUNE 1963

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MISSION 7102 SPECIFICATIONS

ORBIT:

Three Satellites Launched 15 June 1963 from Western Test Range.
96 × 495 nautical Mile Altitude and 69.9° Inclination.
45 day total lifetime.

SATELLITES:	7102A	7102B	7102C
Diameter	24 inches	20 inches	20 inches
Weight	85 pounds	85 pounds	60 pounds

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ELINT EXPERIMENT:

Twelve collection Bands ranging from 90 mc to a high of 4,100 mc.
Five portions of spectrum

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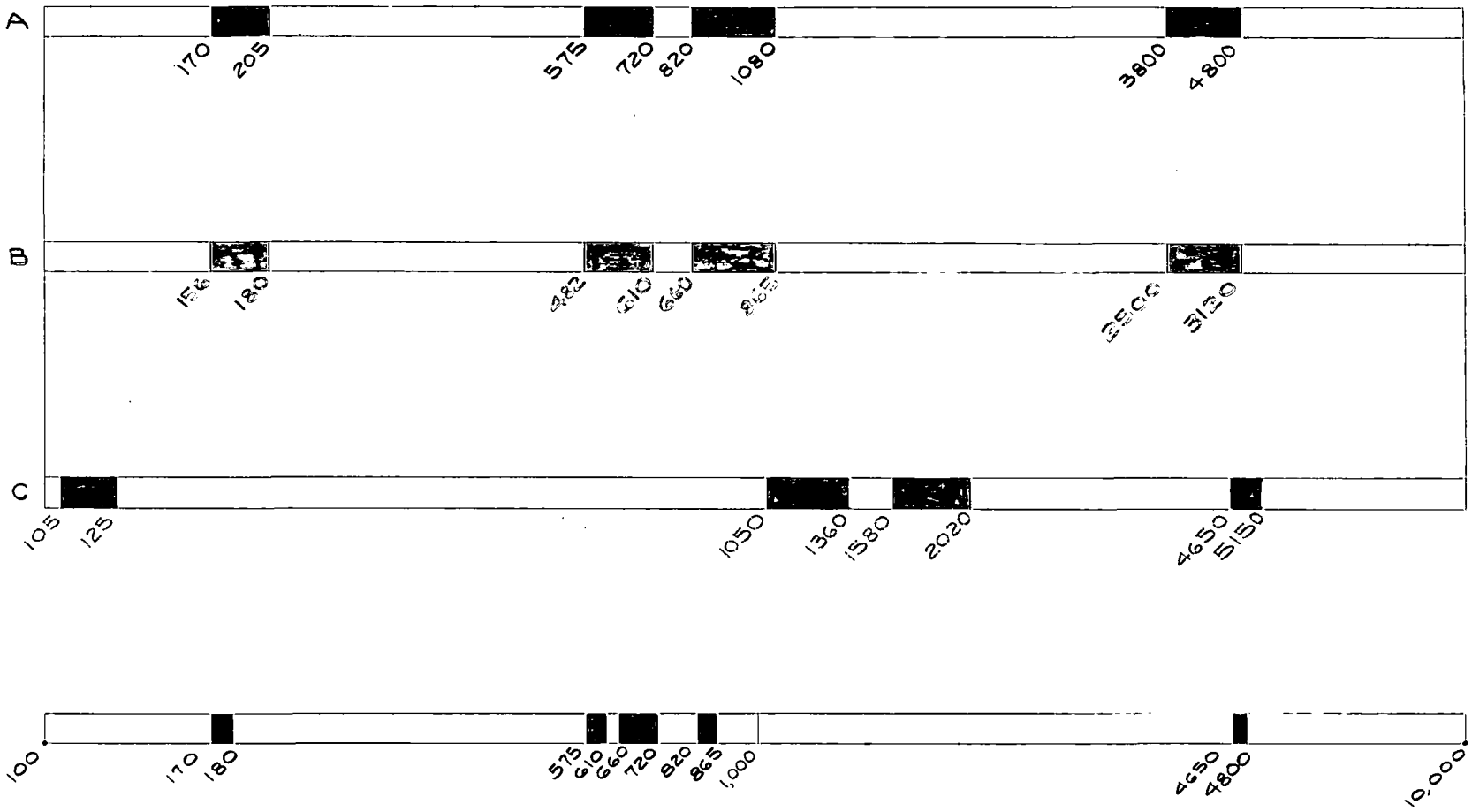

7103 BAND COVERAGE

LAUNCHED ~~MARCH~~ 4 Jan 1964

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MISSION 7103 SPECIFICATIONS

ORBIT:

1. Three Satellites Launched 11 January 1964 from Western Test Range.
2. 490 X 506 nautical mile Altitude attained at 69.9° Inclination.

SATELLITES:	7103A	7103B	7103C
1. Diameter (inches)	20	24	20
2. Weight (pounds)	65	89	84
3. Stabilization	Spinning	tumbling	2-Axis Gravity Gradient
4. Date of last use	27 Mar 65	28 July 65	20 Jan 1968

ELINT EXPERIMENTS:

1. Pulse Width measurement demonstrated which was capable of discriminating between the two TALL-KING Pulse widths

3. The 7103C satellite was the first two Axis Gravity Gradient Stabilization attempt in the POPPY effort and did succeed at orienting the satellite to within 8°.

