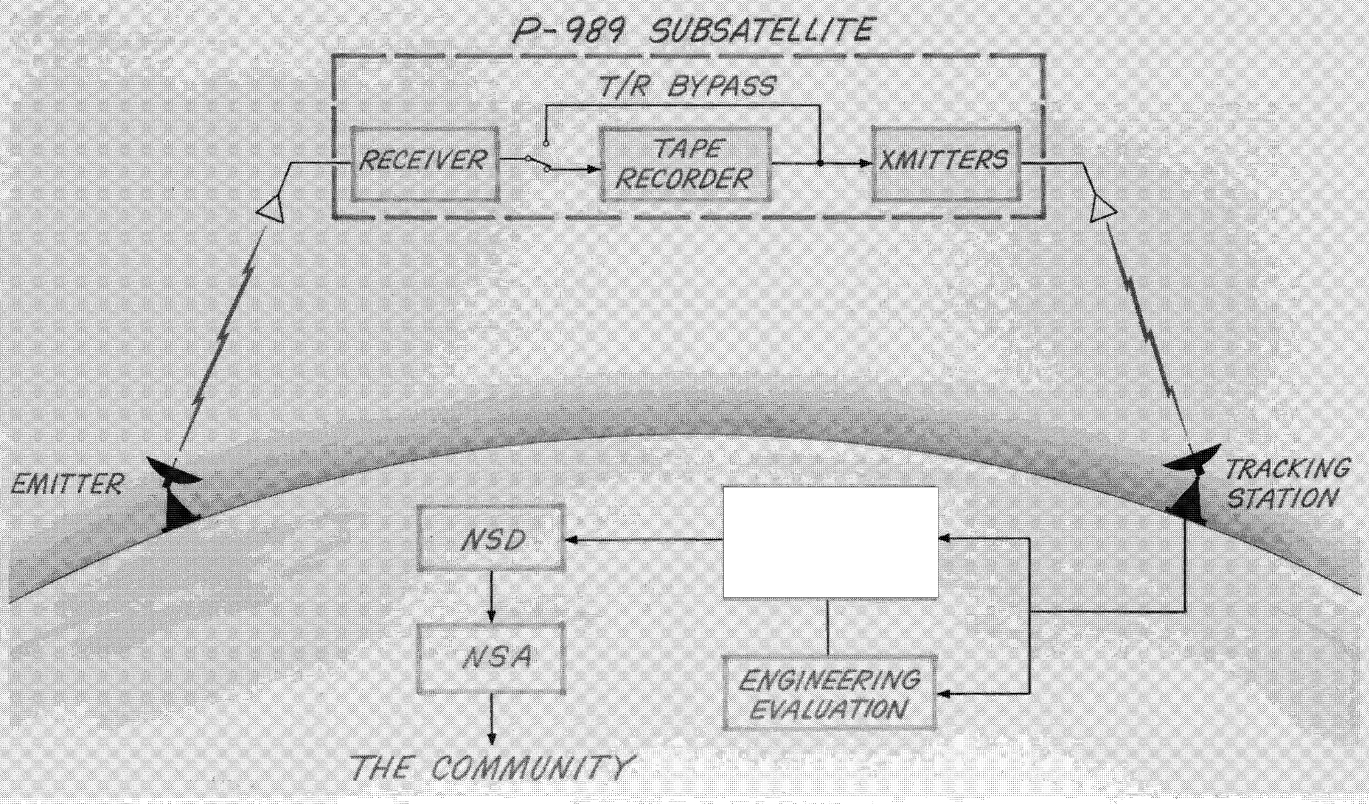
TOP SECRET / E

SYSTEMS DATA FLOW



50X1

TOP SECRET / E

HANDLE VIA BYEMAN
CONTROL SYSTEM ONLY

PROGRAM P-11 OVERVIEW

PROGRAM P-11 SPACECRAFT ARE SUBSATELLITES THAT ARE DEPENDENT UPON HOST VEHICLE PROGRAMS FOR LAUNCH AND INSERTION INTO ORBIT. CURRENTLY, PROGRAM P-11 SPACECRAFT ARE BEING LAUNCHED BY BOOSTERS OF THE NEW HOST VEHICLE (NHV) PROGRAM.

ELINT, COMINT, AND TELINT MISSIONS HAVE BEEN AND ARE NOW BEING ACCOMPLISHED BY PROGRAM P-11 SPACECRAFT. THESE MISSIONS INCLUDE GENERAL SEARCH IN THE FREQUENCY RANGE FROM 50 TO 18,000 MHz, DIRECTED SEARCH IN THE FREQUENCY RANGE FROM 50 TO 4020 MHz, ELECTRONIC ORDER OF BATTLE (EOB) EMITTER LOCATION, AND COMMUNICATIONS INTELLIGENCE.

PROGRAM P-11 PROVIDES THE AIR FORCE WITH A QUICK-REACTION CAPABILITY IN THE FIELD OF ELECTRO-MAGNETIC RECONNAISSANCE. FOR EXAMPLE, THE FIRST ABM RADAR SEARCH SYSTEM (SPACECRAFT 4410/ FACADE) WAS DELIVERED READY FOR FLIGHT ONLY SEVEN MONTHS AFTER GO-AHEAD.

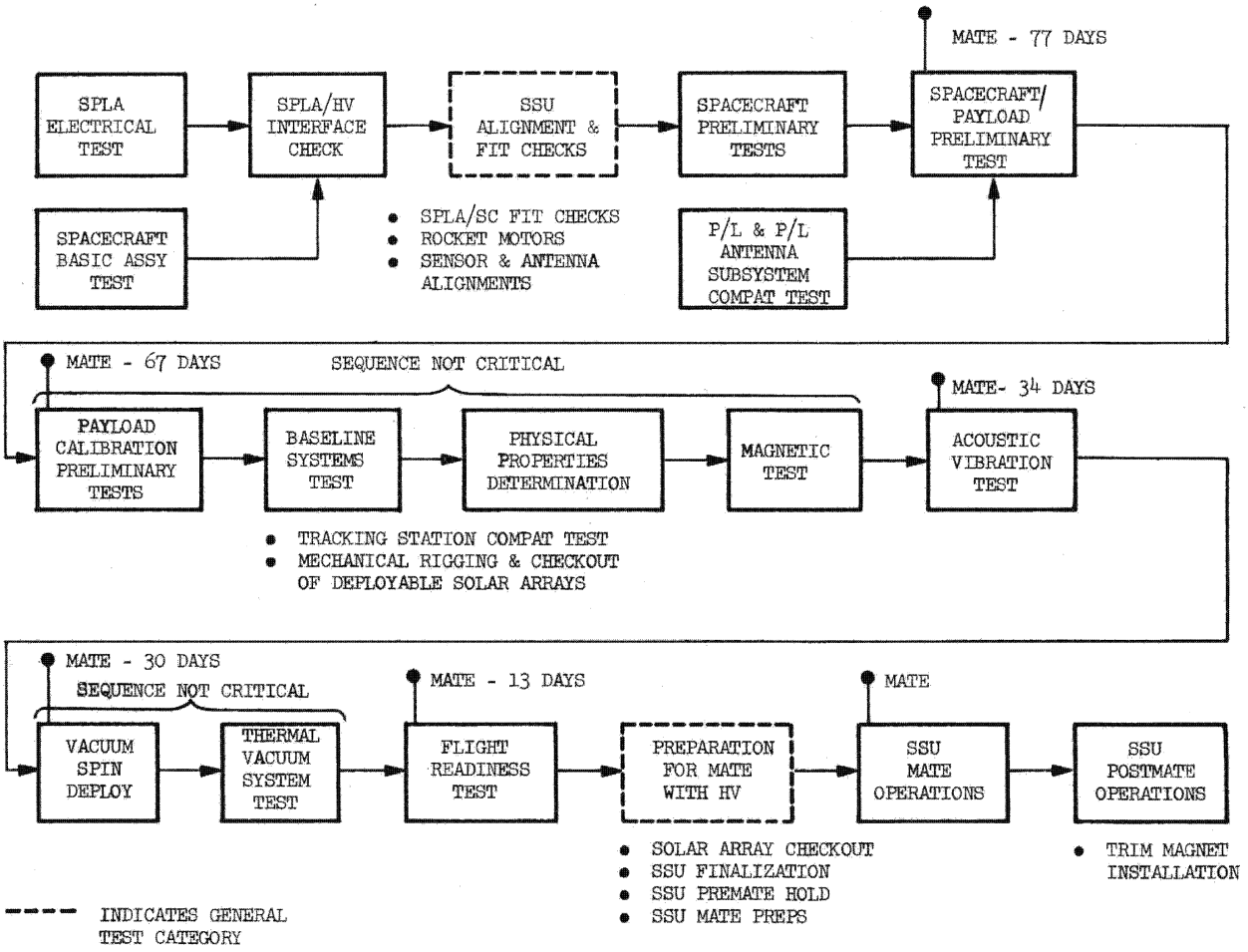
HANDLE VIA BYEMAN
CONTROL SYSTEM ONLY

PROGRAM P-11 MAJOR SUBCONTRACTORS

SUBCONTRACTOR	LOCATION	PAYLOAD
MOTOROLA	PHOENIX, ARIZONA	URSALA I, II, III
LTV E-SYSTEMS	DALLAS, TEXAS	TOPHAT I, II, AND RAQUEL

~~TOP SECRET / E~~

TYPICAL TEST SEQUENCE



~~TOP SECRET / E~~

HANDLE VIA BYEMAN
CONTROL SYSTEM ONLY

SPACECRAFT SUPPORT SYSTEMS

ATTITUDE CONTROL

- MAINTAIN STABLE SPACECRAFT ATTITUDE WITH ANTENNAS EARTH-ORIENTED
- VARY ATTITUDE TO STEER INTERCEPT ANTENNA BEAM FOR OPTIMUM CO-BORESIGHTING WITH TARGET BEAM

ORBIT ADJUST

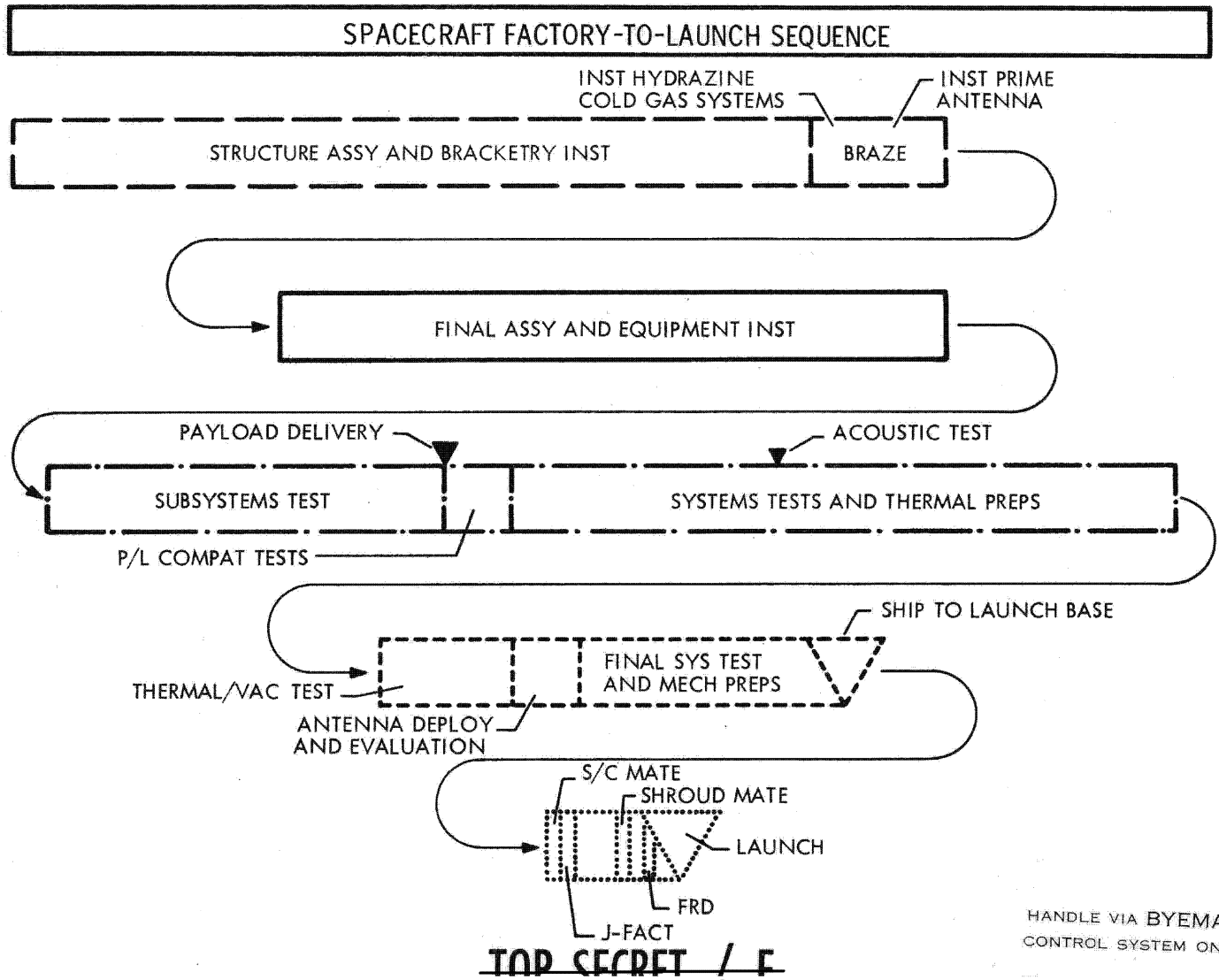
- MAINTAIN DESIRED ORBITAL PARAMETERS
- MOVE LOGITUDINAL POSITION

COMMUNICATIONS

- RELAY INTERCEPTED SIGNAL INFORMATION TO THE GROUND
- COMMAND CONTROL FROM GROUND TO SPACECRAFT
- PROVIDE SPACECRAFT OPERATIONAL AND HEALTH TELEMETRY

