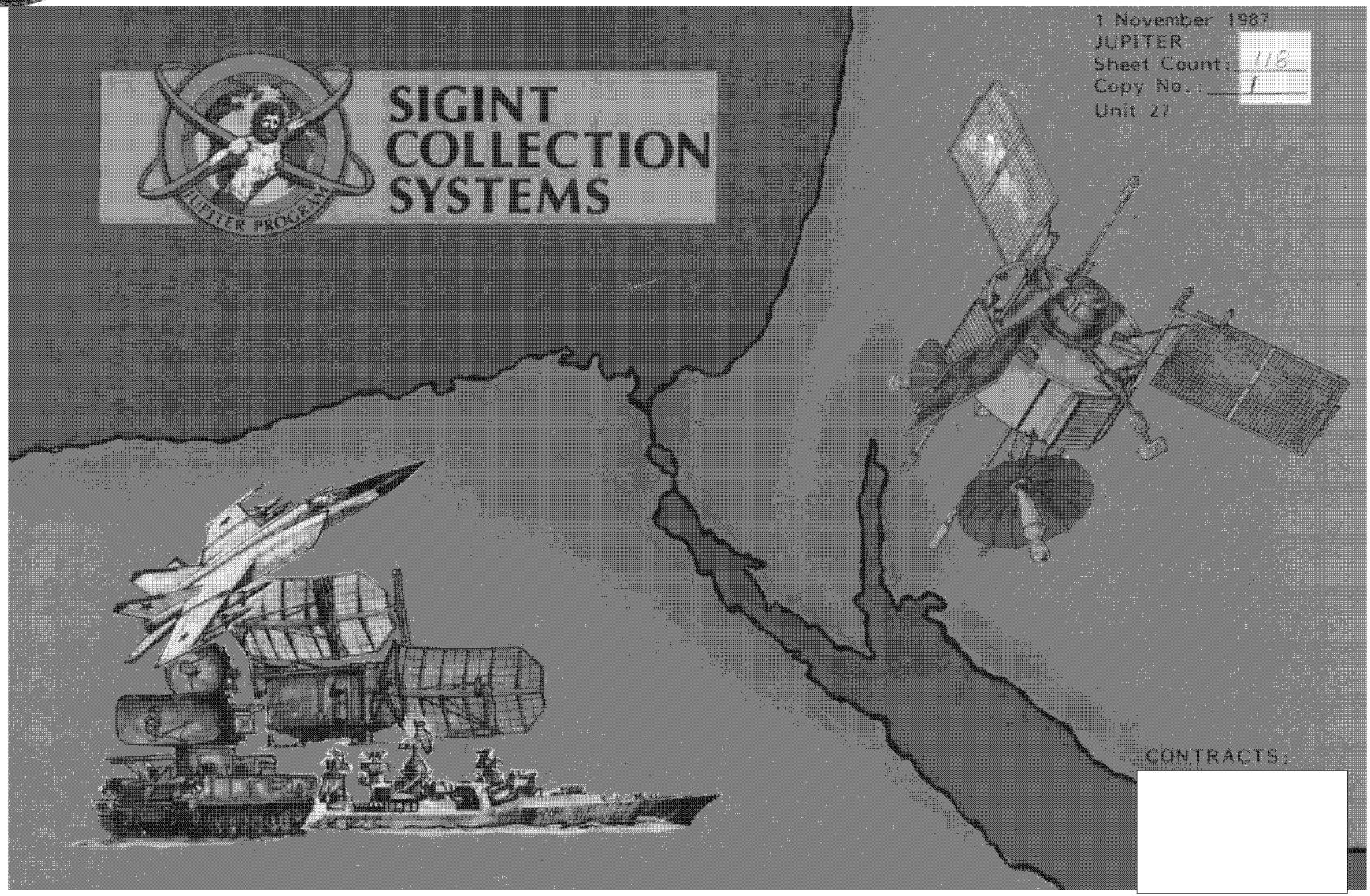

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14 February 1992

This pictorial history is presented to describe the achievements of the Jupiter Program from its inception in 1963.

The first Air Force SIGINT mission was placed in orbit using the Agena vehicle as a launch system in October 1963. Missions of increasing complexity, performance, and life have continued to the present. Mission data processing was initially done on an informal basis, but in 1966 the activity was moved to a dedicated facility which subsequently was designated as the [redacted] SIGINT data collection and processing capability have increased over the years to their present high level of responsiveness and capacity.

The SAFSP Jupiter Program achievements of the past 29 years are the result of imaginative and professional teamwork among SAFSP, NSA, and LMSC. We are proud to have had the opportunity to participate in this program which contributes to the maintenance of our national security.

V. D. COFFMAN
President, Space Systems Division
Lockheed Missiles & Space Company

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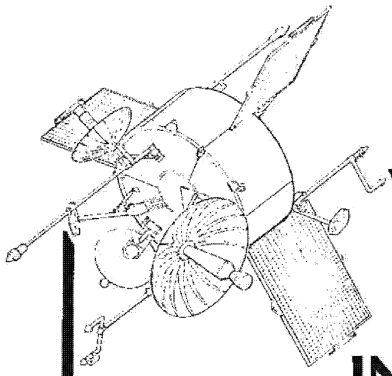
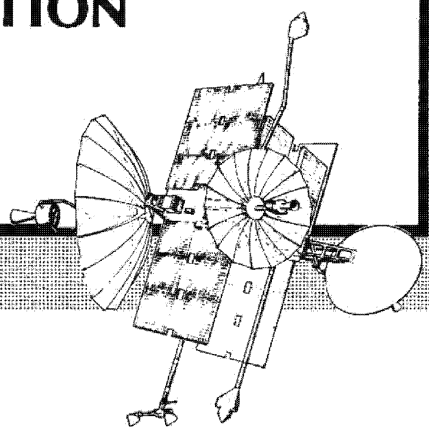


INTRODUCTION



JUPITER PROGRAM EVOLUTION

THE JUPITER PROGRAM HAS A RICH HISTORY DURING WHICH 38 SIGINT SPACECRAFT WERE LAUNCHED FROM 1963 THROUGH 1989. INITIALLY, THESE SPACECRAFT WERE DIRECTED AT UNIQUE MISSIONS AND WERE LAUNCHED INTO LOW-EARTH ORBITS FROM THE AGENA AFT RACK. WHEN THE NUMBER OF AGENA LAUNCH OPPORTUNITIES DIMINISHED, THE AF467 SPACECRAFT WAS USED AS A HOST, BEGINNING IN 1972. BECAUSE OF CONTINUED REDUCED LAUNCH OPPORTUNITIES ON THIS HOST, THE PROGRAM EMBARKED UPON A COMBINATION OF MISSIONS BEGINNING WITH THE FARRAH I SPACECRAFT LAUNCHED IN 1982, FOLLOWED BY FARRAH II IN 1984. THROUGH 1984 ALL SPACECRAFT SHARED A SIMILAR BUS STRUCTURE DESIGNED TO BE CARRIED INTO ORBIT "PIGGYBACK" WITH OTHER SPACECRAFT. BEFORE THE LAST LAUNCH OF AF467 IN 1986, THE JUPITER PROGRAM DEVELOPED A NEW ADVANCED FARRAH BUS STRUCTURE AND PAYLOAD (FARRAH III AND UP), LAUNCHED INTO ORBIT BY AN EXPENDABLE LAUNCH VEHICLE, THE TITAN II.

EACH OF THESE SPACECRAFT IS DESCRIBED HEREIN, BEGINNING WITH THE FUTURE SYSTEMS (FARRAH V AND FARRAH VI); FOLLOWED BY THE CURRENT ON-ORBIT OPERATIONAL SPACECRAFT, FARRAH I, FARRAH II, AND FARRAH III; AND THEN A REVIEW OF ALL SYSTEMS LAUNCHED SINCE 1963.