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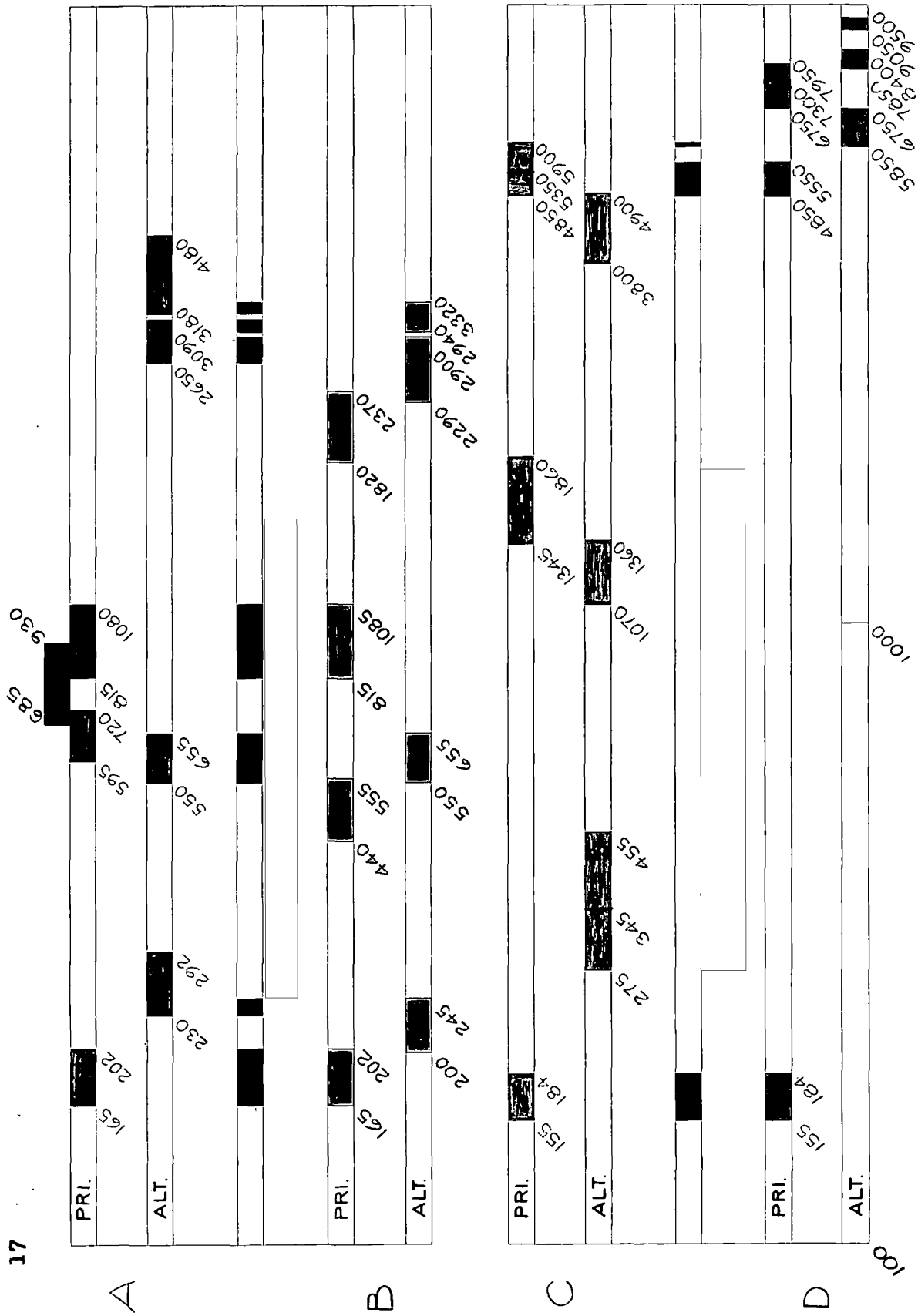

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7104 BAND COVERAGE
LAUNCHED MARCH 1965

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MISSION 7104 SPECIFICATIONS

ORBIT:

1. 4 satellites launched 9 March 1965 Western Test Range
2. 490 x 506 nautical mile orbital altitude attained at 70.1° inclination

SATELLITES:	7104A	7104B	7104C	7104D
1. Diameter (inches)	24	24	24	24
2. Weight (pounds)	103	106	130	130
3. Stabilization (method)	Spin	Tip mast	2 Axis (GGS)	3 Axis (GGS)
4. On-board Thruster	No	No	No	Yes
	operable			
5. Date of last use		5 July 66	29 OCT 68	31 Aug 66

FLINT SPECS.:

1.

2. Complete collection capability throughout spectrum 155 to 9,500 mc.
3. Sensitivities as high as - 74 dbm demonstrated in X-Band.
4.

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POPPY PROCESSING

1. TAPES TO NSA.
2. A TO D CONVERSION
3. BURST SELECTION
4. BEST CENTRE TIME AND P.R.I. CALCULATION
5. [redacted]

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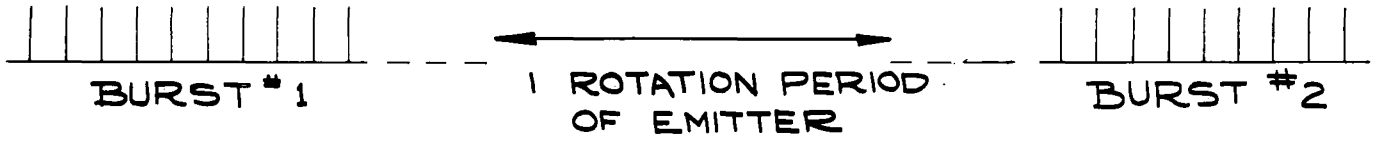
SYSTEM STABILITY



PRF OF SOME TARGETS SO STABLE AND NSA DATA REDUCTION SO ACCURATE THAT:-

A NEAR INTEGRAL NUMBER OF PRI'S IS OBSERVED BETWEEN ONE BURST AND THE NEXT.

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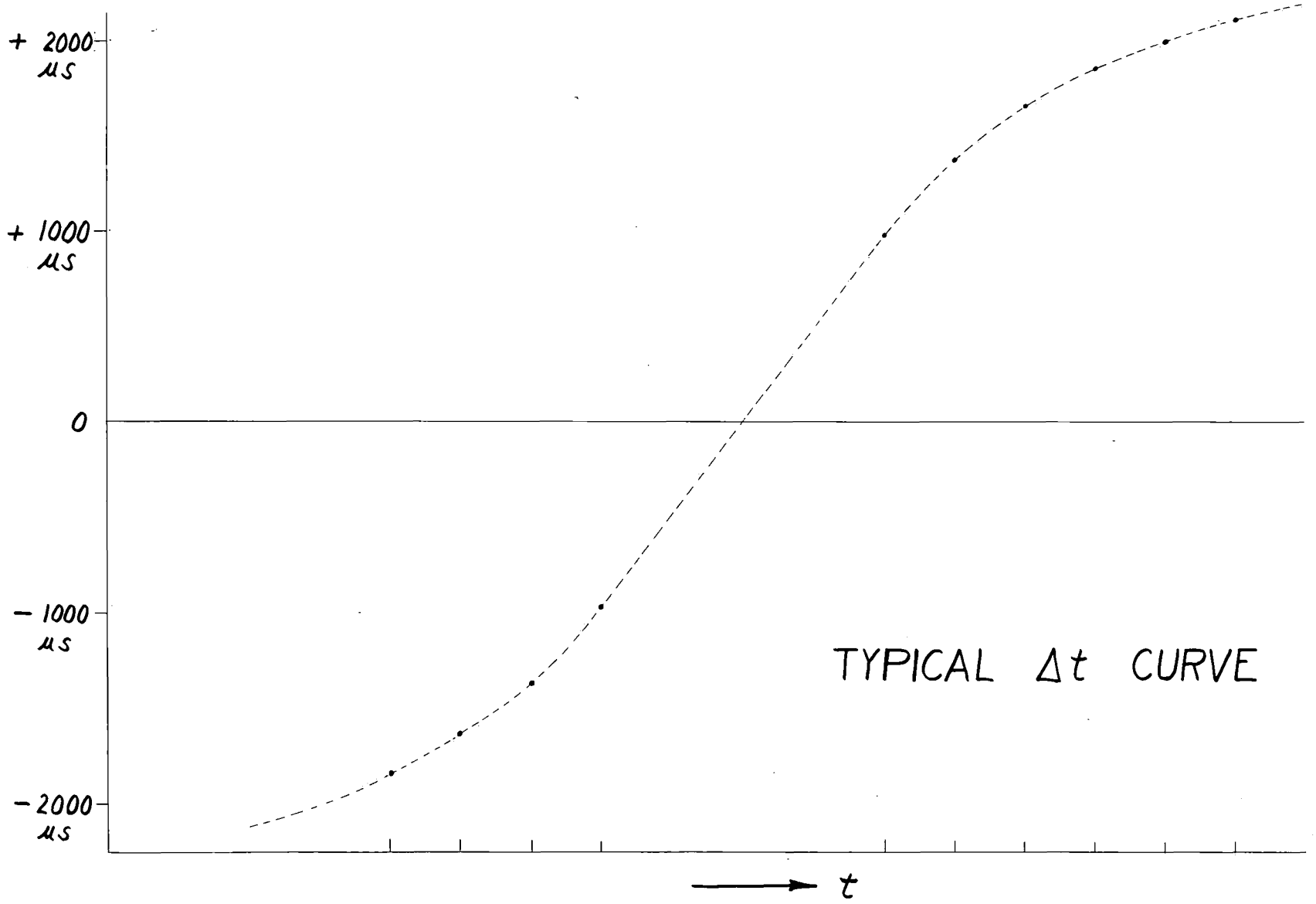