POWER

- PROVIDE POWER FOR SPACECRAFT EQUIPMENT EXCEPT DURING ECLIPSE PERIODS



HANDLE VIA BYEMAN CONTROL SYSTEM ONLY

HANDLE VIA BYEMAN
CONTROL SYSTEM ONLY

STRAWMAN CAPABILITY SUMMARY

GENERAL	● AGENA WEIGHT - 1810 LBS ● PV WEIGHT - 2150 LBS
ORBIT	● ALTITUDE - 270 NM ● ECCENTRICITY - CIRCULAR ORBIT ● INCLINATION - 75 DEGREES
POWER SYSTEM	● TYPE: BATTERY/SOLAR ARRAY SYSTEM ● MINIMUM OUTPUT REQUIRED 230 AMP HRS/DAY BETA < 15 DEGREES 270 AMP HRS/DAY OTHER BETAS
ATTITUDE	● CONTROL GRAVITY GRADIENT WITH CMG DAMPING ● SENSING ACCURACY PITCH ± 0.3° ROLL ± 0.3° YAW ± 0.5°* * USING ATTITUDE DETERMINATION PROGRAM

HANDLE VIA BYEMAN
CONTROL SYSTEM ONLY

~~TOP SECRET / E~~

REAPER GEO-POSITIONING

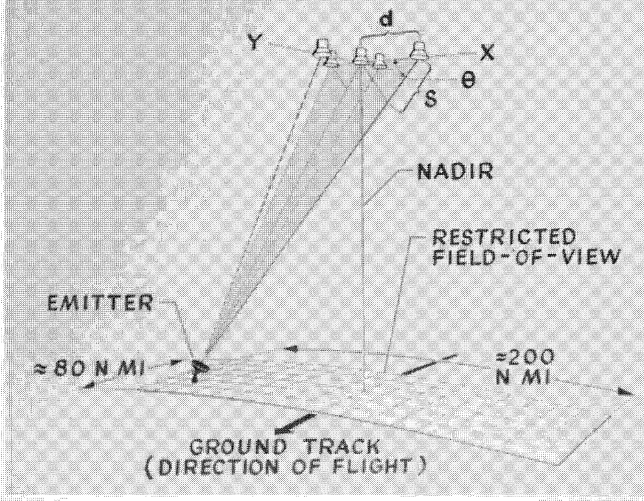
770 PROGRAM

INTERFEROMETER MEASUREMENT

$\theta = \cos^{-1} \frac{S}{d}$, $S = \frac{\phi\lambda}{360}$ d = CONSTANT

ϕ = DIFFERENCE IN PHASE BETWEEN ANTENNA PAIR

RESOLUTION : [ ] NAUTICAL MILES



50X1

~~TOP SECRET / E~~

HANDLE VIA BYEMAN CONTROL SYSTEM ONLY

~~TOP SECRET / E~~

ASTROPHYSICAL RESEARCH VEHICLE ~~(U)~~

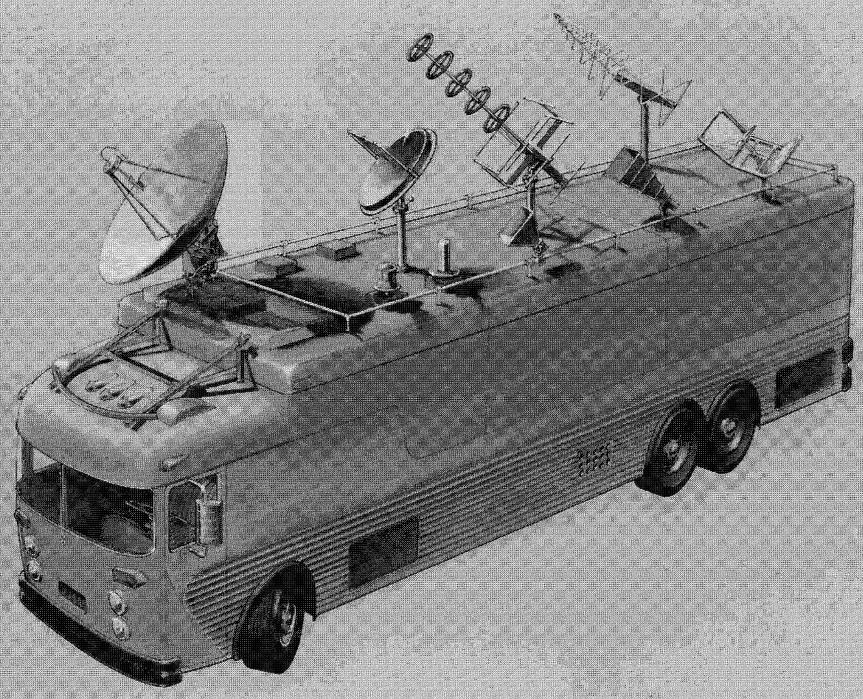
50X1

[redacted] PROGRAM

THREE (3) ARV'S, EACH WITH THE FOLLOWING TRANSMITTER COMPLEMENT:

TRANSMITTER	FREQUENCY RANGE (MHz)
• LB-1	60-100
• LB-2	150-250
• NO. 6*	120-400
• LB-3	400-850
• TR-8*	375-1000
• TR-10*	100-1000
• LB-4	1000-1500
• NO. 1	750-3000
• NO. 5	2600-3200
• NO. 2	3000-5000
• NO. 3	4950-6825
• NO. 4	7900-11,500

* AVAILABLE IN ARV "C" ONLY



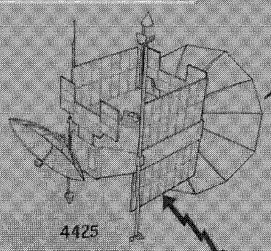
HANDLE VIA BYEMAN CONTROL SYSTEM ONLY

~~TOP SECRET / E~~

~~TOP SECRET / E~~

URSALA DATA HANDLING (S)