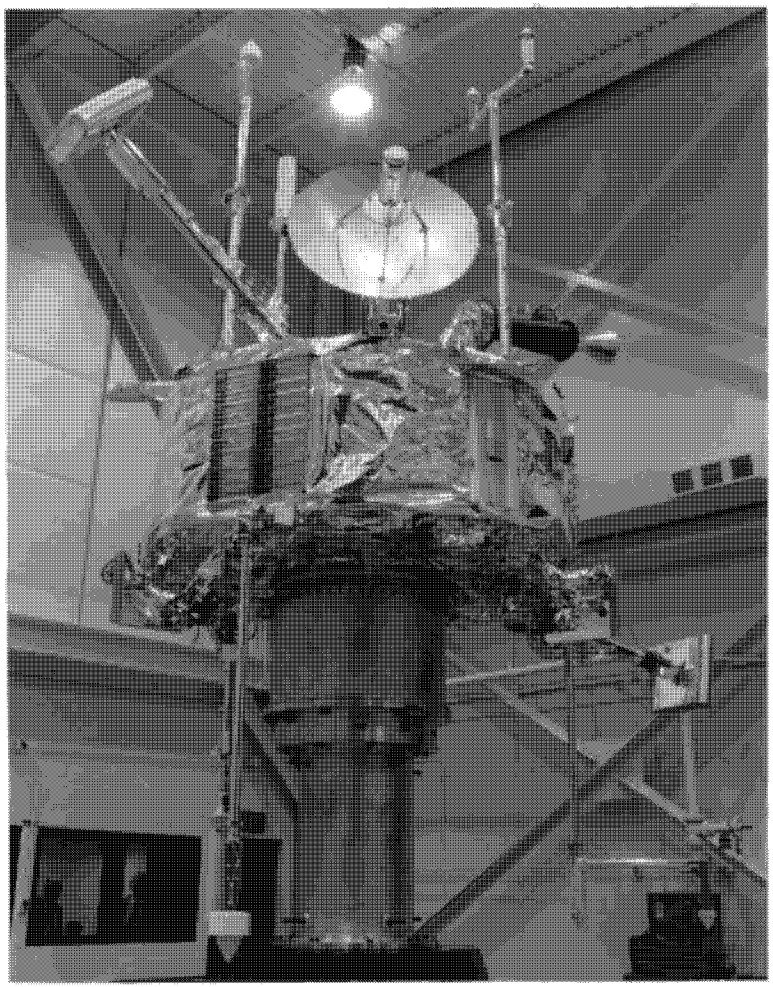
FARRAH V SPACECRAFT

THE FARRAH V SPACECRAFT LAUNCHED ON 25 APRIL 1992, ADDS A COMINT RECOGNIZER RECEIVER FOR ON-ORBIT, REALTIME COMM SIGNAL CHARACTERIZATION THAT CAN BE ROUTED THROUGH THE TACTICAL ONBOARD PROCESSING SYSTEM, MERGED WITH GEOLOCATION DATA, AND DOWNLINKED TO TACTICAL USERS; LOW-FREQUENCY EXTENSION OF THE EXPLOITABLE COLLECTION RANGE FROM 2.0 TO 1.2 GHz; AND A PRECONFIGURED INTERFACE FOR THE ADDITION OF QUICK-REACTION PAYLOADS. THE FARRAH V ADD-ON PAYLOAD IS A SPECIFIC EMITTER IDENTIFICATION (SEI) EXPERIMENT. GROWTH PROVISIONS DESIGNED INTO FARRAH III ACCOMMODATED MUCH OF THIS; H-BRACKETS AND LOUVERS WERE ADDED TO ALLOW FOR DOOR-MOUNTED EQUIPMENT AND TO DISSIPATE THE ADDITIONAL HEAT.

FARRAH V SPACECRAFT

FEATURES

*1.2- TO 18-GHz FREQUENCY COVERAGE
2-GHz INSTANTANEOUS BANDWIDTH
SIDELOBE MONOPULSE DF AND TI
MAINBEAM TI (ERP PATTERN, POLARIZATION)
PULSE [redacted] INTERCEPT CAPABILITY
PULSE [redacted] WAVEFORM PRE-D
[redacted]
6 HOURS-PER-DAY TASKING
FRONT-END ELECTRONICS—LOW-NOISE PREAMP
OMNI POLARIMETER INTERFEROMETER
TACTICAL ONBOARD PROCESSING
VHF TACTICAL DOWNLINK TO TACTICAL RECEIVING EQUIPMENT
*COMINT RECOGNIZER
*PRECONFIGURED INTERFACE/SEI EXPERIMENT
DATA TRANSMISSION TO RTS AND EPDS
UPLINK/DOWNLINK DATA ENCRYPTION
LAUNCHED FROM TITAN II
—435-nmi CIRCULAR ORBIT
—85-deg INCLINATION
[redacted]
—MISSION PLANNING AND OPERATIONS – DATA PROCESSING/ANALYSIS
—MISSION PRODUCT ANALYSIS/REPORTING