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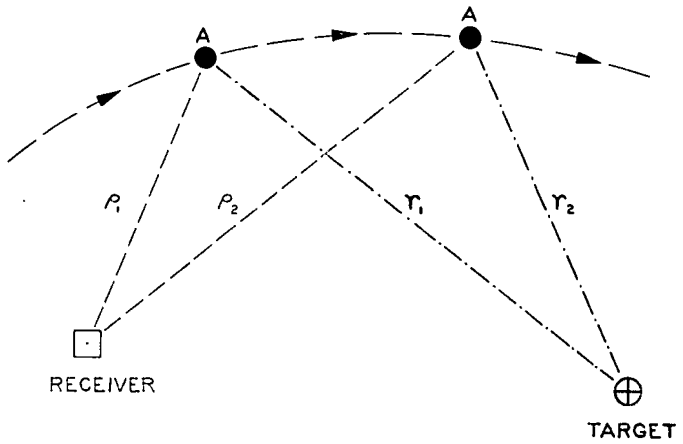
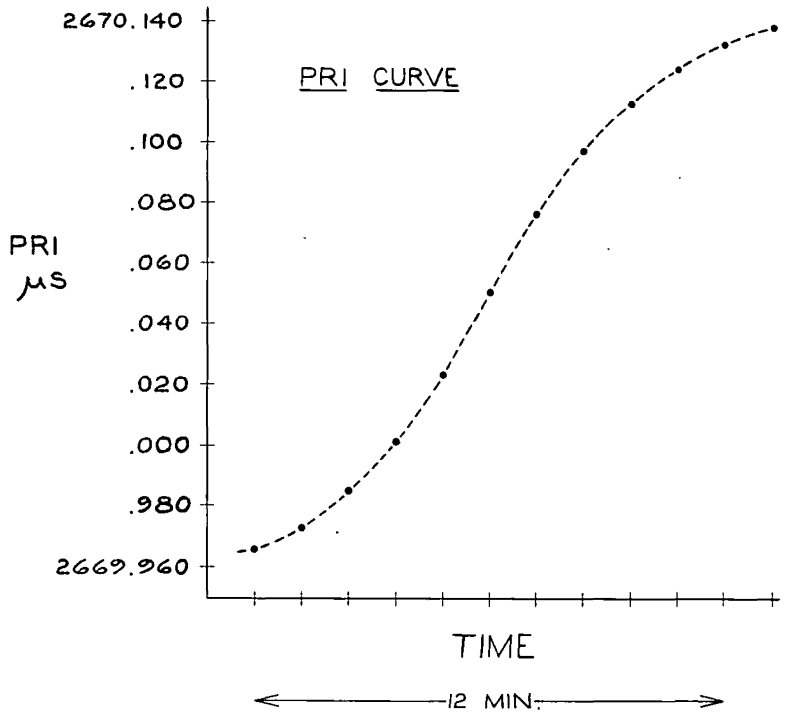
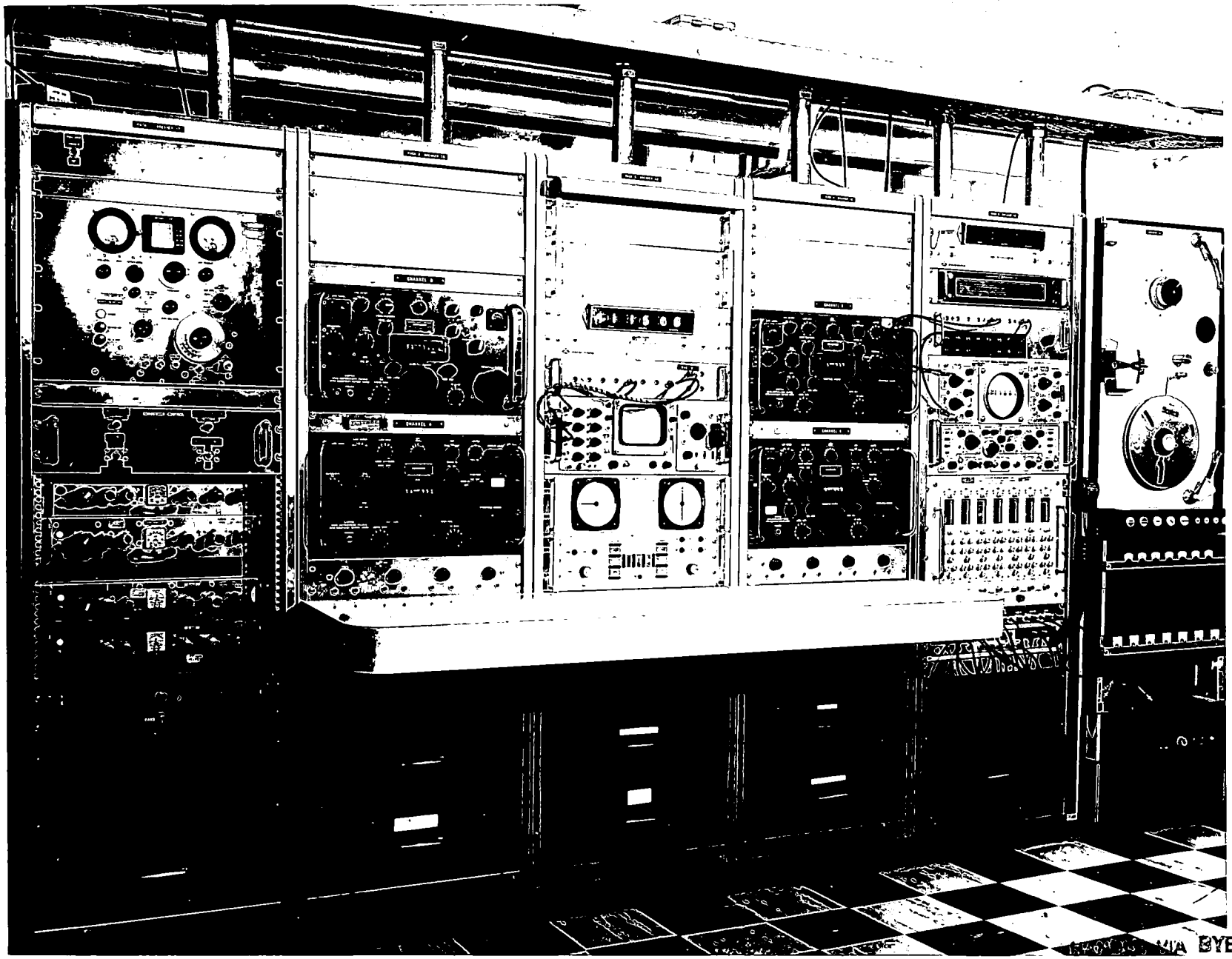