PROGRAM



TRACKING STATION

ANALOG MAG TAPES
MICROWAVE DATA
TM & TRKG DATA
MSORTM DATA

STC

ANALOG MAG TAPES
MICROWAVE DATA
PASS LOGS, RCASP
RDEL TAPE
MSORTM DATA

NSA

USER

ARV

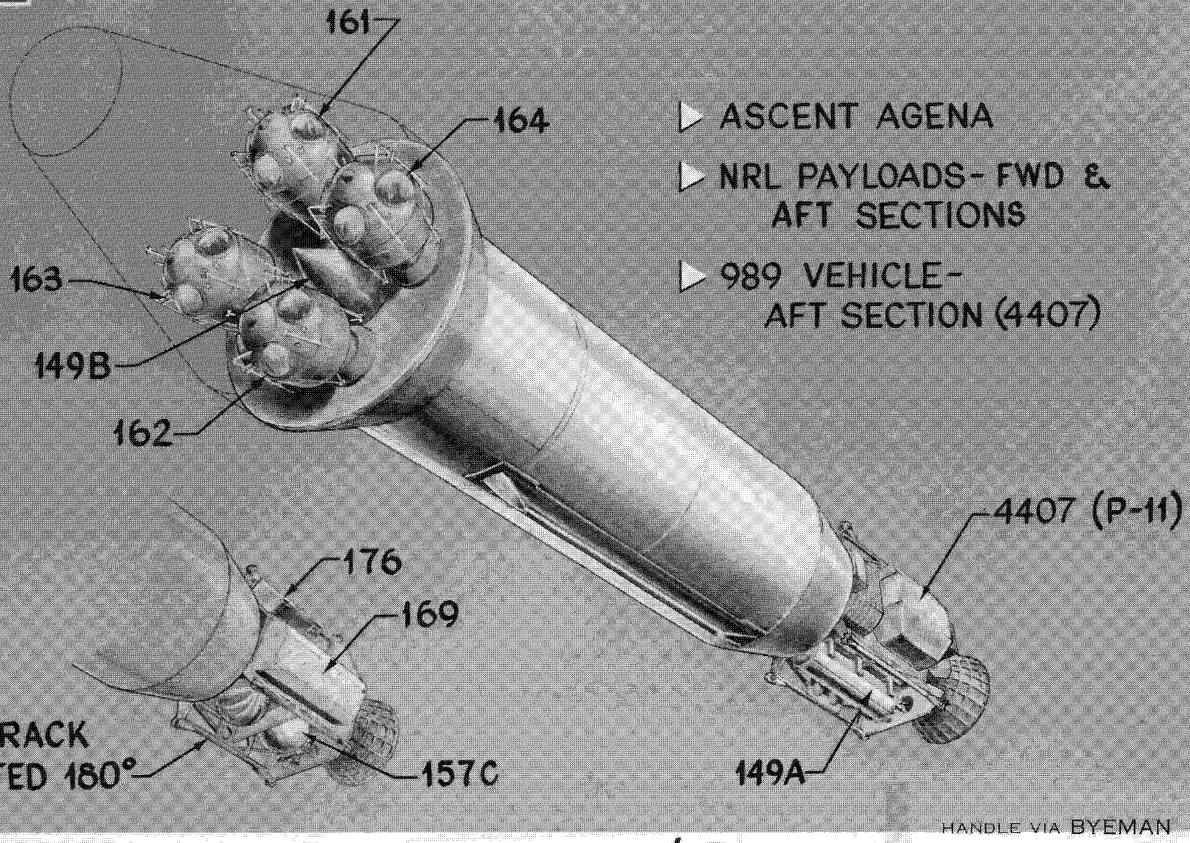
NSA

50X1

~~TOP SECRET / E~~

HANDLE VIA BYEMAN
CONTROL SYSTEM ONLY

VEHICLE CONFIGURATION - 2706

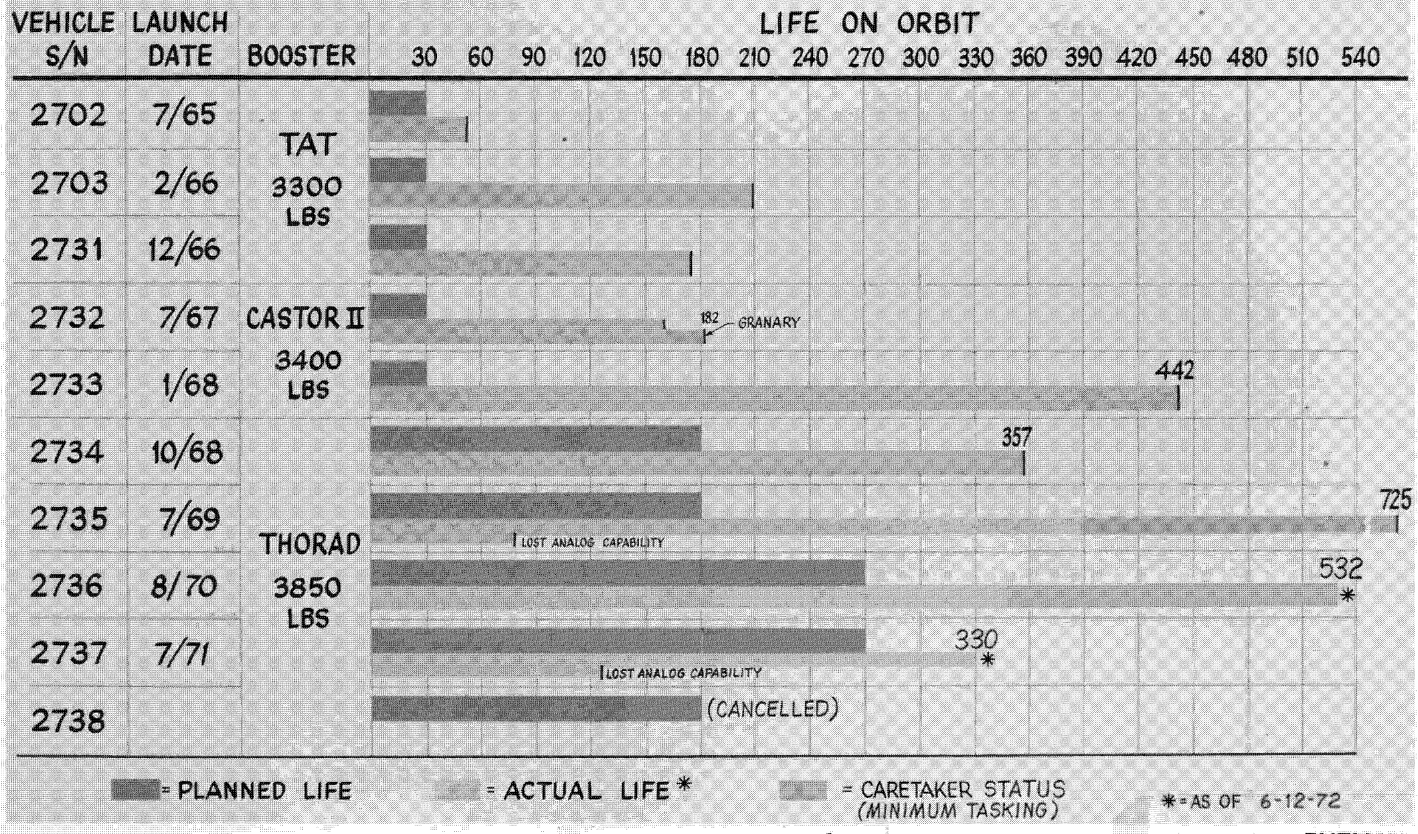


- ASCENT AGENA
- NRL PAYLOADS - FWD & AFT SECTIONS
- 989 VEHICLE - AFT SECTION (4407)

HANDLE VIA BYEMAN
CONTROL SYSTEM ONLY

~~TOP SECRET / E~~

770 PERFORMANCE (U)



HANDLE VIA BYEMAN CONTROL SYSTEM ONLY

~~TOP SECRET / E~~

STRAWMAN CAPABILITY SUMMARY (U)

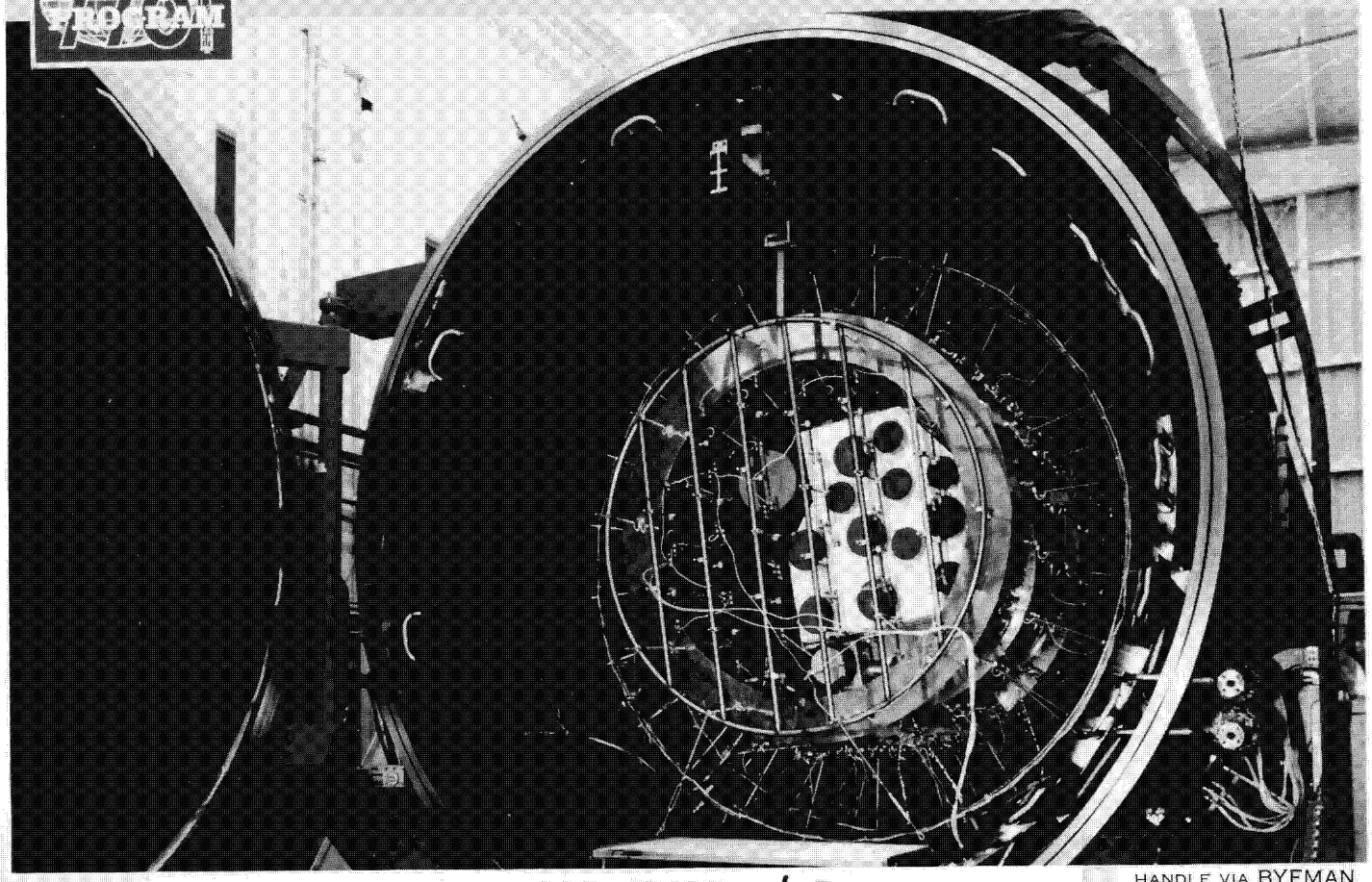
- REAPER PAYLOAD
  - FREQ RANGE 1800 MHz - 3300 MHz
  - LOCATION ACCURACY ± 7.5 NM
- THRESHER PAYLOAD
  - FREQ RANGE 125 MHz - 2100 MHz
  - LOCATION ACCURACY B2 & B4 10 NM
    B3 & B5 20 NM
- P69 TH PAYLOAD (2734)
  - FREQ RANGE 386 MHz - 426 MHz
  - SIGNAL OF INTEREST: DOGHOUSE
- CONVOY PAYLOAD (2735)
  - SIGNALS OF INTEREST: DOGHOUSE — 380 MHz - 425 MHz
  - [redacted] 50X1
  - BUGH — 853 MHz - 977 MHz
- HARVESTER – SIGNALS OF INTEREST:
  SOVIET SA-5 & SA-6 MISSILE SYSTEM RADARS

HANDLE VIA BYEMAN
CONTROL SYSTEM ONLY

~~TOP SECRET / E~~

~~TOP SECRET / E~~

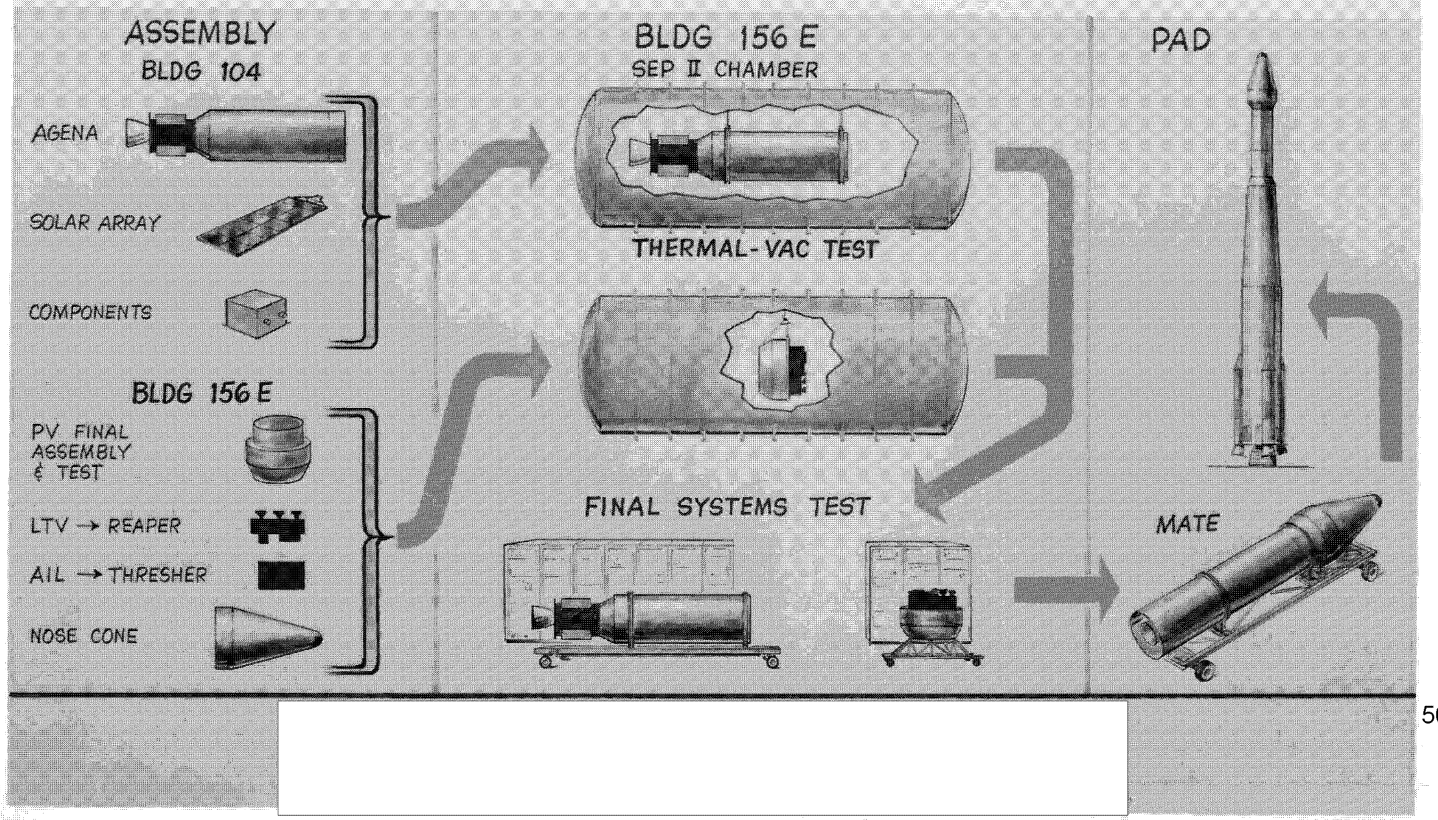
THERMAL/VACUUM CHAMBER



~~TOP SECRET / E~~

HANDLE VIA BYEMAN
CONTROL SYSTEM ONLY

ASSEMBLY & TEST SEQUENCE



50X1

HANDLE VIA BYEMAN
CONTROL SYSTEM ONLY

~~TOP SECRET / E~~

STRAWMAN CAPABILITY SUMMARY

PROGRAM 70

COMMAND SYSTEM	PRIMARY: INFLIGHT LOADABLE PROGRAMMER (100 % REDUNDANT) MEMORY CAPACITY - 1021 COMMANDS COMMAND TYPES 256 DISCRETE CMDS (REAL OR STORED TIME) 11 VARIABLE STORED COMMANDS BACK-UP: 375 MHz LINK WITH 32 DISCRETE COMMANDS
TELEMETRY SYSTEM	TYPE: SGLS - PCM - 128 KILOBITS PER SECOND RATES: MAIN FRAME- 125 FRAMES/SECOND SUB MULTIPLEXERS - 1 FRAME/SEC (REAL TIME) 1/16 FRAME/SEC (STORED TIME)