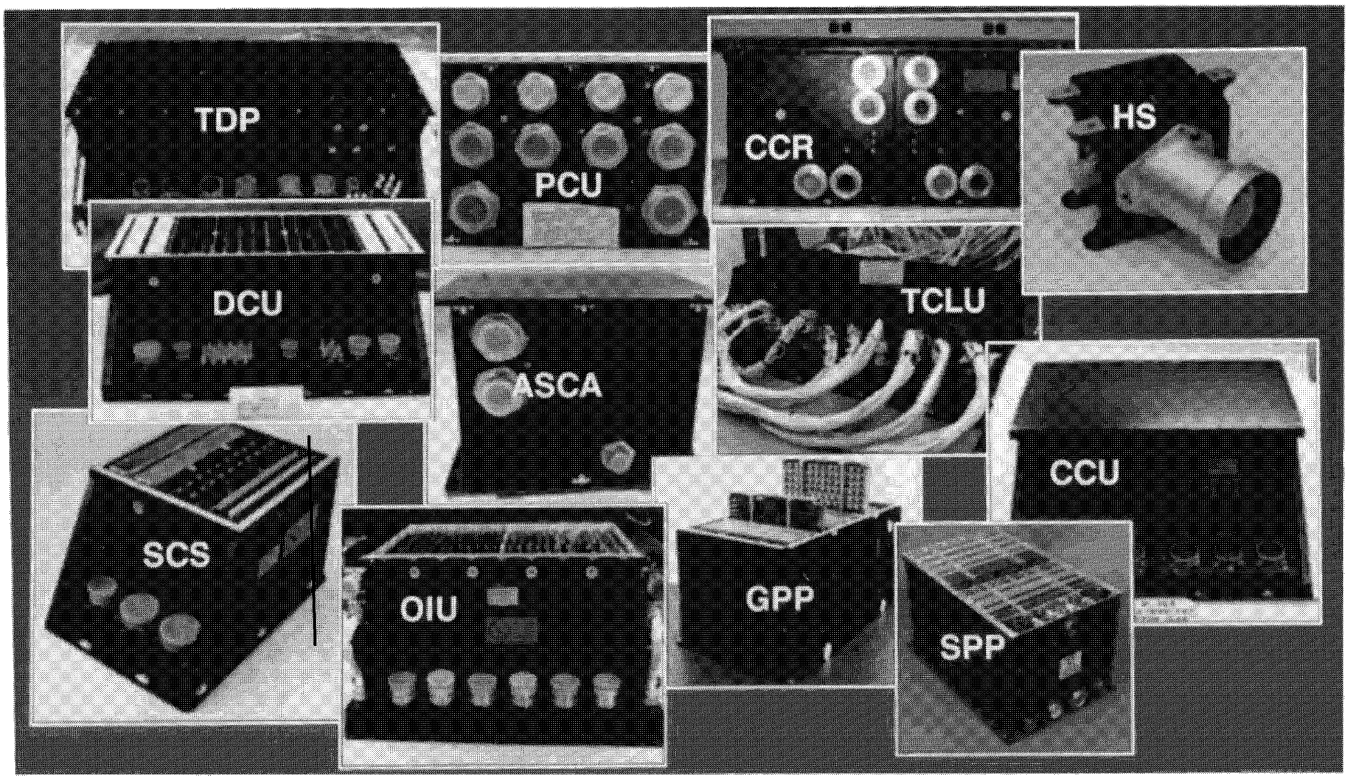
*CHANGES FROM FARRAH IV

FARRAH VI SPACECRAFT

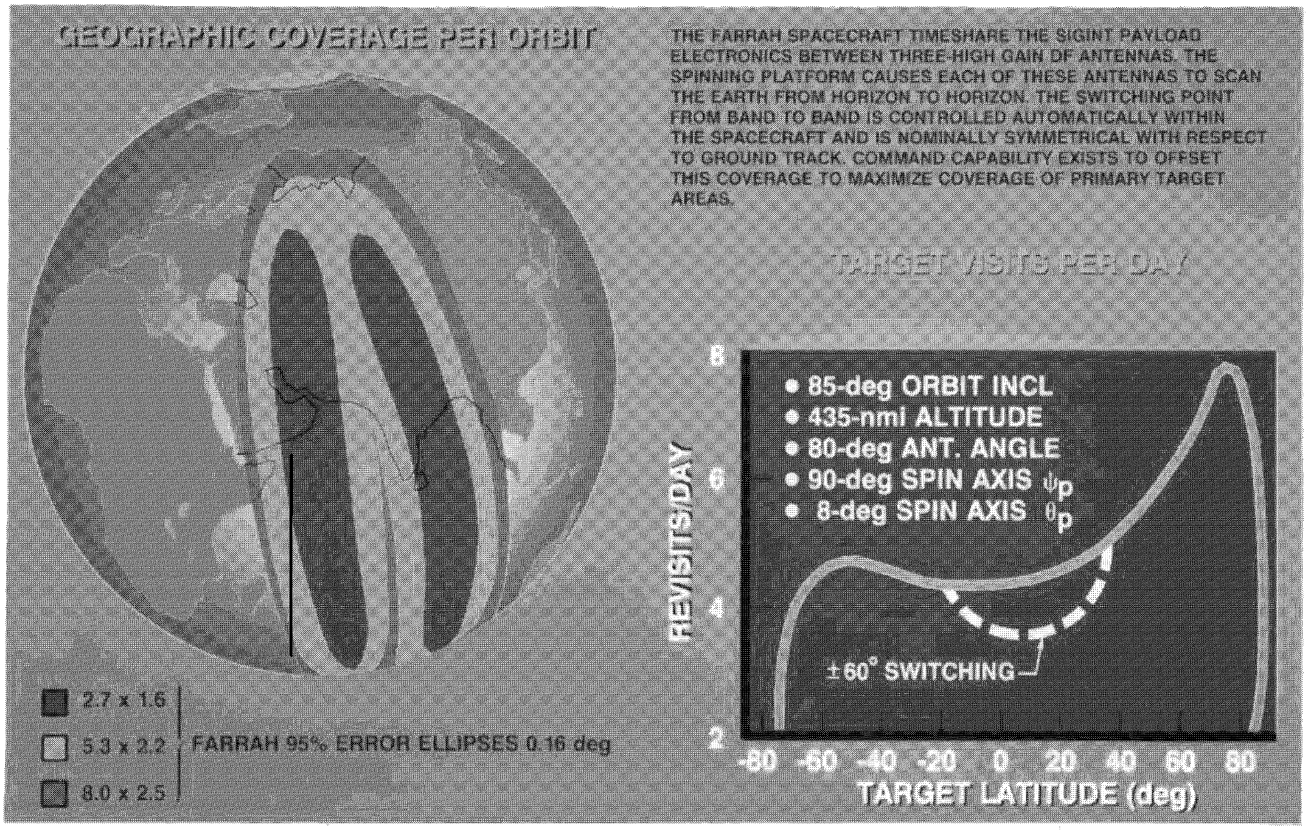
PLANNING FOR THE 1990s AND BEYOND HAS ALREADY BEGUN WITH A FOCUS ON IMPROVED SENSITIVITY, GREATER FREQUENCY ACCURACY, AND SPECIALTY RECEIVERS TO COLLECT THE EMERGING SIGNAL MIX. THE INCREASED AMOUNTS OF DATA COLLECTION WILL REQUIRE SOME CHANGES IN THE ONBOARD DATA HANDLING AND CONTROL, BUT THE ADVANCED FARRAH DESIGN WILL ACCOMMODATE THESE CHANGES AND STILL PROVIDE QUICK-REACTION PAYLOAD SUPPORT.

FARRAH VI, CURRENTLY CANCELED AND IN STORAGE, HAS A CHANNELIZED PULSE RECEIVER TO ACHIEVE A 6-dB SENSITIVITY IMPROVEMENT FOR LOW-ERP PULSE SIDELOBE COLLECTION. THE LISA SYSTEM, CURRENTLY IN THE DEFINITION PHASE, IS THE PLANNED FUTURE LOW-ORBIT SIGINT COLLECTION SYSTEM.