$$\frac{PRI_1}{PRI_2} - 1 = \frac{1}{C'} \frac{d(\rho + r)}{dt}$$

LEAST-SQUARES PROBLEM IN FOUR (FIVE) PARAMETERS



PRF DOPPLER LOCATION PROGRAM FROM A SINGLE SATELLITE



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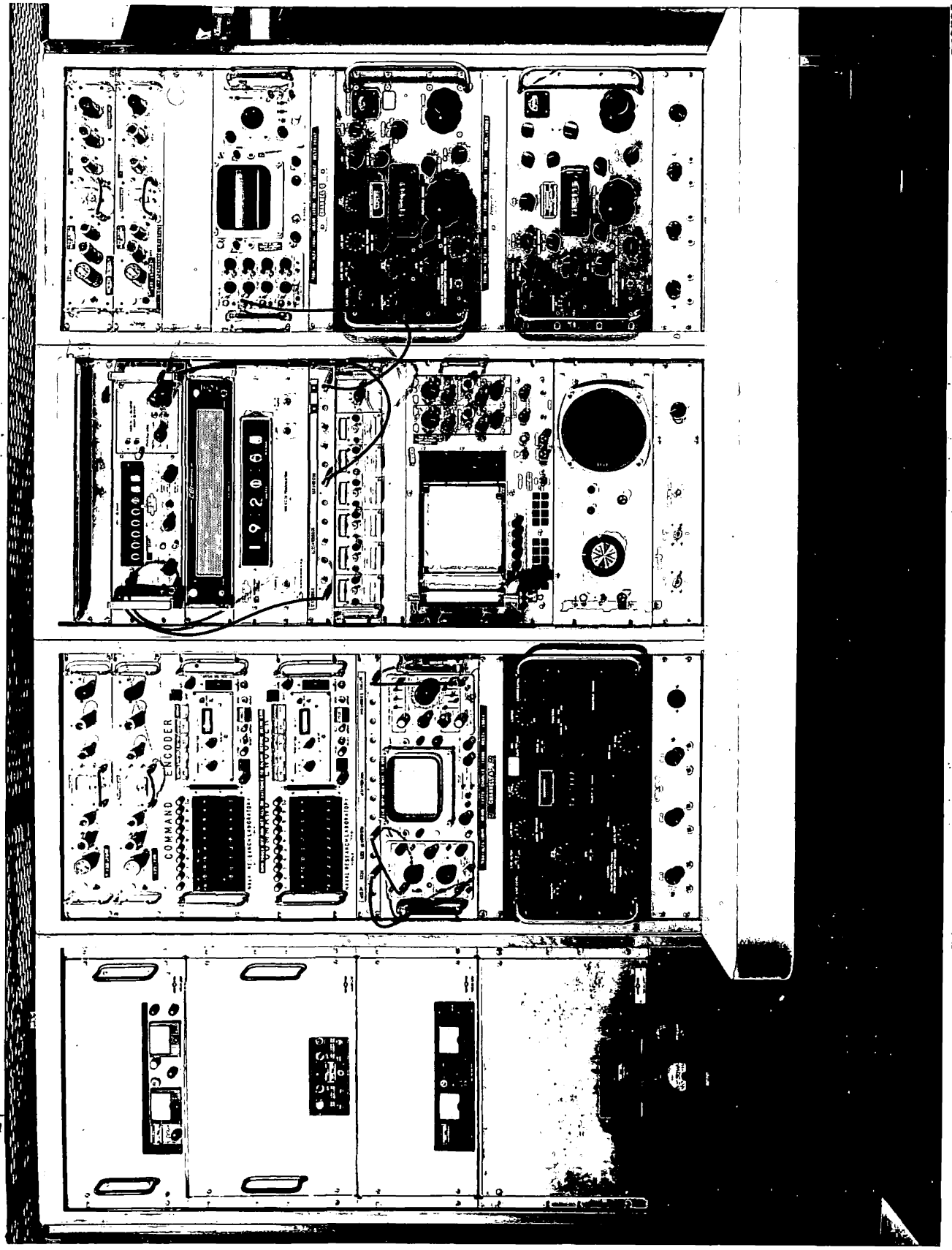