MEASUREMENT CAPACITY:

	DIGITAL WORDS	ON/OFF MONITORS	4-BIT ANALOG	8-BIT ANALOG
MAIN FRAME	11	12	28	13
SUB MULTIPLEXERS	0	728	190	221

~~TOP SECRET / E~~

HANDLE VIA BYEMAN
CONTROL SYSTEM ONLY

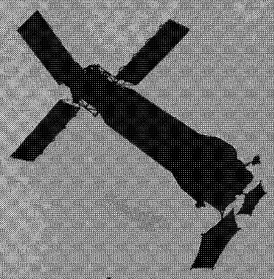
~~SECRET / E~~

50X1

THE TOTAL SYSTEM (U)

770 PROGRAM

FLIGHT EQUIPMENT



- DESIGN/DEVELOPMENT
- TEST
- OPERATIONS

REQUIREMENTS & DIRECTION

SAFSP | SAFSS

SIGINT REQ

INTELLIGENCE COMMUNITY

COLLECTION REQ

INTELL DATA

NSA

50X1

DATA

PRIORITIES

HIGHLIGHT

REPORTS

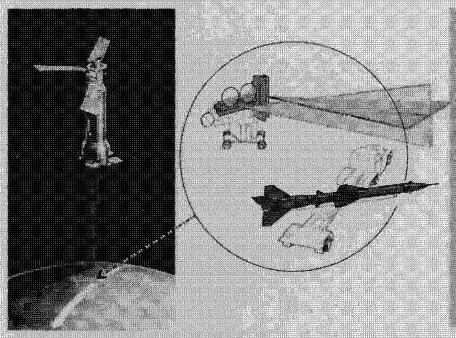
- PROCESSING
- REPORTING

PRE-LAUNCH TEST SUPPORT - DESIGN FEEDBACK

~~SECRET / E~~

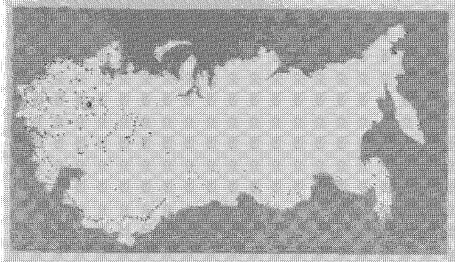
SIGINT COLLECTION PROGRAM 770 (S)

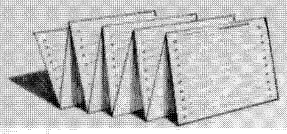
ELINT SEARCH AND TECHNICAL MEASUREMENT



- EARLY IDENTIFICATION OF ELECTRONIC EMITTERS OF WEAPON SYSTEMS OF INTEREST
- TECHNICAL MEASUREMENTS TO DETERMINE EMITTER SUBSYSTEM PERFORMANCE WITHIN THE OVERALL SYSTEM
- DATA TO SUPPORT DESIGN OF ECM SYSTEM

EOB AND ELINT SURVEILLANCE





- PROVIDE CONTINUING ACCURATE LOCATION OF SOI'S OF OPERATIONALLY DEPLOYED SYSTEMS
- DETERMINE ACTIVITY LEVELS, INTERRELATIONSHIPS, AND USAGE PATTERNS
- PROVIDE A CONTINUING WORLDWIDE DATA BASE WITH HISTORY FILES FOR SELECTIVE ANALYSIS OF PRIORITY AREAS OF INTEREST

HANDLE VIA BYEMAN
CONTROL SYSTEM ONLY

[redacted] PROGRAM

770 DATA PROCESSING CHRONOGRAM ~~(S)~~ 50X1

BASELINE
(WITHOUT RAPID DATA TRANSMISSION)

TOTAL TIME = 4-10 DAYS

[redacted]

- MANPOWER MGMT. REFINEMENTS
- RAPID DATA TRANSMISSION
- PREDICT COMMANDING & VECTORS

24 HR. PROCESSING

TOTAL TIME = 15-34 HRS.

[redacted]

- SELECTIVE INTERCEPT PROCESSING
- POLITICAL BOUNDARIES DETERMINATION
- S/W PROCESSING REFINEMENTS
- OPERATING PROCEDURE REFINEMENTS

IMPROVED 24 HR PROCESSING

TOTAL TIME = 10-15 HRS

[redacted]

- DISPLAY SYSTEMS
- DIRECT DATA TRANSFER

FUTURE ESTIMATE

TOTAL TIME = 3-6 HRS

50X1

HANDLE VIA BYEMAN CONTROL SYSTEM ONLY

DATA REDUCTION FOR TRANSMISSION (U)

50X1

PROGRAM

SIGNALS RF PRF PW

50X1

50X1

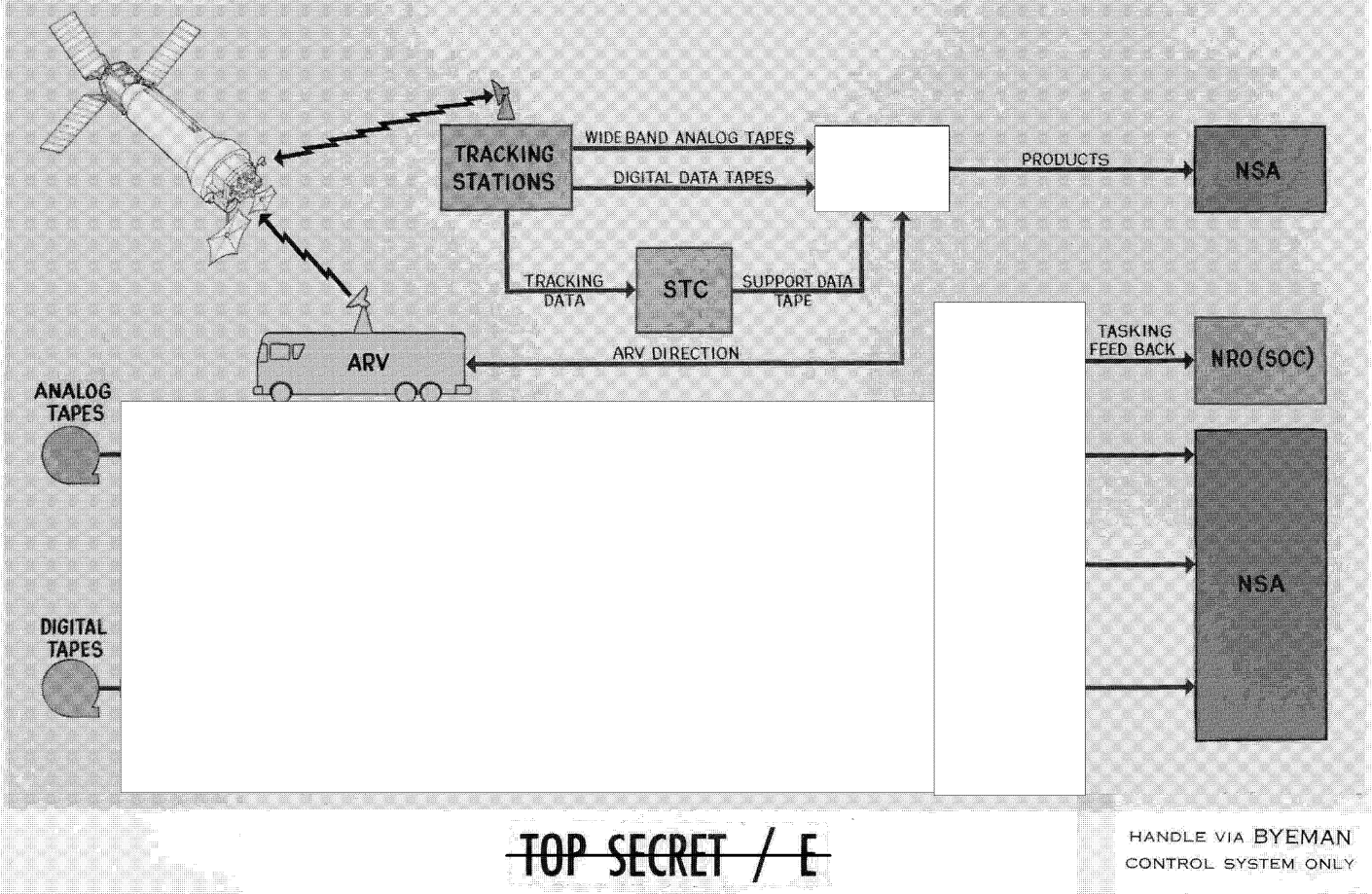
ELK

UNITRAN

MISSION 7236 (REAPER)
R/I ORBIT 3841
R/O ORBIT 3842
BURST 4412

HANDLE VIA BYEMAN
CONTROL SYSTEM ONLY

TYPICAL 770 DATA HANDLING (S)

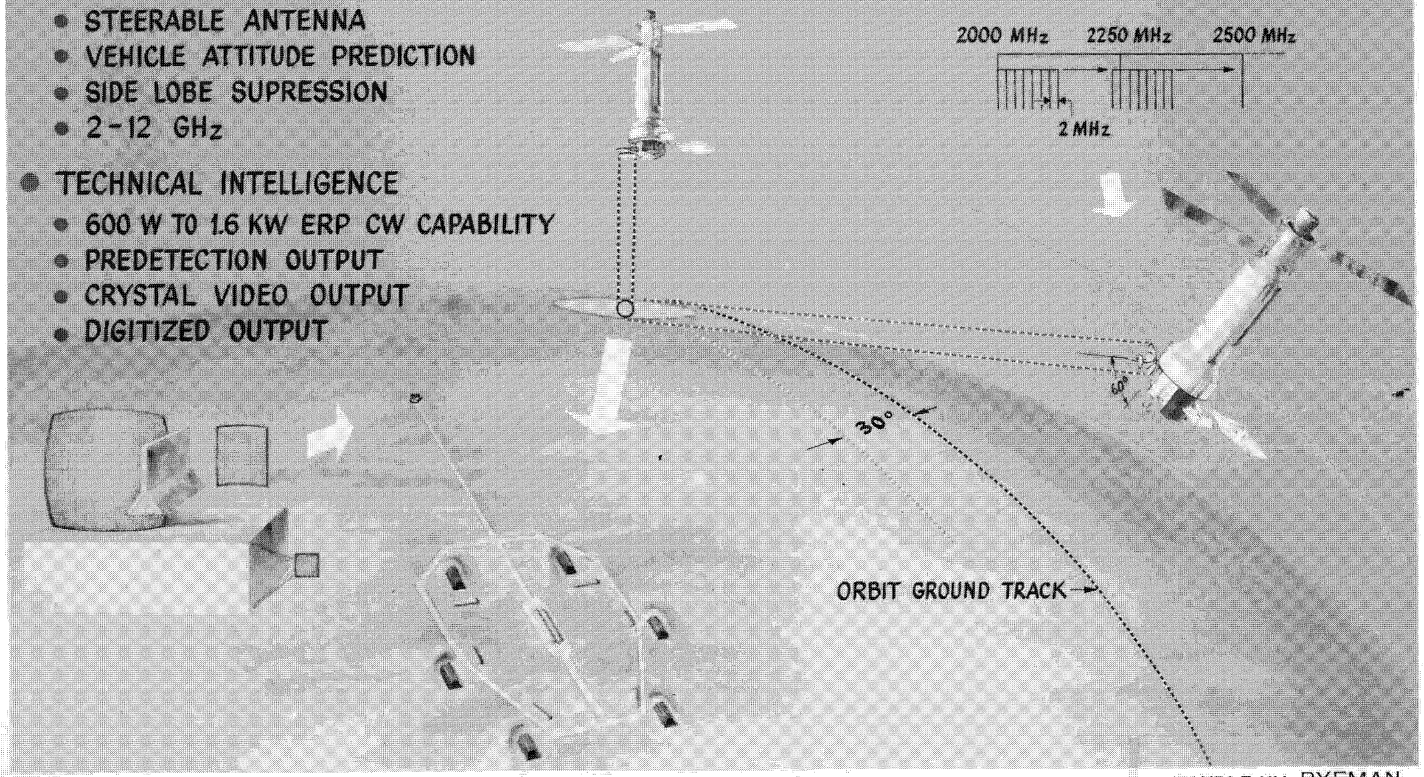


50X1

HANDLE VIA BYEMAN CONTROL SYSTEM ONLY

HARVESTER INTERCEPT CONCEPT

- DIRECTED SEARCH
  - STEERABLE ANTENNA
  - VEHICLE ATTITUDE PREDICTION
  - SIDE LOBE SUPRESSION
  - 2-12 GHz
- TECHNICAL INTELLIGENCE
  - 600 W TO 1.6 KW ERP CW CAPABILITY
  - PREDETECTION OUTPUT
  - CRYSTAL VIDEO OUTPUT
  - DIGITIZED OUTPUT