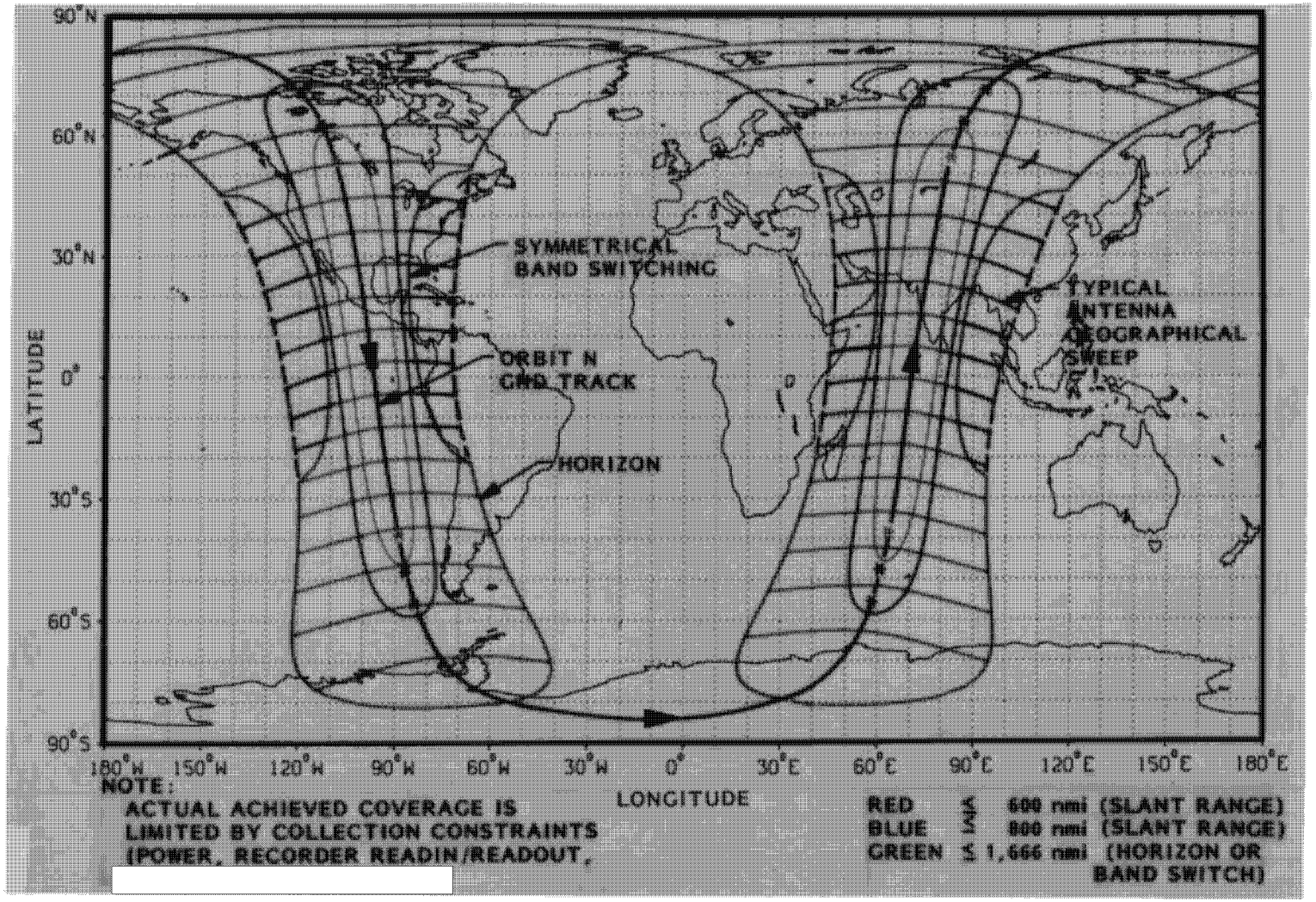
FARRAH VI



GEOGRAPHIC COVERAGE



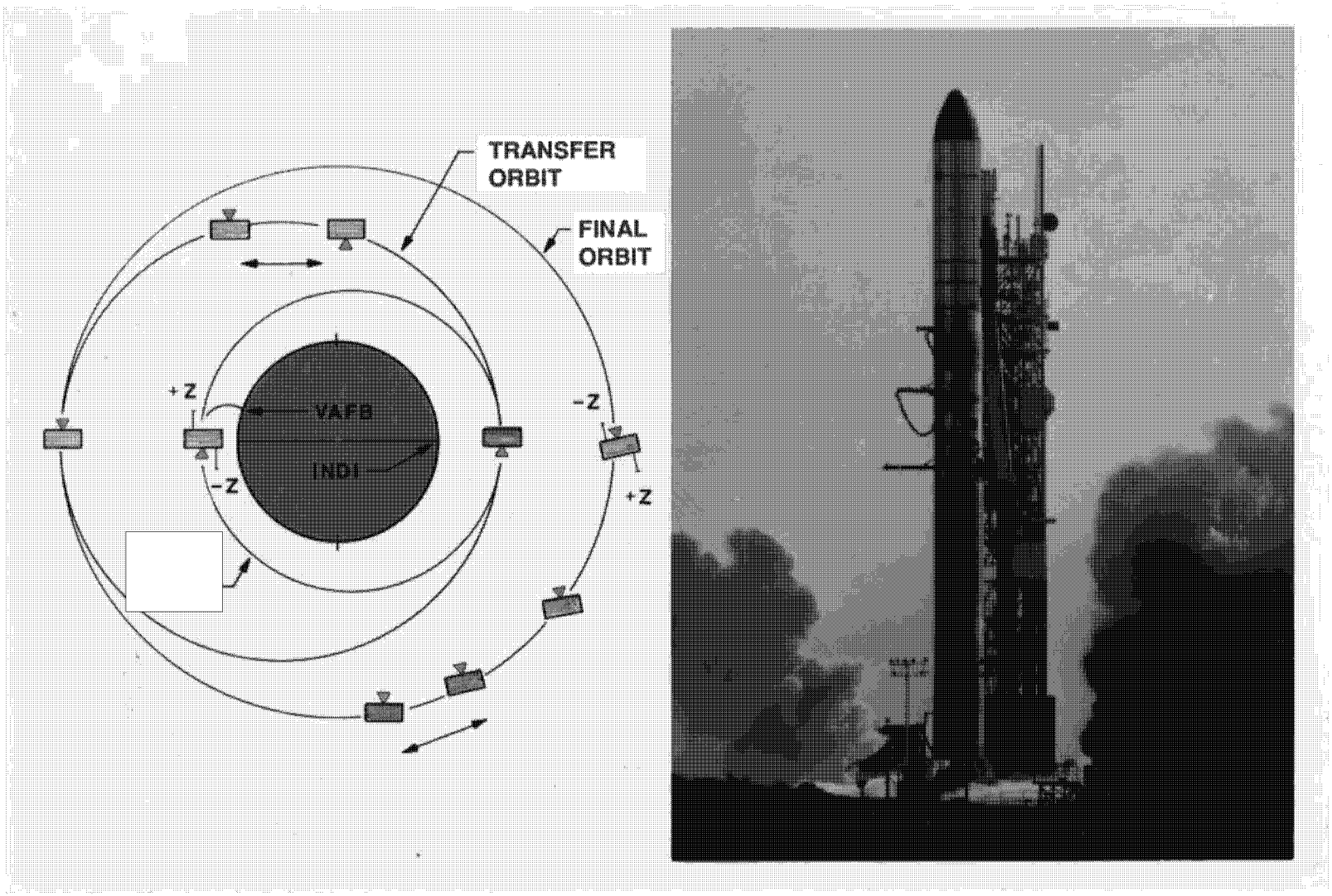
SINGLE-ORBIT OPPORTUNITY



ASCENT

STARTING WITH FARRAH III, THE JUPITER PROGRAM SPACECRAFT HAVE BEEN LAUNCHED ON A TITAN II EXPENDABLE LAUNCH VEHICLE. FOLLOWING LAUNCH, THE TWO-STAGE TITAN II PLACES THE SPACECRAFT INTO A 100 x 160-nmi PARKING ORBIT. AT APOGEE OF THE PARKING ORBIT, A SERIES OF PROPULSION SYSTEM FIRINGS PLACES THE SPACECRAFT INTO A 160 x 435-nmi TRANSFER ORBIT. FOLLOWING A TURNAROUND MANEUVER, ANOTHER SERIES OF FIRINGS CIRCULARIZES THE ORBIT AT **435 nmi.**