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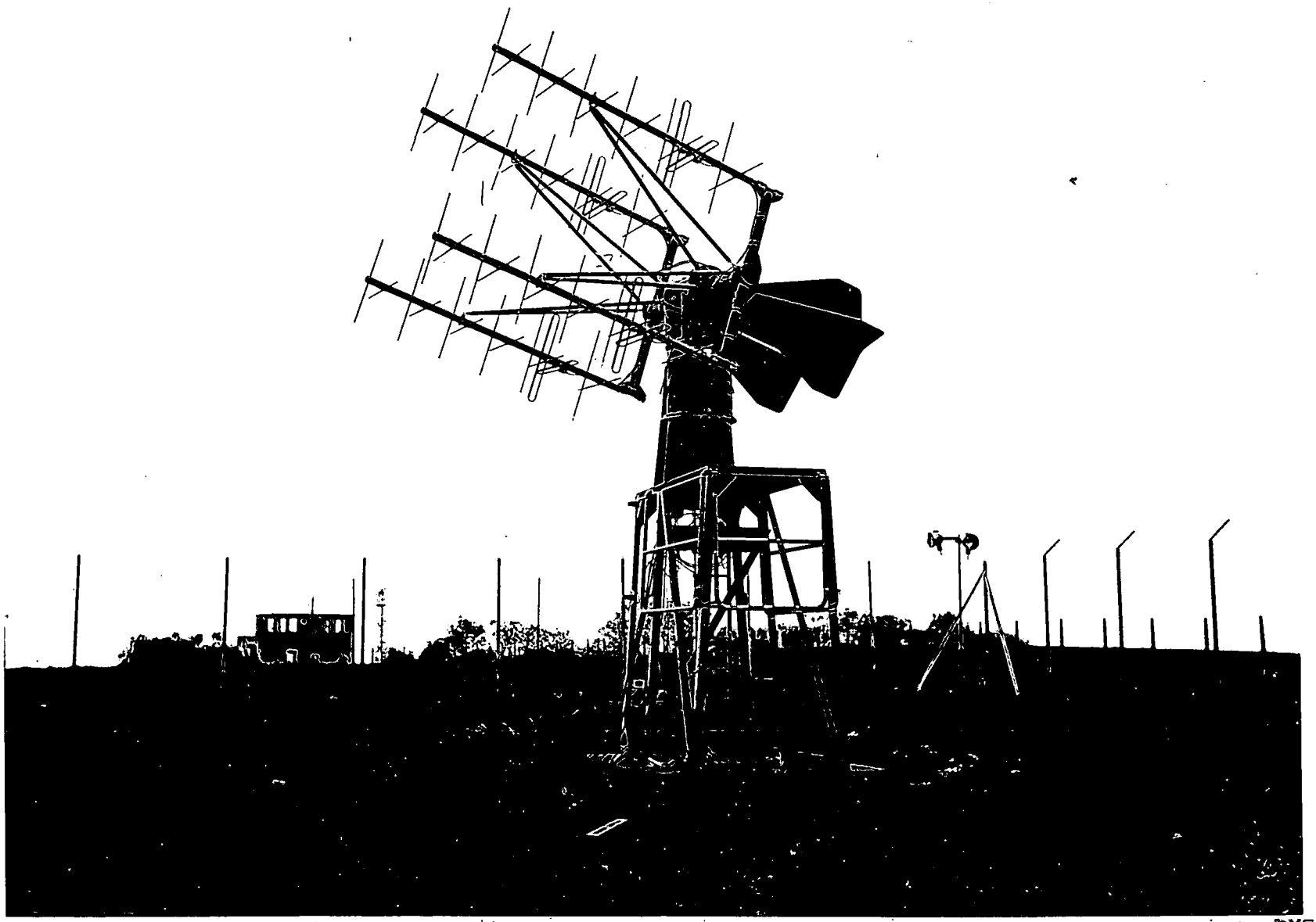

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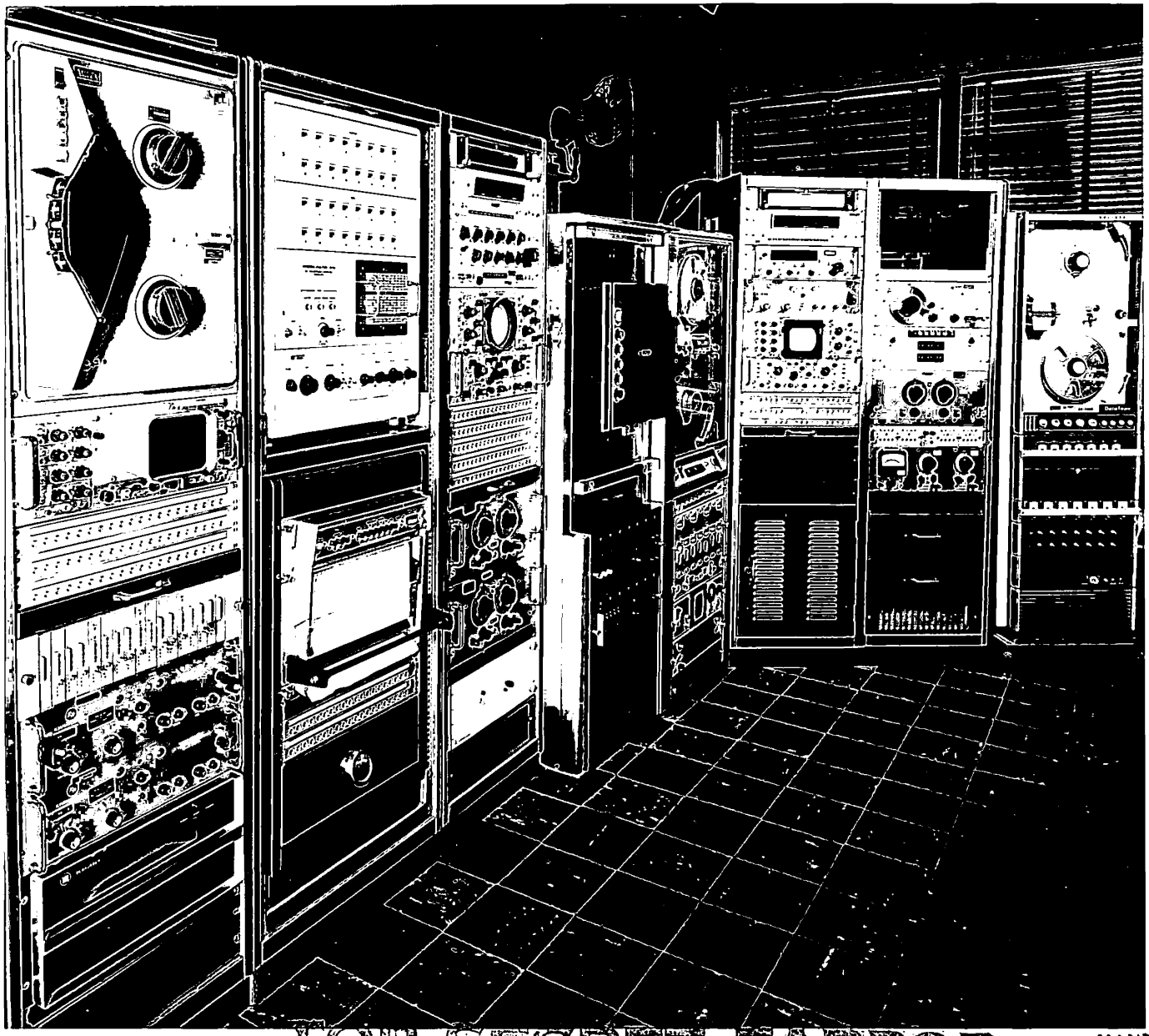