HANDLE VIA BYEMAN
CONTROL SYSTEM ONLY

989 DATA PROCESSING CHRONOGRAM ~~(S)~~

50X1

[redacted] PROGRAM

PRESENT PLAN

TOTAL 4 TO 10 DAYS

ALL 989 DATA VIA MAIL

REVISED URSALA I PLAN

- STATION TAPE PROCESSING
- P/L BURST/DAY COUNTER
- RAPID SAD
- PREDICT VECTORS
- EXTENSIVE PERMANENT FILE UTILIZATION

FUTURE PLAN

- ON-LINE EDITING
- DIRECT & CONTINUOUS DATA FLOW
- AUTOMATIC ACCOUNTING AND STATUS

50X1

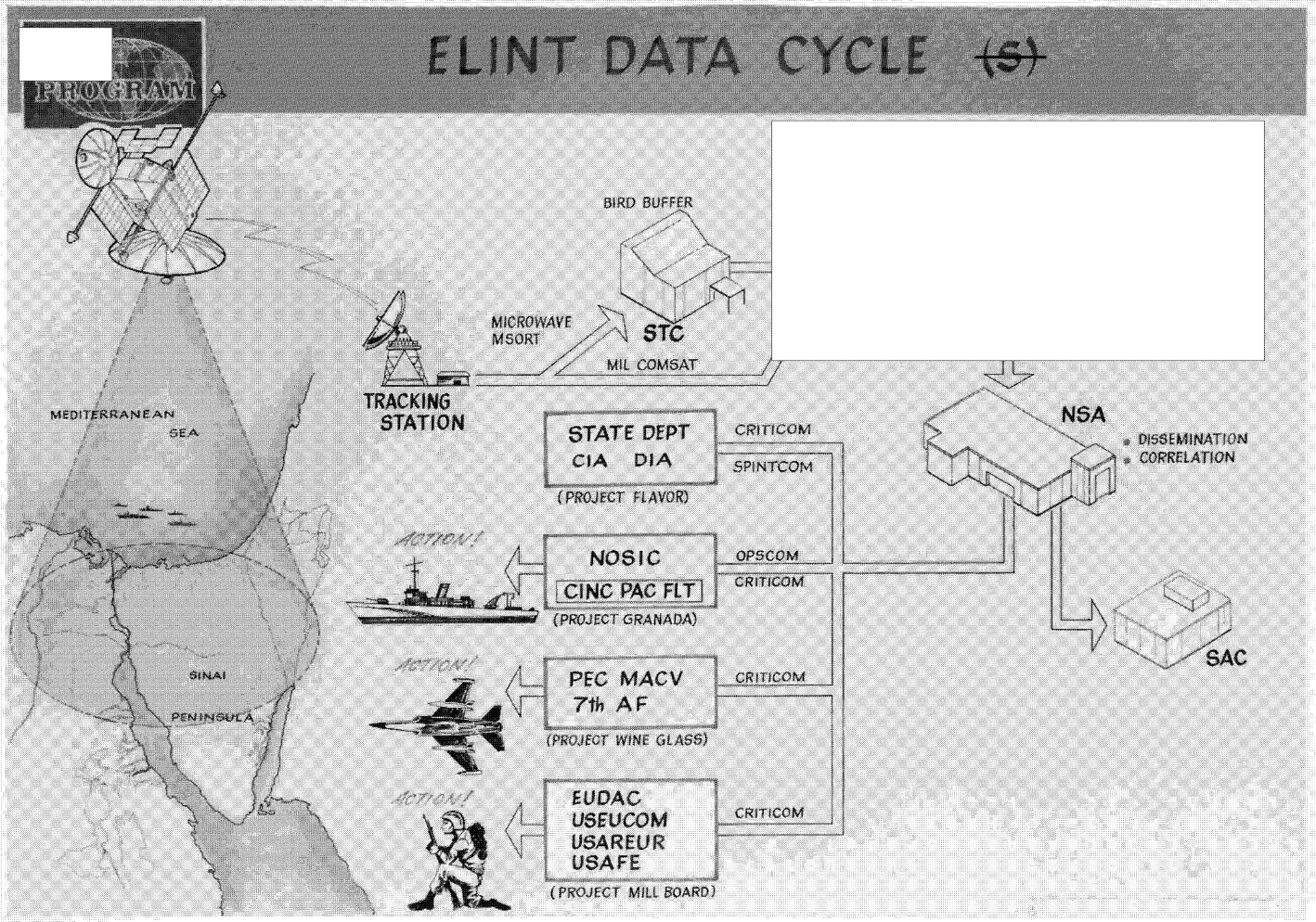
[redacted]

HANDLE VIA BYEMAN CONTROL SYSTEM ONLY

ELINT DATA CYCLE ~~(S)~~

50X1

50X1



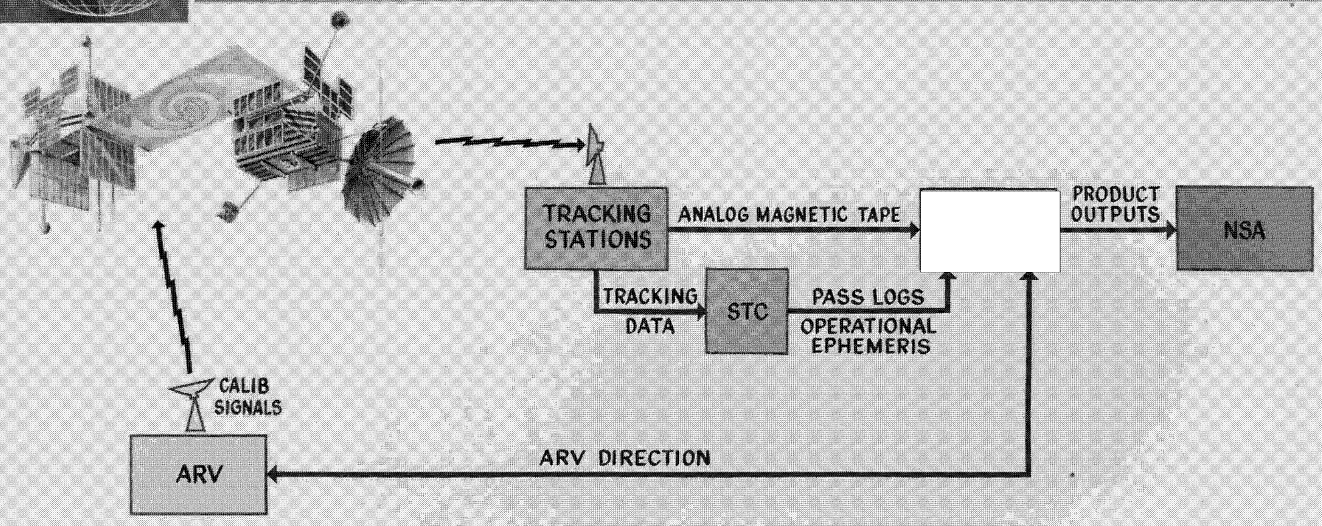
~~TOP SECRET / E~~

HANDLE VIA BYEMAN
CONTROL SYSTEM ONLY

Approved for Release: 2024/08/06 C05098644

TYPICAL 989 DATA HANDLING (S)

50X1



50X1

50X1

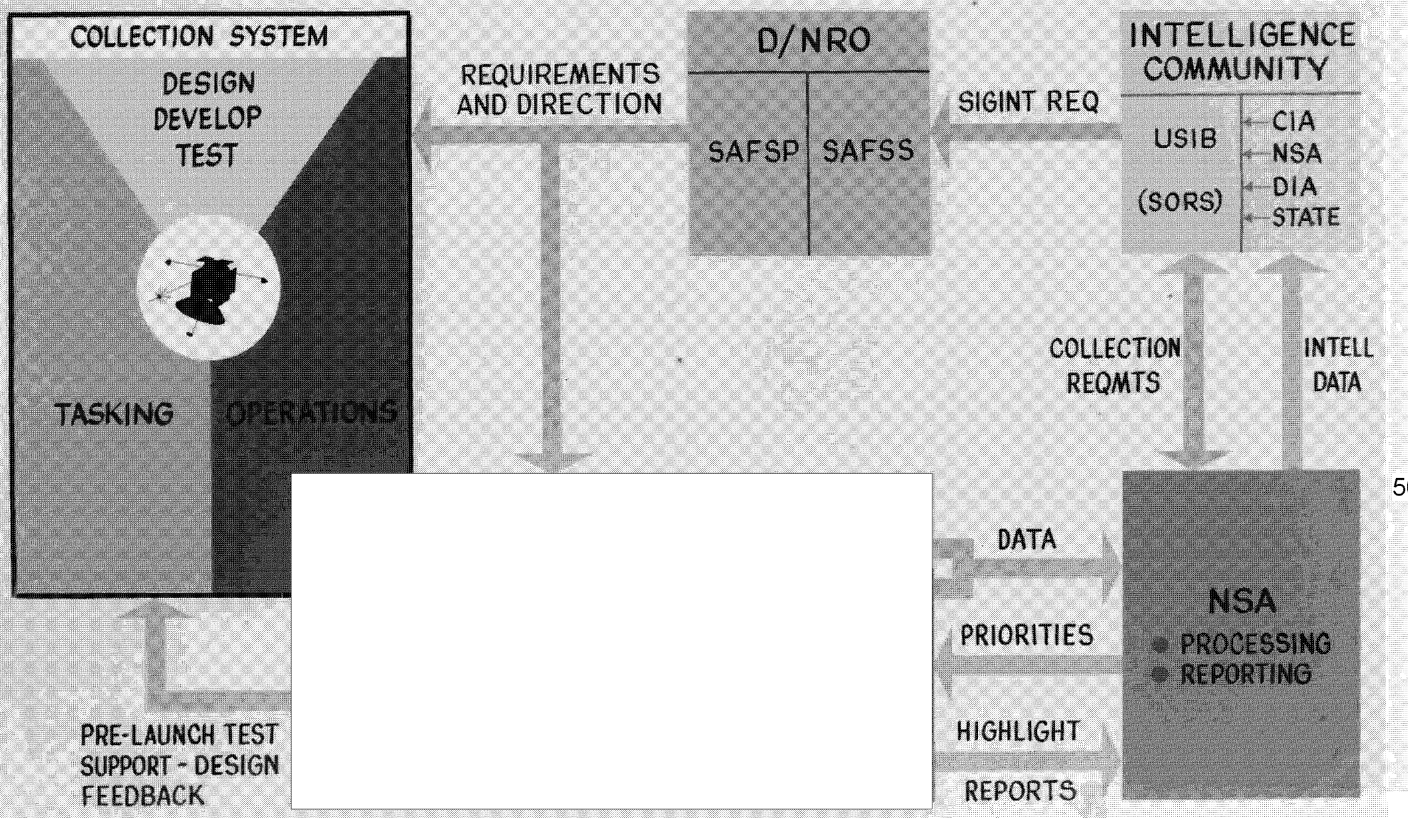
SHIP

HANDLE VIA BYEMAN CONTROL SYSTEM ONLY

SYSTEM INTERRELATION (U)

50X1

PROGRAM [redacted]