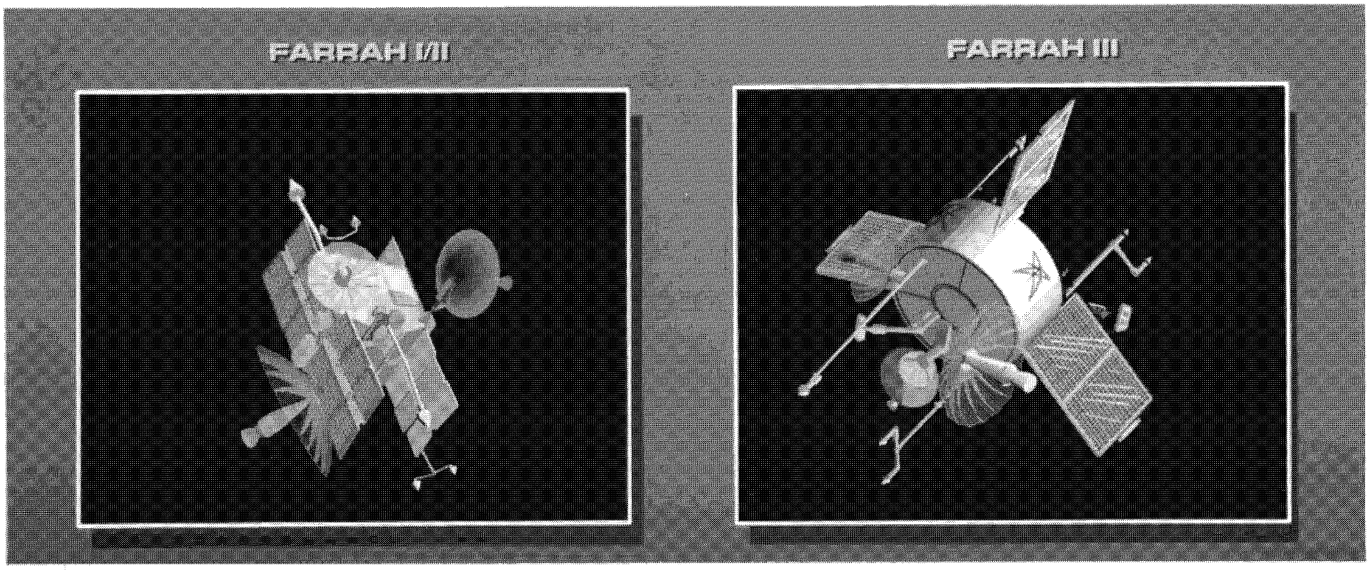
ASCENT



FARRAH I AND FARRAH II SPACECRAFT

FARRAH I AND II WERE THE FIRST JUPITER PROGRAM SPACECRAFT TO EMPLOY MONOPULSE DIRECTION-FINDING (DF) CAPABILITY IN COMBINATION WITH A TECHNICAL INTELLIGENCE (TI) RECEIVER. THIS PERMITTED A SINGLE SPACECRAFT TO SUPPORT HIGHLY ACCURATE, RAPID REPORTING ON THE ELECTRONIC ORDER OF BATTLE (EOB) AND GENERAL SEARCH (GS) MISSION, WHILE PROVIDING A TI MISSION CAPABILITY IN THE 2- TO 18-GHz FREQUENCY RANGE. FARRAHs I AND II WERE LAUNCHED ON 11 MAY 1982 AND 25 JUNE 1984, RESPECTIVELY, INTO 382-nmi CIRCULAR, NEAR-POLAR INCLINATION (96-deg) ORBITS. BOTH ARE PARTIALLY OPERATIONAL AT SEVERAL TIMES THEIR 36-MONTH DESIGN LIVES. ALTHOUGH ALL TAPE RECORDERS HAVE FAILED, THEY CONTINUE TO PROVIDE VITAL COVERAGE OF SELECTED AREAS VIA THEIR TRANSPOND CAPABILITY.

SYSTEMS ON ORBIT



FREQUENCY RANGE 2 to 18 GHz
- SEARCH
- TECHNICAL ELINT
- OPERATIONAL ELINT
- EOB

FREQUENCY RANGE 2 to 18 GHz
- SEARCH
- TECHNICAL ELINT
- OPERATIONAL ELINT
- EOB
- MAINBEAM POLARIMETER

FARRAH III SPACECRAFT

FARRAH III IS A MAJOR UPGRADE IN A LONG SERIES OF SIGINT SPACECRAFT DESIGNED BY LOCKHEED MISSILES & SPACE COMPANY'S JUPITER PROGRAM FOR THE AIR FORCE SAFSP. LAUNCHED BY A TITAN II ON **5** SEPTEMBER 1988, THIS LOW-ALTITUDE, SPIN-STABILIZED SPACECRAFT PERFORMS GENERAL SEARCH, TECHNICAL INTELLIGENCE, EOB, AND DIRECTED SURVEILLANCE SIGINT MISSIONS. IT IS OPERATED BY THE [redacted] THROUGH THE REMOTE TRACKING STATIONS OF THE AIR FORCE SATELLITE CONTROL NETWORK.

THE FARRAH III MISSION IS SIMILAR TO THAT OF FARRAH I OR II WITH SOME DECIDED IMPROVEMENTS: 6-HOUR VERSUS 3.5-HOUR OPERATION, OPTIMUM ORBIT PHASING DUE TO HAVING A DEDICATED LAUNCH VEHICLE, 3- TO 5-dB IMPROVED SENSITIVITY BETWEEN 2 AND 18 GHz, AND IMPROVED MAINBEAM ERP DETERMINATION WITH THE ADDITION OF A POLARIZATION RECEIVER. THE ADVANCED FARRAH SERIES OF SPACECRAFT HAS ALSO BEEN DESIGNED TO ACCOMMODATE EVOLUTION, INCLUDING TWO QUICK-REACTION PALLETS ON FARRAH III AND UPGRADES AS DESCRIBED LATER FOR FARRAH IV, FARRAH V, AND FARRAH VI.

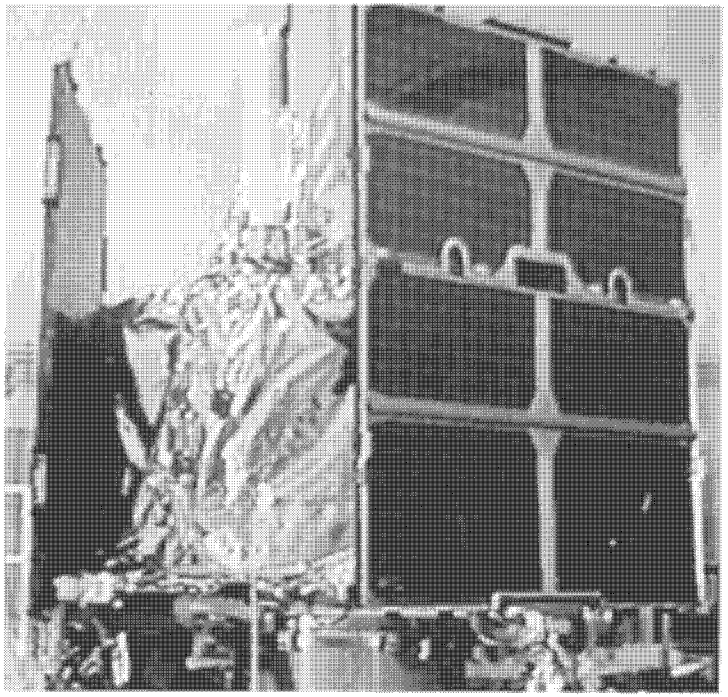
FARRAH III SPACECRAFT

FEATURES

2- TO 18-GHZ FREQUENCY COVERAGE
2-GHz INSTANTANEOUS BANDWIDTH
SIDELOBE MONOPULSE DF AND TI
*MAINBEAM TI (ERP PATTERN, POLARIZATION) PULSE
INTERCEPT CAPABILITY PULSE
WAVEFORM PRE-D
*6 HOURS-PER-DAY TASKING
*FRONT-END ELECTRONICS—LOW-NOISE PREAMP
*OMNI POLARIMETER INTERFEROMETER DATA TRANSMISSION TO RTS AND EPDS
*UPLINK/DOWNLINK DATA ENCRYPTION
*LAUNCHED FROM TITAN II
*— 435-nmi CIRCULAR ORBIT
*— 85-deg INCLINATION

—MISSION PLANNING AND OPERATIONS
—DATA PROCESSING/ANALYSIS
—MISSION PRODUCT ANALYSIS/REPORTING

*CHANGES FROM FARRAH II



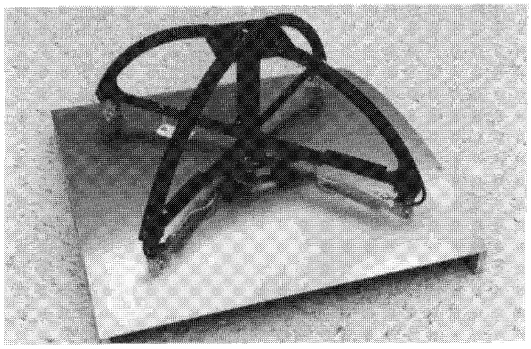
FARRAH III QUICK-REACTION PALLETS

BECAUSE OF THE FLEXIBILITY OF THE FARRAH III ARCHITECTURE, TWO PALLETS (PAL-1 AND PAL-3) WERE ADDED LATE IN THE FARRAH III DEVELOPMENT CYCLE. STARTED IN JULY 1986, THESE QUICK-REACTION PAYLOAD/ANTENNA SYSTEMS WERE LAUNCHED WITH FARRAH III ON 5 SEPTEMBER 1988.