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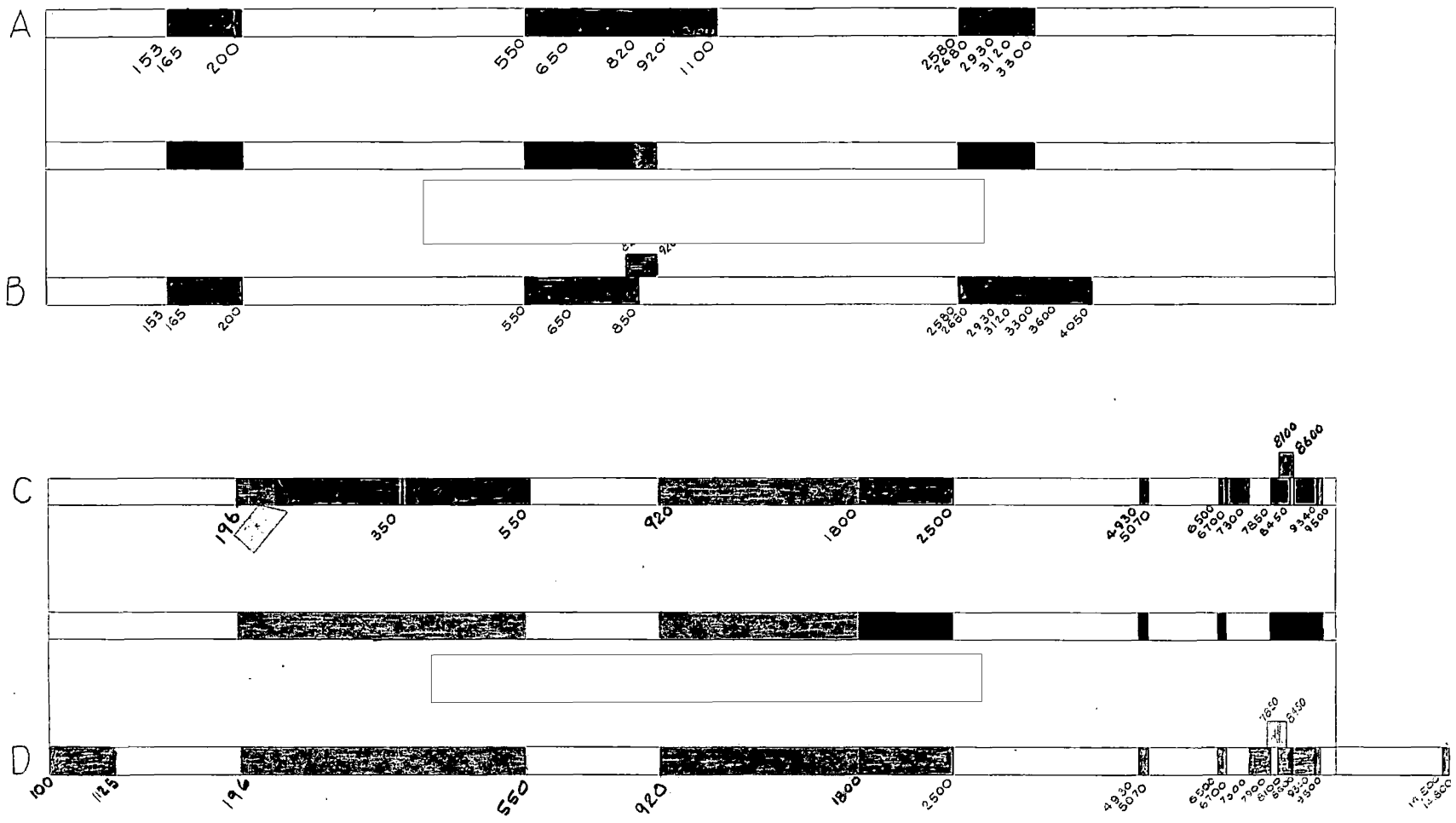

7105 BAND COVERAGE

LAUNCHED 31 MAY 1967

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MISSION 7105 SPECIFICATIONS

ORBIT:

1. Launched 31 May 1967 From Western Test Range.
2. 500 x 508 nautical mile Orbit attained at 70° inclination.
3. Four Satellites

SATELLITES:	7105A	7105B	7105C	7105D
1. Diameter Inches	24 round	27 multiface	27 multiface	27 multiface
2. Weight (pounds)	108.6	181.5	161.8	221.8
3. Thruster	no	Yes	no	Yes
4. Stabilization	2-Axis	3-Axis	2-Axis	3-Axis
5. Date of last use	operable	Operable	operable	operable

5. Stabilization will be 2-Axis and 3-Axis as indicated above, utilizing Gravity Gradient Stabilization systems and long booms.
6. Aspect Monitoring systems will be employed on all Satellites.

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MISSION 7105 ELINT SPECIFICATIONS

ELINT:

1. The Highest Frequency and Sensitivity thus attained in the POPPY Program are to be provided in the 14,400 to 14,800 mc collection band in Satellite 7105D. with sensitivities in excess of -100 dbm.

3. 7105A has available upon command, one band at a time, nine collection bands which can utilize

4. 7105B has available upon command, one band at a time, nine bands which can

5. 7105D in the band covering 7850 to 8450 mc will have available upon command an experiment

6. Sensitivities in excess of -78 dbm are available through the X-Band portion of the Frequency spectrum in Satellites 7105C and D.

7. 7105A and B will have available for the first time in POPPY, the ability to be

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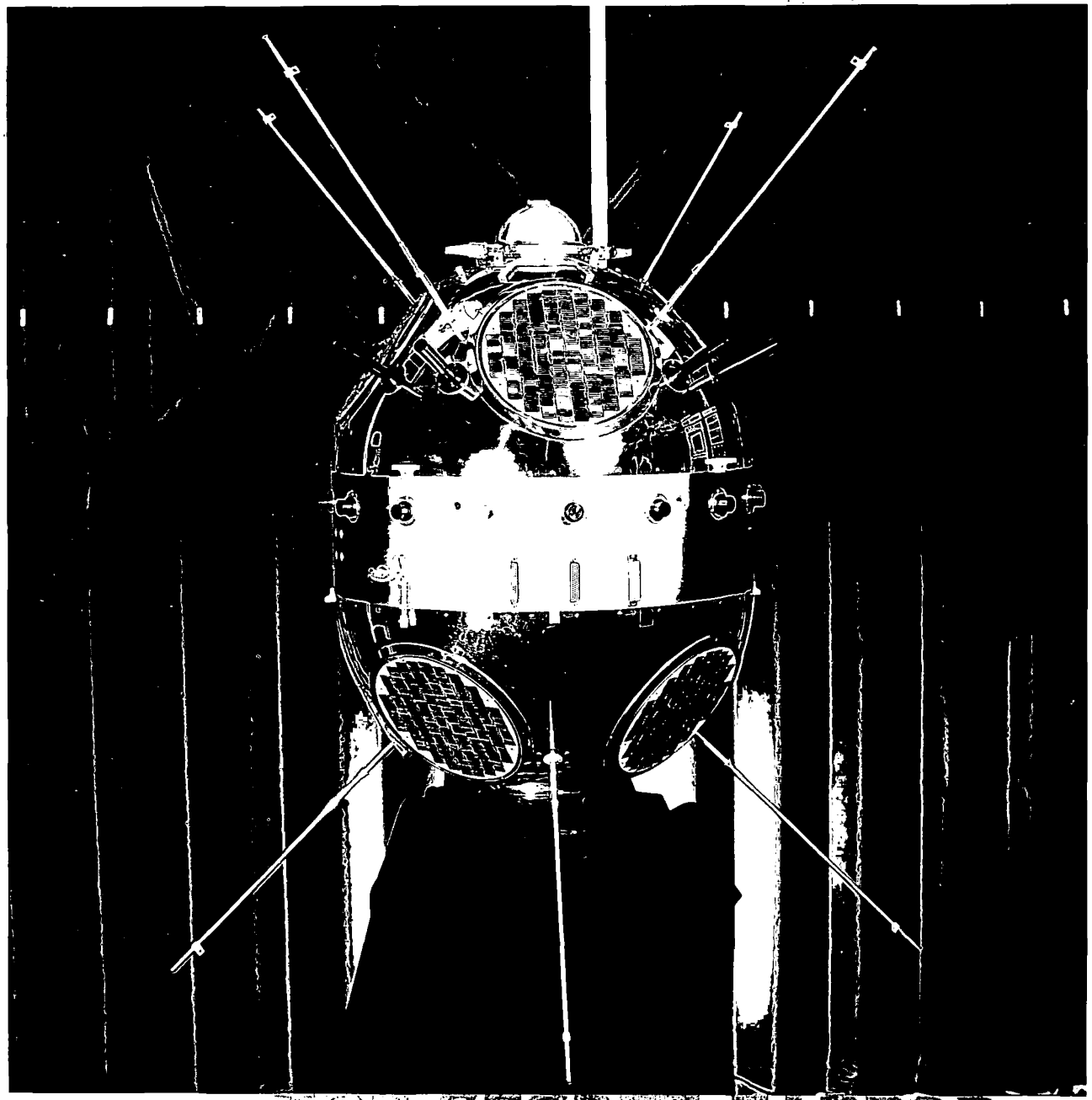