50X1

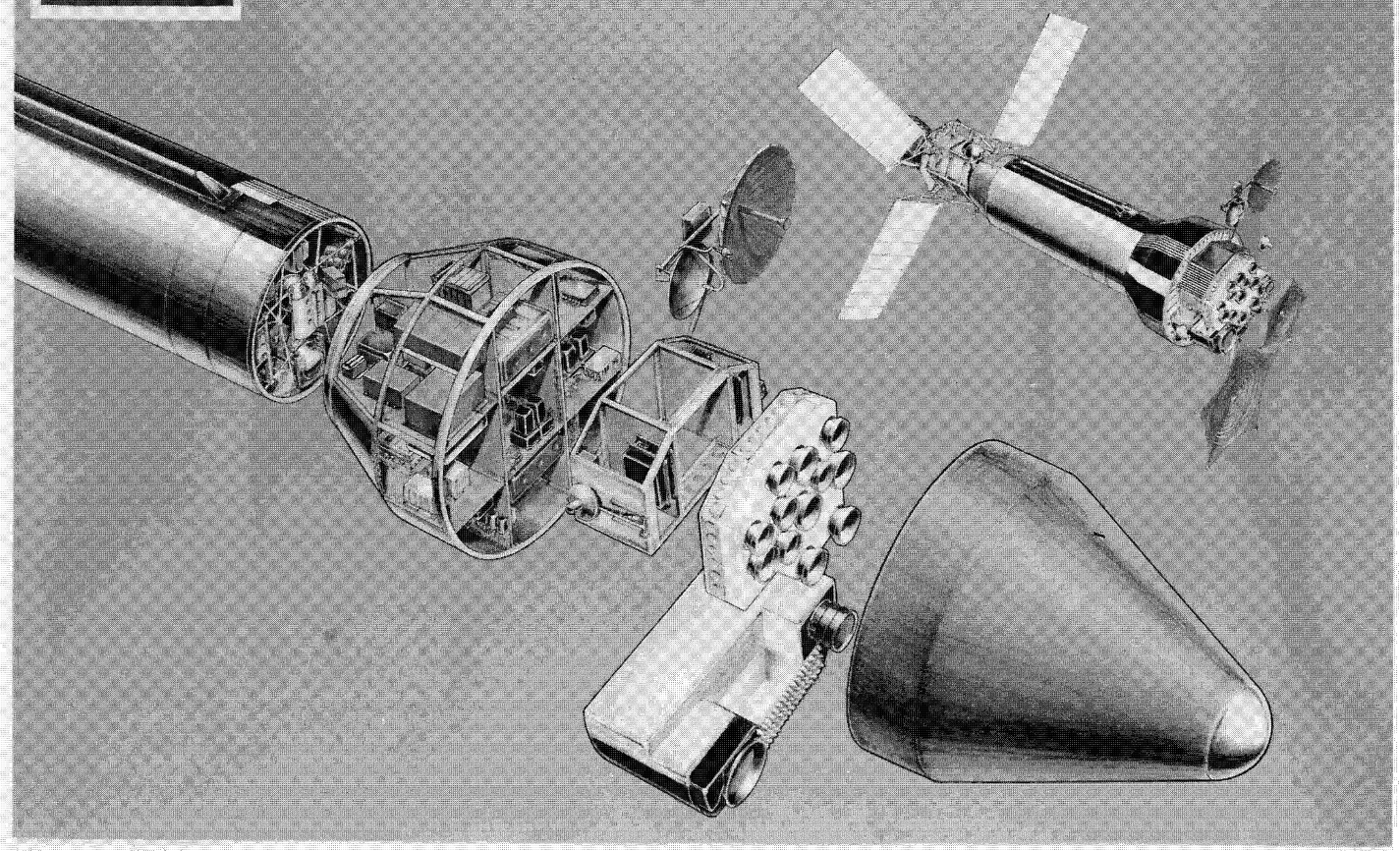
HANDLE VIA BYEMAN CONTROL SYSTEM ONLY

TOP SECRET / E

~~SECRET~~

STRAWMAN P/L VEHICLE ~~(S)~~

50X1



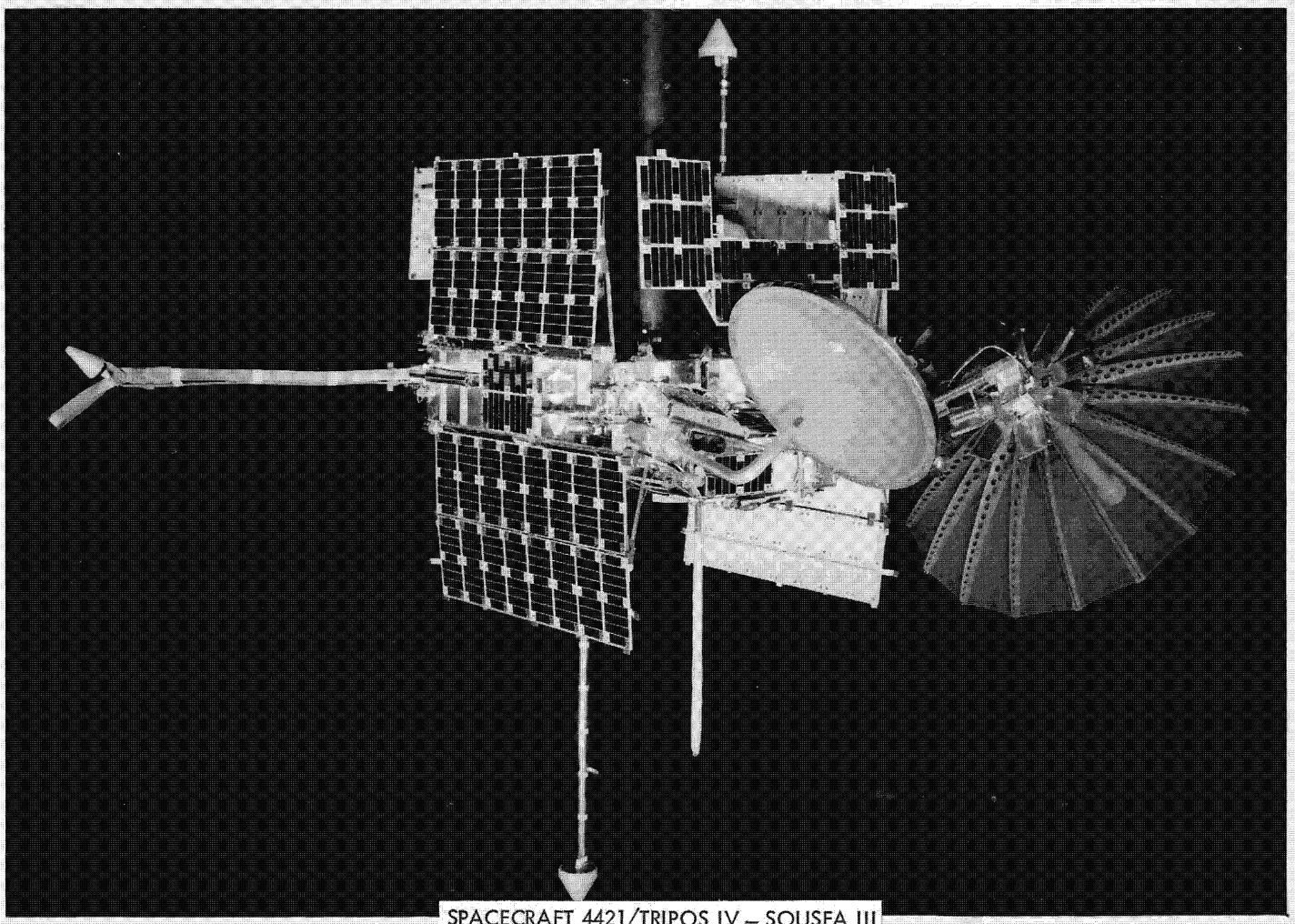
HANDLE VIA BYEMAN
CONTROL SYSTEM ONLY

~~SECRET~~

1-14

HANDLE VIA BYEMAN
CONTROL SYSTEM ONLY

Approved for Release: 2024/08/06 C05098644



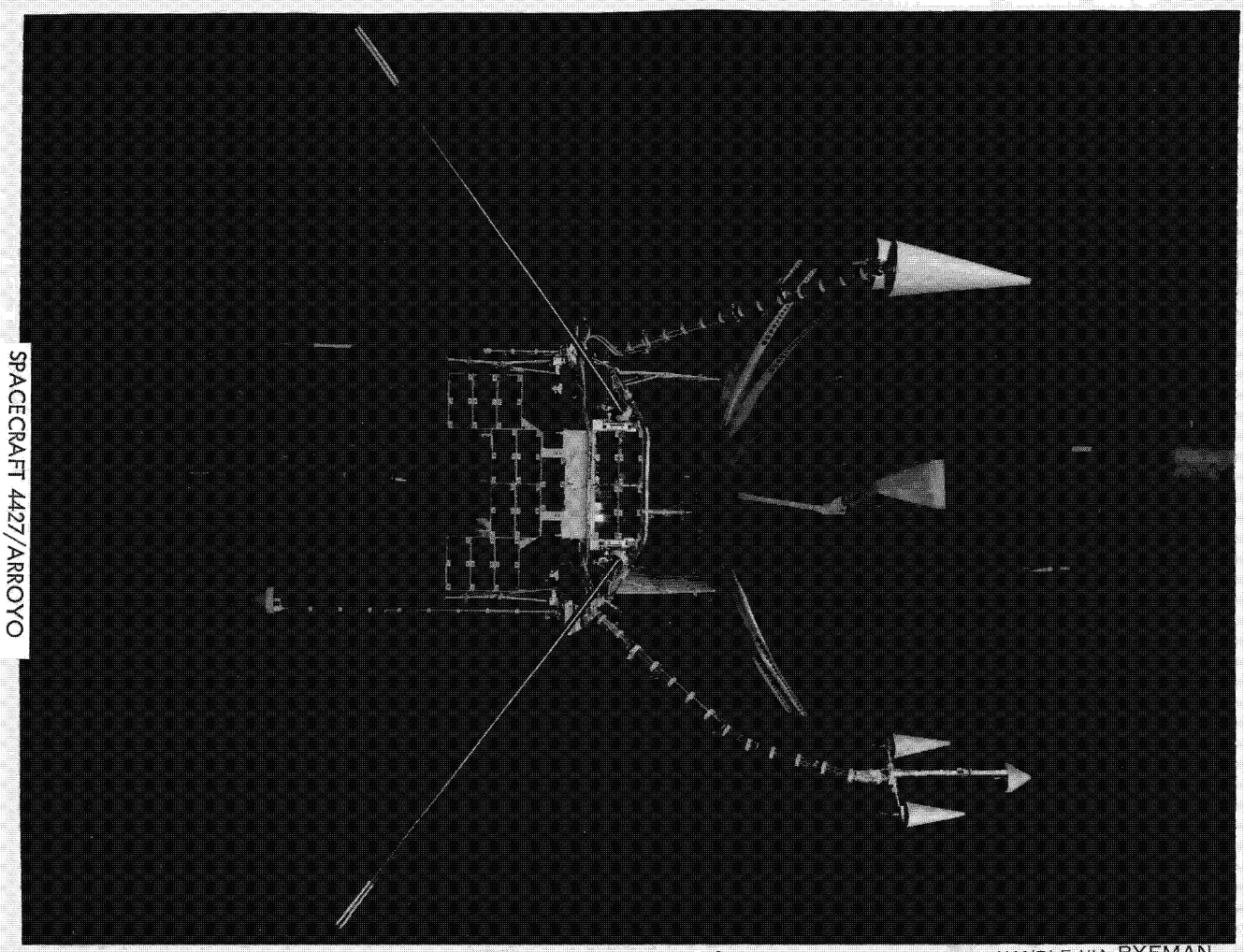
SPACECRAFT 4421/TRIPOS IV – SOUSEA III

~~TOP SECRET / E~~

HANDLE VIA BYEMAN
CONTROL SYSTEM ONLY

Approved for Release: 2024/08/06 C05098644

~~TOP SECRET / E~~

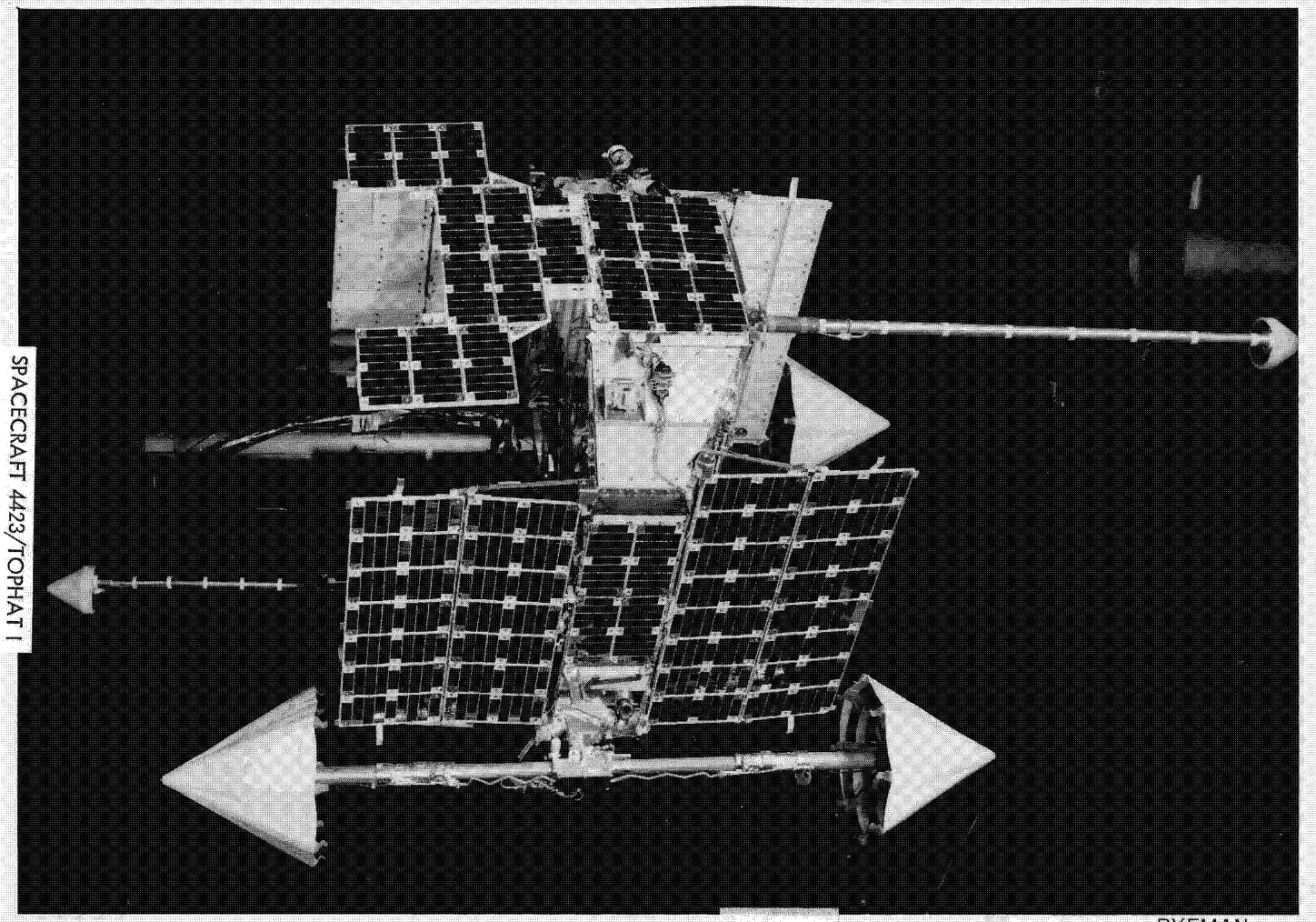


SPACECRAFT 4427/ARROYO

~~TOP SECRET / E~~

HANDLE VIA BYEMAN
CONTROL SYSTEM ONLY

~~TOP SECRET~~ /

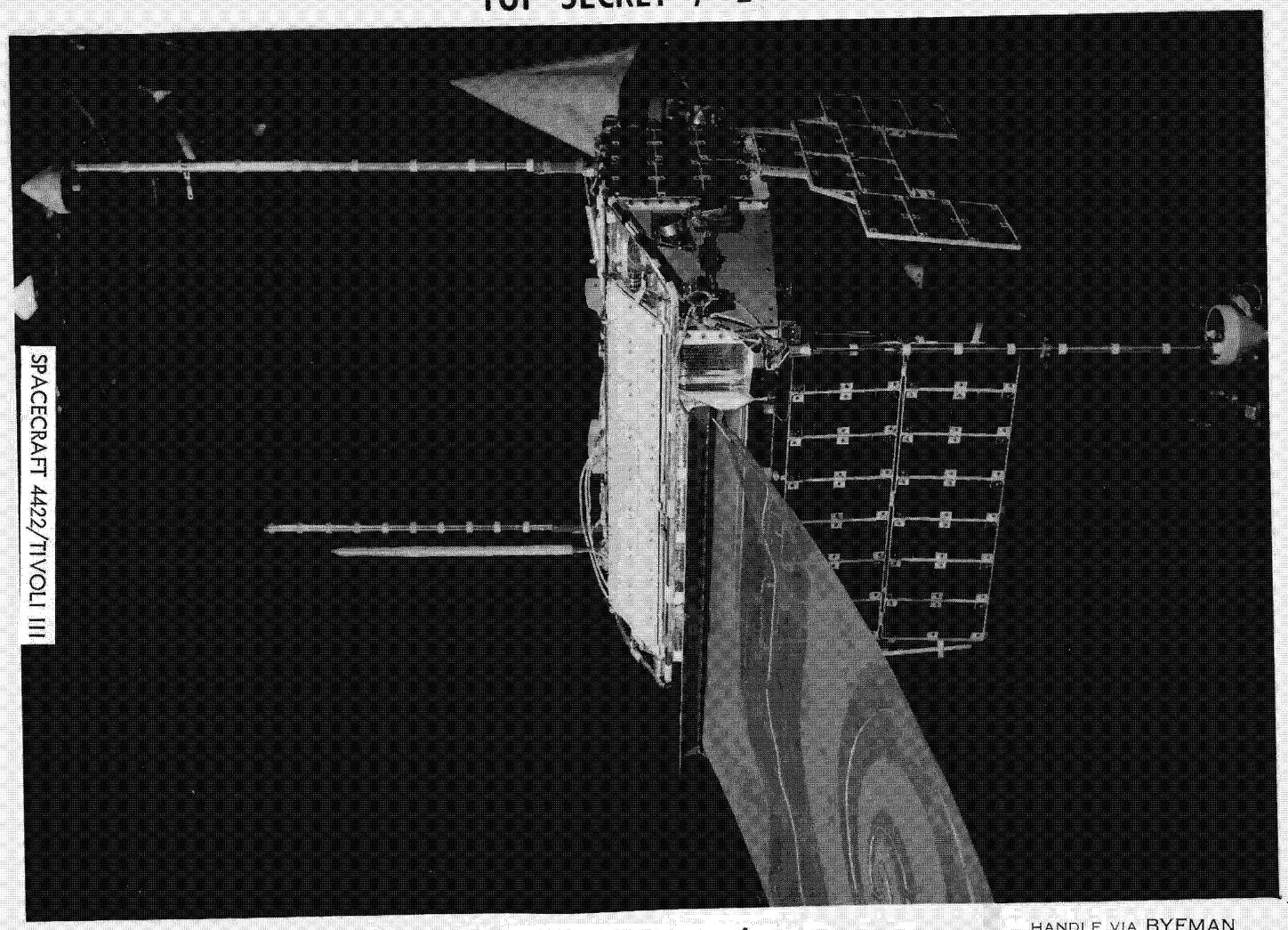


SPACECRAFT 4423/TOPHAT I

~~TOP SECRET~~ /

HANDLE VIA BYEMAN
CONTROL SYSTEM ONLY

~~TOP SECRET / E~~



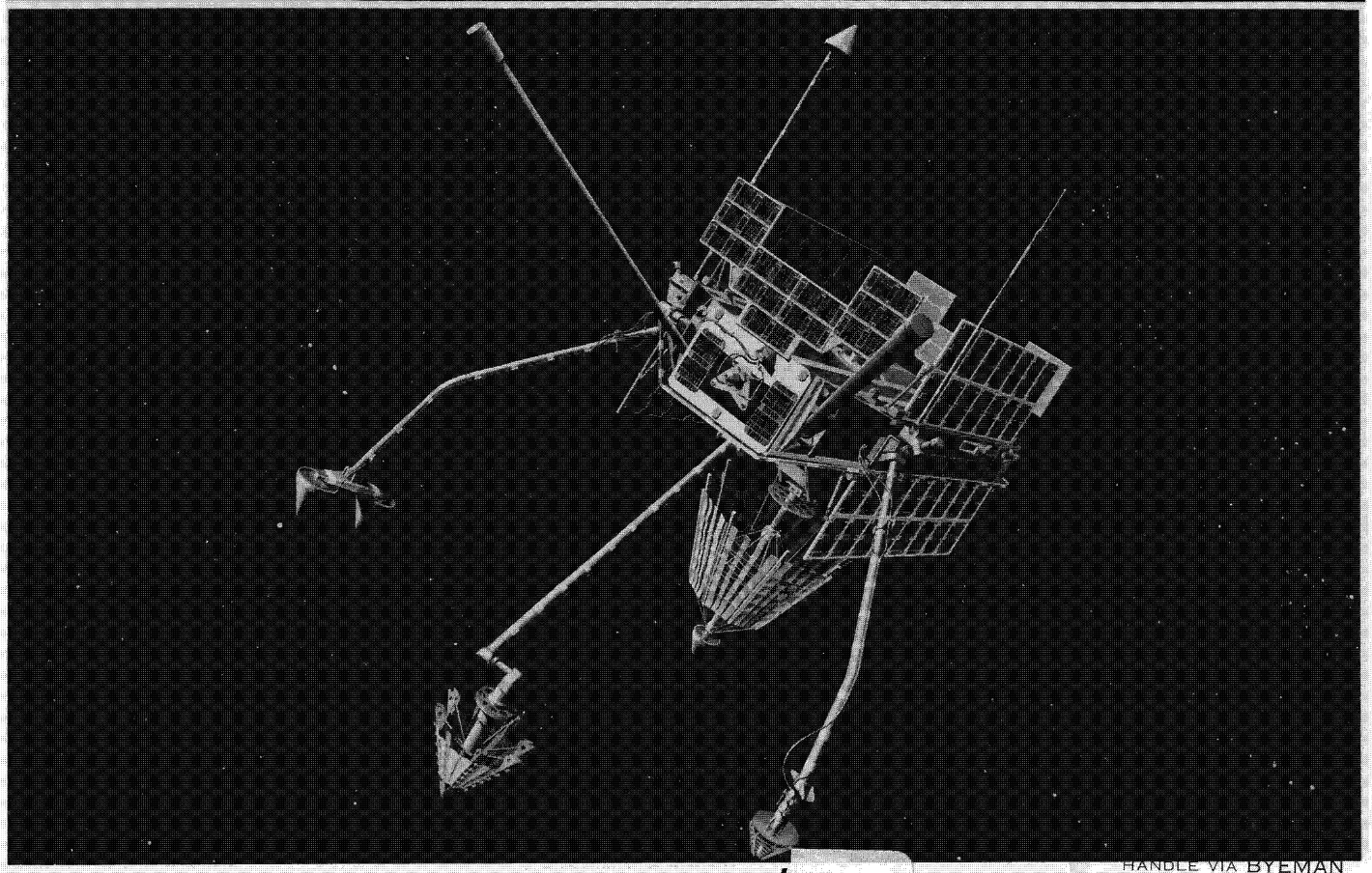
SPACECRAFT 4422/TIVOLI III

~~TOP SECRET / E~~

HANDLE VIA BYEMAN
CONTROL SYSTEM ONLY

~~TOP SECRET / E~~

SPACECRAFT 4424/MABELI ~~(S)~~

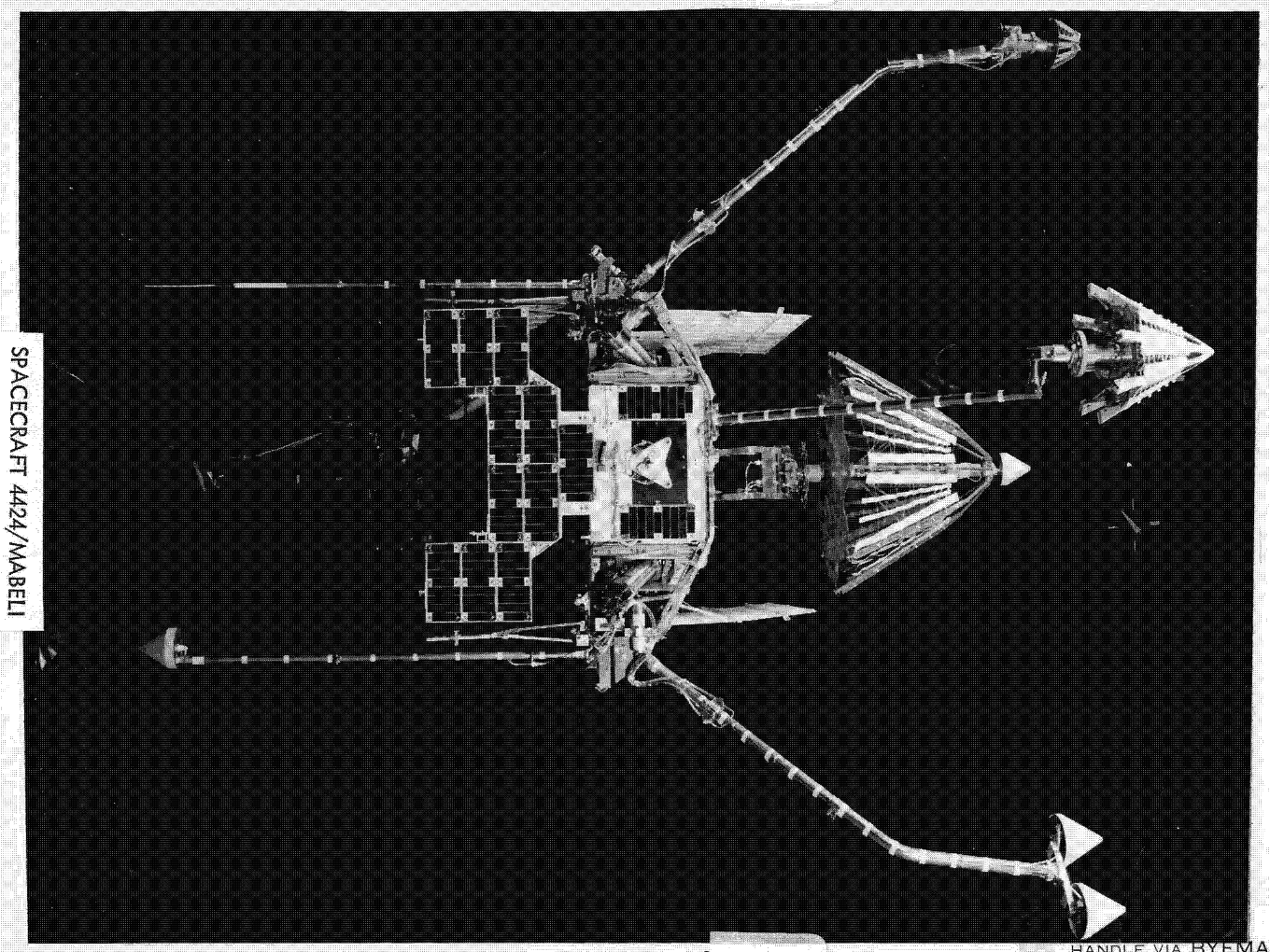


~~TOP SECRET / E~~

HANDLE VIA BYEMAN
CONTROL SYSTEM ONLY

Approved for Release: 2024/08/06 C05098644

~~TOP SECRET / E~~



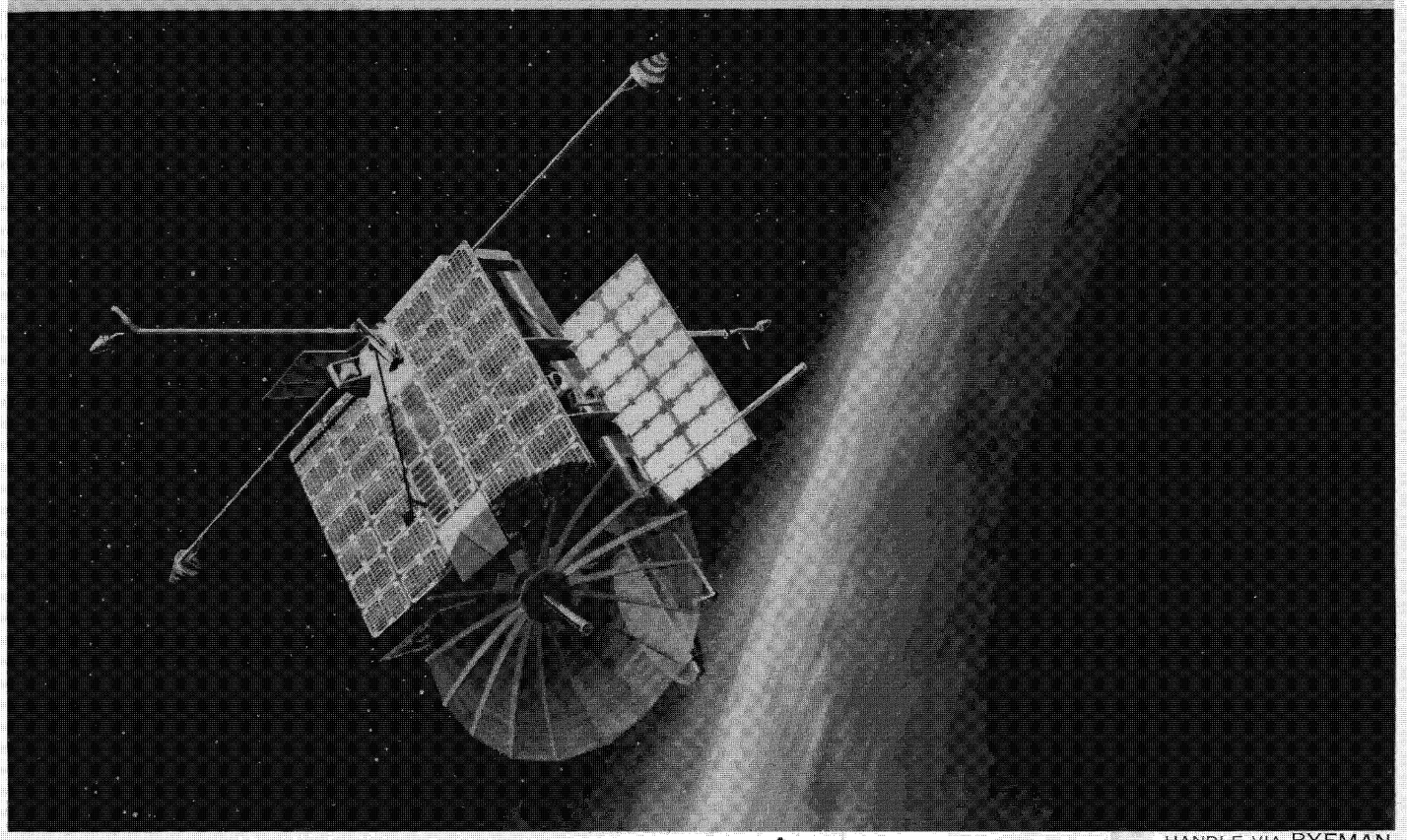
SPACECRAFT 4424/MABELI

~~TOP SECRET / E~~

HANDLE VIA BYEMAN
CONTROL SYSTEM ONLY

Approved for Release: 2024/08/06 C05098644

SPACECRAFT 4421-TRIPOS/SOUSEA-GS/EOB-4000-8000MHz 8000-12000MHz