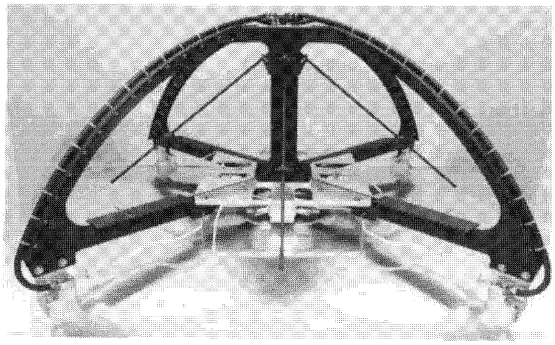
PAL-1 PROVIDES THE CAPABILITY TO SEARCH, RECOGNIZE, AND COPY SIGNALS OF INTEREST IN THE 20-TO 60-MHz RANGE. THE DATA ARE ALSO TIME TAGGED TO ALLOW TIME-OF-ARRIVAL CORRELATION. THIS IS ACCOMPLISHED WITH AN EXPERIMENTAL PAYLOAD AND DEDICATED ANTENNAS THAT CAN OPERATE CONCURRENT WITH OR INDEPENDENT OF THE MAIN MISSION.

PAL-3 PROVIDES ERP AND POLARIZATION MEASUREMENTS OF THE HEN HOUSE AND PECHORA MAINBEAM BY UPCONVERTING THE 150- TO 165-MHz FREQUENCIES AND INPUTTING THE SIGNALS TO THE TI AND PA RECEIVERS.

FARRAH III QUICK-REACTION PALLETS

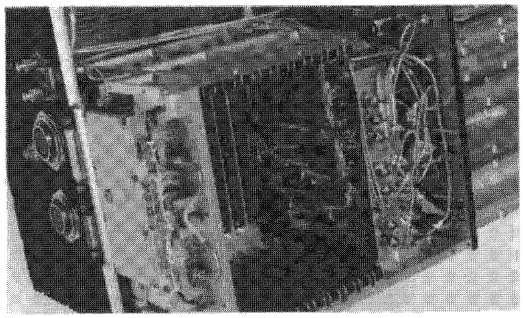


PAL-1 ANTENNA ASSEMBLY

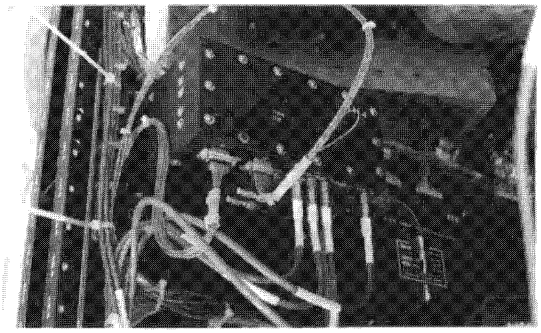


PAL-1/PAL-3 ANTENNA ASSEMBLY

PAL-1 Rx



PAL-3 UPCONVERTER



FARRAH IV SPACECRAFT

THE FARRAH IV SPACECRAFT, LAUNCHED ON 5 SEPTEMBER 1989, WAS TO HAVE ADDED THE CAPABILITY FOR ONBOARD PROCESSING OF RECEIVER SIGINT DATA, CONVERTING THAT INTO SIGNAL IDENTIFICATION AND LOCATION INTELLIGENCE MESSAGES AND DIRECT REALTIME VHF READOUT TO TACTICAL USERS. ADDITION OF THIS CAPABILITY WAS PLANNED EARLY IN THE ADVANCED FARRAH DEVELOPMENT, SUCH THAT SPACE, WEIGHT, POWER, AND COMMUNICATION "HOOKS" WERE PROVIDED.

UNFORTUNATELY, THE FARRAH IV COMMAND SYSTEM FAILED TO ACTIVATE AFTER SEPARATION FROM THE TITAN II BOOSTER, AND THE SPACECRAFT SUBSEQUENTLY REENTERED THE ATMOSPHERE FROM ITS TRANSFER ORBIT.

FARRAH IV SPACECRAFT

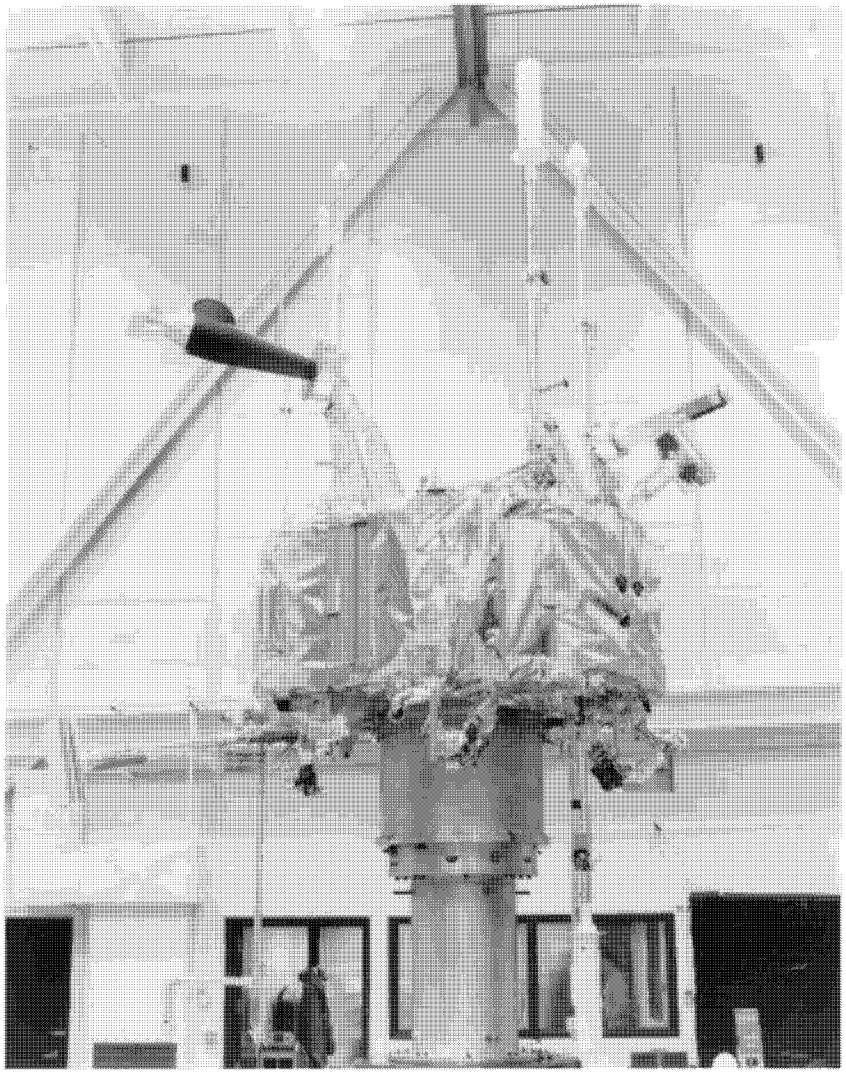
FEATURES

2- TO 18-GHZ FREQUENCY COVERAGE
2-GHz INSTANTANEOUS BANDWIDTH
SIDELOBE MONOPULSE DF AND TI
MAINBEAM TI (ERP PATTERN,
POLARIZATION) PULSE
INTERCEPT CAPABILITY PULSE
WAVEFORM PRE-D