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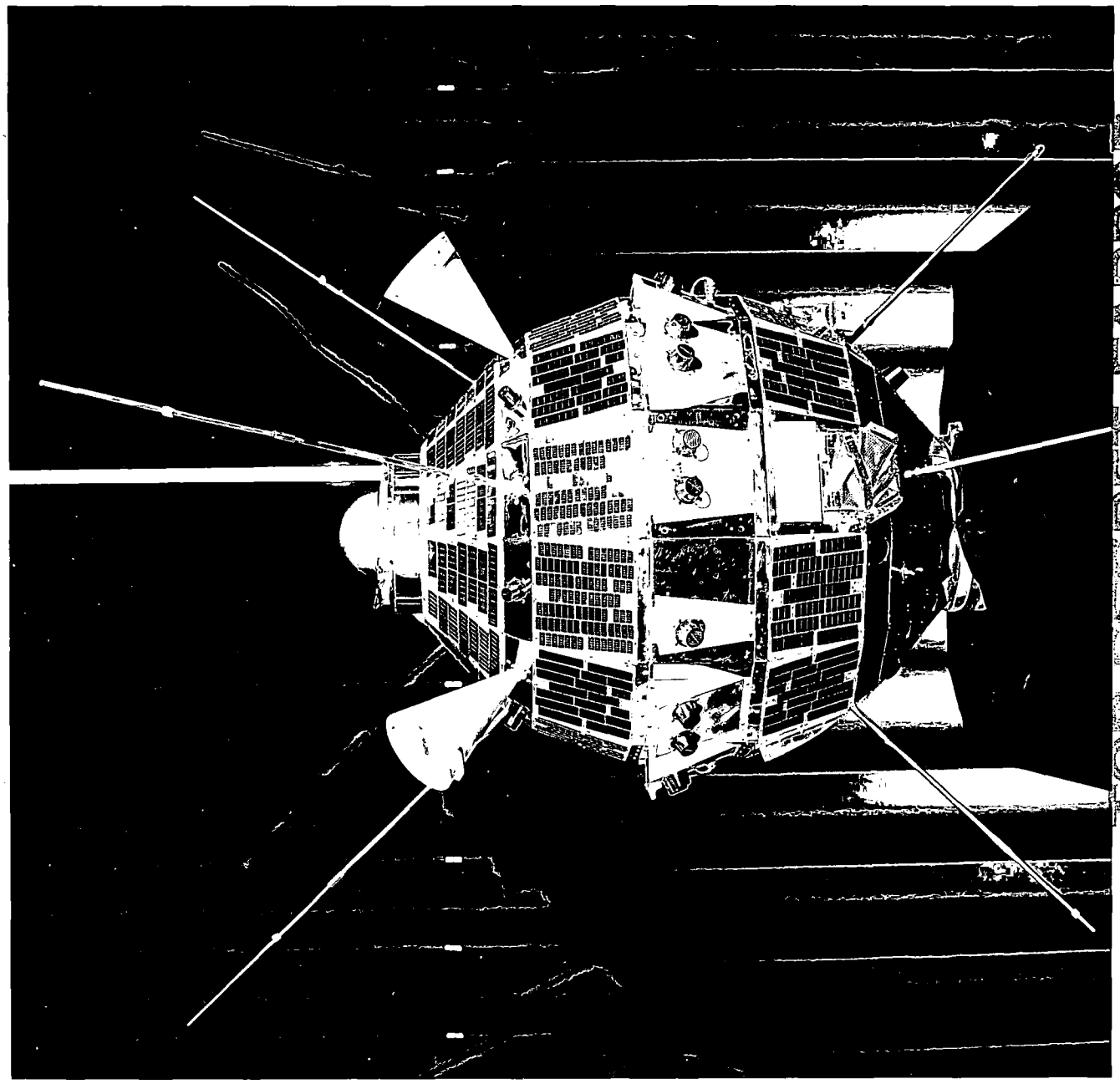