HANDLE VIA BYEMAN
CONTROL SYSTEM ONLY

~~TOP SECRET / E~~

FLIGHT SUMMARY

OPERATIONAL LIFE

VEHICLE	MISSION	FREQUENCY RANGE	1963	1964	1965	1966	1967	MOS	OPS	STATUS
4201	MAP INNER VAN ALLEN BELT		7-1 9-15					2	130	TERMINATED
4001	SOVIET TELEMETRY		10-30		5-22			19	1502	MISSION COMPLETE
4101	SOVIET TELEMETRY		12-19	3-9				3	231	TAPE RCRDR. FAILURE
4301	GENERAL SEARCH VHF			7-6 8-6				1	18	TAPE RCRDR FAILURE
4202	MAP INNER VAN ALLEN BELT			8-4	11-1			15	359	MISSION COMPLETE
4302	ANTI-SATELLITE RADAR SEARCH			10-23	2-23			4	490	MISSION COMPLETE
4401	SOVIET TELEMETRY	61-76 MHz			4-28	1-25		21	2308	MISSION COMPLETE
4402	C-BAND SEARCH	4.9-5.15 GHz 4.0-8.0 GHz			6-27	3-16		21	3385	MISSION COMPLETE
4403	ANTI-SATELLITE RADAR SEARCH	100-250 MHz			8-3	7-28		20	3244	MISSION COMPLETE
4404	DIRECTION FINDING PRE-DET. INTERCEPT	168-178 MHz 153-163 MHz				5-14		0	0	SHRT. CIRC'T. FAILURE
4405	X & S-BAND SEARCH AND D/F	2.1-4.0 GHz 8.0-12.0 GHz				8-16	10-15	14	2878	MISSION COMPLETE
4406	C-BAND SEARCH	4.0-8.0 GHz 4.9-4.15 GHz				9-16	1-7	3	553	TAPE RCRDR. FAILURE

50X1

50X1

~~TOP SECRET / E~~

HANDLE VIA BYEMAN CONTROL SYSTEM ONLY

50X1

PROGRAM [redacted]

FLIGHT SUMMARY

50X1

VEHICLE	MISSION	FREQUENCY RANGE	OPERATIONAL LIFE (1967 / 1968 / 1969 / 1970 / 1971)	MOS	OPS	STATUS
4408	[redacted] & ABM RDR. T/I	4.9-5.15 GHz 154-162 MHz	5-9 8-11	3	872	NO RESPONSE