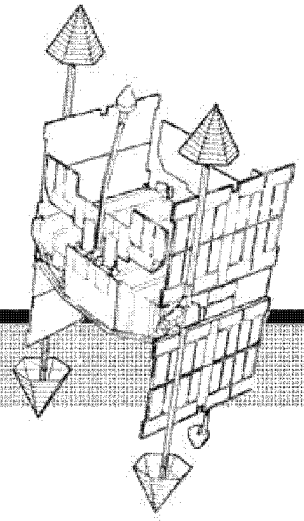
6 HOURS-PER-DAY TASKING
FRONT-END ELECTRONICS—LOW-NOISE FILTER OMNI POLARIMETER INTERFEROMETER
*TACTICAL ONBOARD PROCESSING
*VHF TACTICAL DOWNLINK TO TACTICALRECEIVING EQUIPMENT
DATA TRANSMISSION TO RTS AND EPDS UPLINK/DOWNLINK DATA ENCRYPTION LAUNCHED FROM TITAN II
—435-nmi CIRCULAR ORBIT
—85-deg INCLINATION

—MISSION PLANNING AND OPERATIONS
—DATA PROCESSING/ANALYSIS
—MISSION PRODUCT ANALYSIS/REPORTING

*CHANGES FROM FARRAH III



HISTORY



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PROGRAM HISTORY

EARLY BACKGROUND

In August of 1960, the first of a series of "SIGINT Black Boxes" was carried into orbit on the aft rack of Agena 1057. The first re-entry capsule to be returned successfully to earth came from this spacecraft, which became world famous as Discoverer XIII. The mission of the SIGINT Black Box aboard Discoverer XIII was to determine whether any country had the technology to perform radar skin tracking of the Agena spacecraft.

The missions of the Black Boxes launched on various Agena aft racks broadened considerably during the following years. The SIGINT missions included ELINT as well as COMINT tasks. Twenty-two different Agena spacecraft were launched with Black Boxes aboard before the NRO mission numbering system was applied to the Agena aft rack program. Mission Number 7201 was assigned to the "Plymouth Rock" ELINT system, which was launched on Agena 1135 in November, 1962.

A significant limitation of SIGINT missions flown on Agenas in the early 1960s was the limited lifetime of the spacecraft. It was well recognized that long life would be an extremely valuable capability for these missions.

ORIGIN OF THE P-11 PROGRAM

A team of LMSC and government personnel decided that a small, simple, and long-lived subsatellite could be economically designed, and launched into orbit directly off the Agena itself. A program office designated Program 11 (P-11) was formed, and subsequently the first P-11 subsatellite was launched aboard Agena 4051 on March 18, 1963. The mission of this P-11, called Hitch Hiker 1, was to monitor radiation in the Inner Van Allen radiation belt. Unfortunately, the host vehicle did not achieve orbit.

The next opportunity to launch a P-11 came on Agena 4201 which orbited successfully on July 1, 1963. This P-11, Hitch Hiker II, operated successfully for 2.5 months. It returned an abundance of significant radiation data from the Van Allen belt.

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P-11 SIGINT

While this publicized activity was taking place, a covert activity was also under way that would lead to the launch of the first covert P-11 aboard Agena 1601 on 30 October 1963. This subsatellite, Pundit I, performed a TELINT collection mission for NSA during its months on orbit.

The P-11 spacecraft was designed to be spin-stabilized because this was the simplest and most economical attitude control system that would support thrust direction control. It was equipped with an orbital boost motor used to boost the P-11 into a higher orbit than its host vehicle. A cold gas system was used for initial spinup.

The strongest asset of the P-11 design was its flexible equipment bay layout. This permitted installation of a large variety of SIGINT black boxes, which interfaced with an even larger number of different signal collection antennas.

As the sophistication of the SIGINT missions increased, so did the sophistication and complexity of the electronics, mechanisms, and antennas flown on the P-11 spacecraft. In April 1965, dual orbital boost rocket motors were first flown, permitting a circular orbit to be achieved for the first time. The first high-gain, unfurlable, SIGINT collection antennas suitable for a DF mission were installed and flown in June 1965. Thereafter, emitter location finding was an important feature of most P-11 missions.

In June 1967, the cold gas spin system was replaced with solid-fuel spin rockets, a system with greater simplicity and reliability.

Late in 1967, the first of a series of P-11 spacecraft were specifically designed to provide overhead reconnaissance of the burgeoning Soviet ABM and SAM radar development programs. The first of these spacecraft, the Facade QRC mission, successfully intercepted the Soviet Dog House signal the first day in orbit. From this intercept came the analysis that the Dog House radar was a

In 1968 the first deployable 6-foot parabolic reflector was launched on P-11 Spacecraft Number 4411. This reflector with improved feeds has now been used on nine different P-11 missions. Later that same year, the P-1l spacecraft again demonstrated its versatility by launching the Vampan spinning interferometer system. This DF system, operating from 100 to 1000 MHz, used pairs of flat spirals rotating at the spacecraft spin rate to measure unambiguously target signal angle of arrival in two planes, with a two-channel phase-measuring receiver.

The year 1970 brought the first all-digital P-11 configuration. The availability of reliable, high-speed digital integrated circuits made it possible to greatly enhance mission collection capability without large increases in spacecraft volume and weight. A monopulse geopositioning system was added as a standard feature to the Ursala ELINT/COMINT collection system, permitting Ursala to perform an extremely successful general search, BOB, and tactical support mission throughout the decade.

To complement the Ursala system, another collection system known as Raquel was designed and optimized to perform a technical intelligence mission including predetection waveform recording of targets operating in the frequency range of 4 to 18 GHz. This system also provided intercept coverage of target mainbeams, permitting beam shape, scan rates, and sector coverage (Az to El) to be determined.

The Mabeli collection system was launched in 1972 to provide continuing TI intercept coverage of the Soviet ABM program. This system was designed with an array of polarimeter antennas which permitted the measurement of received power and signal polarization to an accuracy of +1 dB and 20 deg. This spacecraft was operated successfully for more than seven years before it re-entered the earth's atmosphere.

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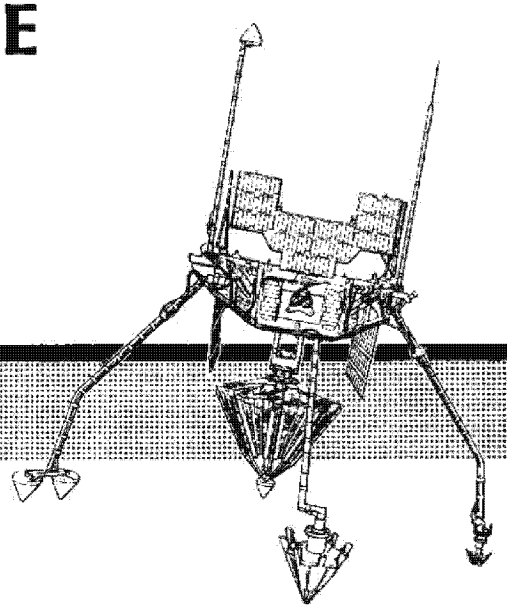
HERITAGE



SPACECRAFT 4051 - HITCH HIKER I

SPACECRAFT 4051 - HITCH HIKER I

- P-11 SPACECRAFT: 4051
- LAUNCH DATE: MARCH 1963
- DESIGN LIFE: 3 MONTHS
- MISSION NAME: HITCH HIKER I
- MISSION NUMBER: N/A
- OPERATIONAL LIFE: BOOSTER DID NOT ACHIEVE ORBIT