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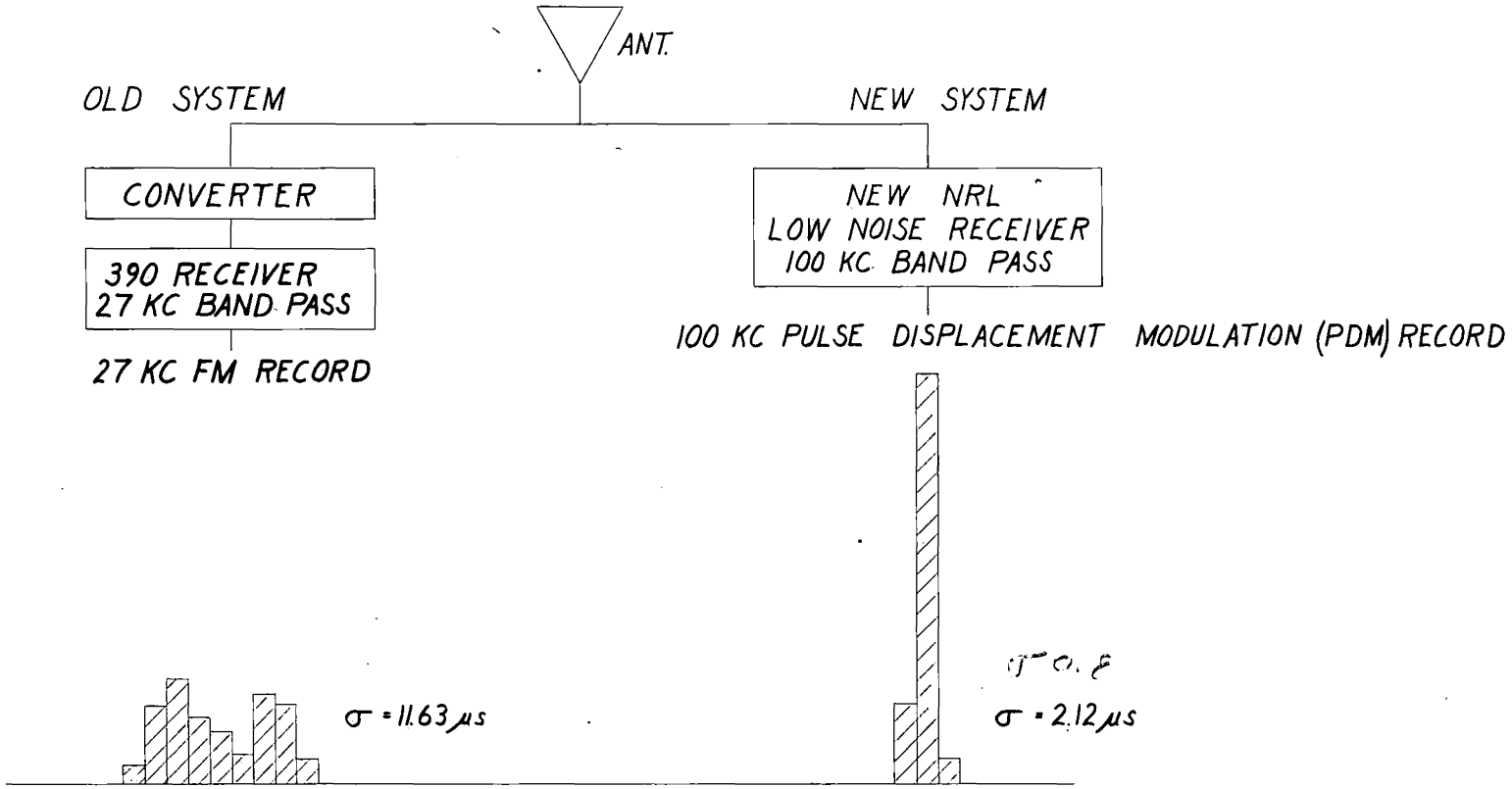
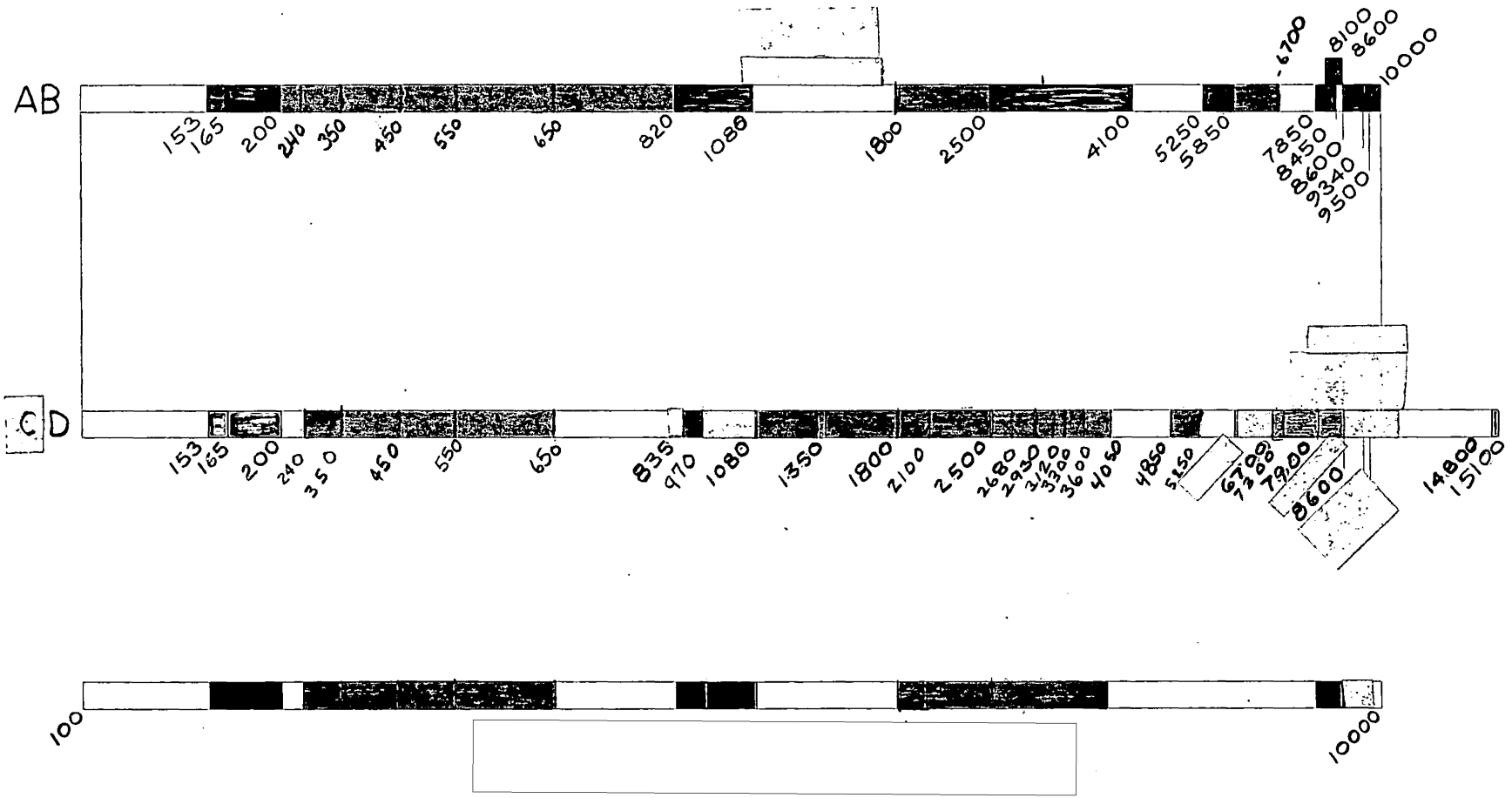
COMPARISON OF TWO RECEIVER SYSTEMS



IMPROVED DATA WILL MEAN:

1 - LESS DATA REQUIRED TO LOCATE A TARGET
2 - MORE TARGETS CAN BE LOCATED
3 - BETTER ACCURACY OF LOCATION



7106 BAND COVERAGE

PROPOSED LAUNCH FY 68

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