4409	SOVIET TELEMETRY	60-62 164-166 65-67 180-182 70-72 239-241 75-77 MHz	6-16 10-22	16	2255	RE-ENTERED
4410	GENERAL SEARCH SOV. ABM & AES RDR.	2.50-2200 MHz	11-2 2-9	3	837	PAYLOAD FAILURE
4412	DIR. SEARCH & PRE-D. T. ANAL of ABM-AES RDR	0.1-4.0 GHz	1-24 4-10	15	1714	TAPE RCRDR FAILURE
4411	GENERAL SEARCH SOV. ABM & AES RDR.	2.1-4.0 GHz 1.0-2.0 GHz	3-14 3-7	12	3068	TAPE RCRDR FAILURE
4420	GENERAL SEARCH & EOB	4.0-8.0 GHz 8.0-12.0 GHz	6-20 1-13	18	4645	RE-ENTERED
4413	GENERAL SEARCH SOV. ABM & AES RDR.	0.1-1.0 GHz	9-18 9-28	12	3327	RE-ENTERED
4418	DIR. SEARCH & PRE-D T. ANAL of ABM-AES RDR.	0.5 4.0 GHz	3-19 9-24	18	2656	DORMANT
4417	GENERAL SEARCH SOV. ABM & AES RDR	2.1-4.0 GHz 1.0-2.0 GHz	5-1 2-16	10	2308	RE-ENTERED
4419	SOVIET TELEMETRY	61-76, MHz 145-248 MHz	9-22 5-16	20	3436	RE-ENTERED
4407	DIR. SEARCH of COMM. MICROWAVE REPEATERS	60-70 MHz 360-420 MHz	9-30 8-17	11	1032	KILLED

HANDLE VIA BYEMAN CONTROL SYSTEM ONLY

50X1

PROGRAM [redacted]

FLIGHT SUMMARY

VEHICLE	MISSION	FREQUENCY RANGE	OPERATIONAL LIFE 1970	1971	1972	1973	MOS	OPS	STATUS
4422	GENERAL SEARCH AND DIRECTED SEARCH - SOV. ABM & AES RADARS	50-4020MHz	3-4 →				15	4016	OPERATIONAL
4421	GENERAL SEARCH AND EOB MISSION FOR PULSED RADARS	4000-8000MHz 8000-12000MHz	5-20 →				12	2470	OPERATIONAL
4423	LOCATION & TECHNICAL INTELL., TROPOSPHERIC SCATTER COMM. LINKS	450-1000MHz	11-18 →				7	2167	OPERATIONAL

HANDLE VIA BYEMAN CONTROL SYSTEM ONLY