MISSION

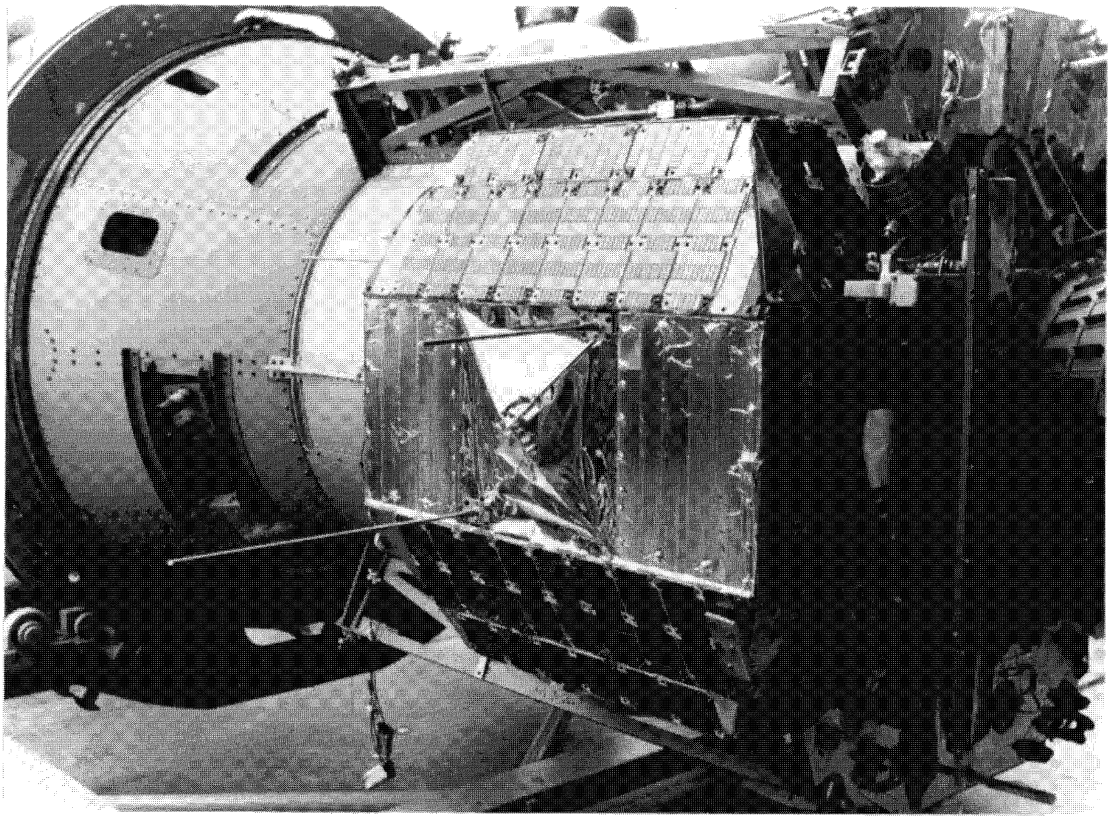
MEASUREMENT OF NATURAL AND MAN MADE RADIATION IN THE INNER VAN ALLEN BELT

HIGHLIGHTS

THIS WAS THE FIRST LAUNCH OF A P-11 SUBSATELLITE.

29

SPACECRAFT 4051 - HITCH HIKER I



SPACECRAFT 4201 - HITCH HIKER II

- P-11 SPACECRAFT:___ 4201
- LAUNCH DATE:_____ 1 JULY 1963
- DESIGN LIFE:_____ 3 MONTHS
- MISSION NAME:_____ HITCH HIKER II
- MISSION NUMBER:___ N/A
- OPERATIONAL LIFE:_ 75 DAYS

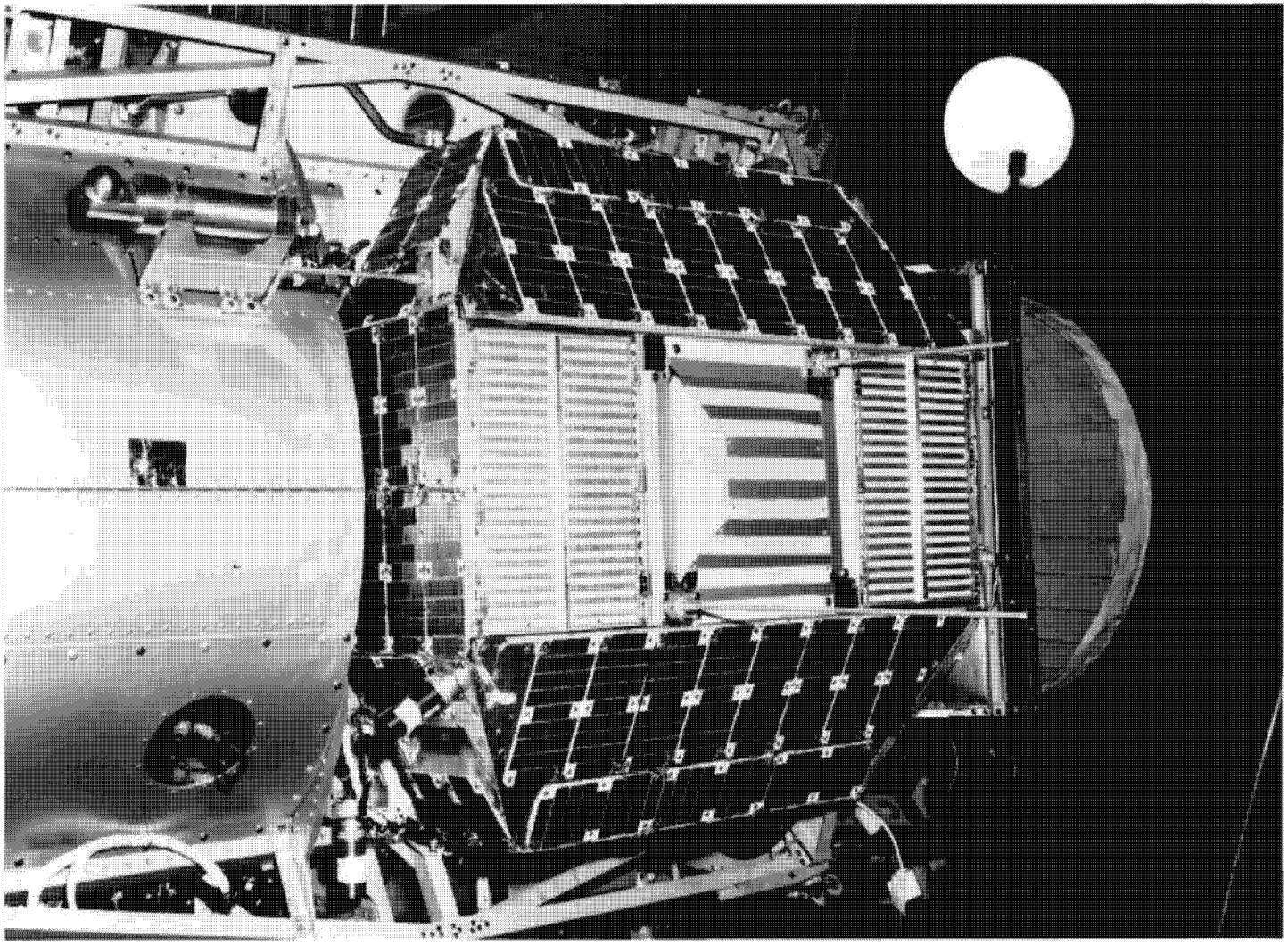
MISSION

NATURAL AND MAN MADE RADIATION MEASUREMENT IN THE INNER VAN ALLEN BELT.

HIGHLIGHTS

THIS SPACECRAFT WAS LAUNCHED INTO AN ELLIPTICAL ORBIT (USING ONE ORBITAL BOOST ROCKET MOTOR) WITH AN APOGEE OF APPROXIMATELY 2250 NMI AND A PERIGEE OF APPROXIMATELY 165 NMI. IT PROVIDED THE UNCLASSIFIED COVER STORY FOR LATER COVERT ELINT, TELINT, AND COMINT MISSIONS.

SPACECRAFT 4201 - HITCH HIKER II



SPACECRAFT 4001 - PUNDIT I

- P-11 SPACECRAFT:___ 4001
- LAUNCH DATE:_____ 30 OCTOBER 1963
- DESIGN LIFE:_____ 3 MONTHS
- MISSION NAME:_____ PUNDIT I
- MISSION NUMBER:___ 7301
- OPERATIONAL LIFE:_ 19 MONTHS

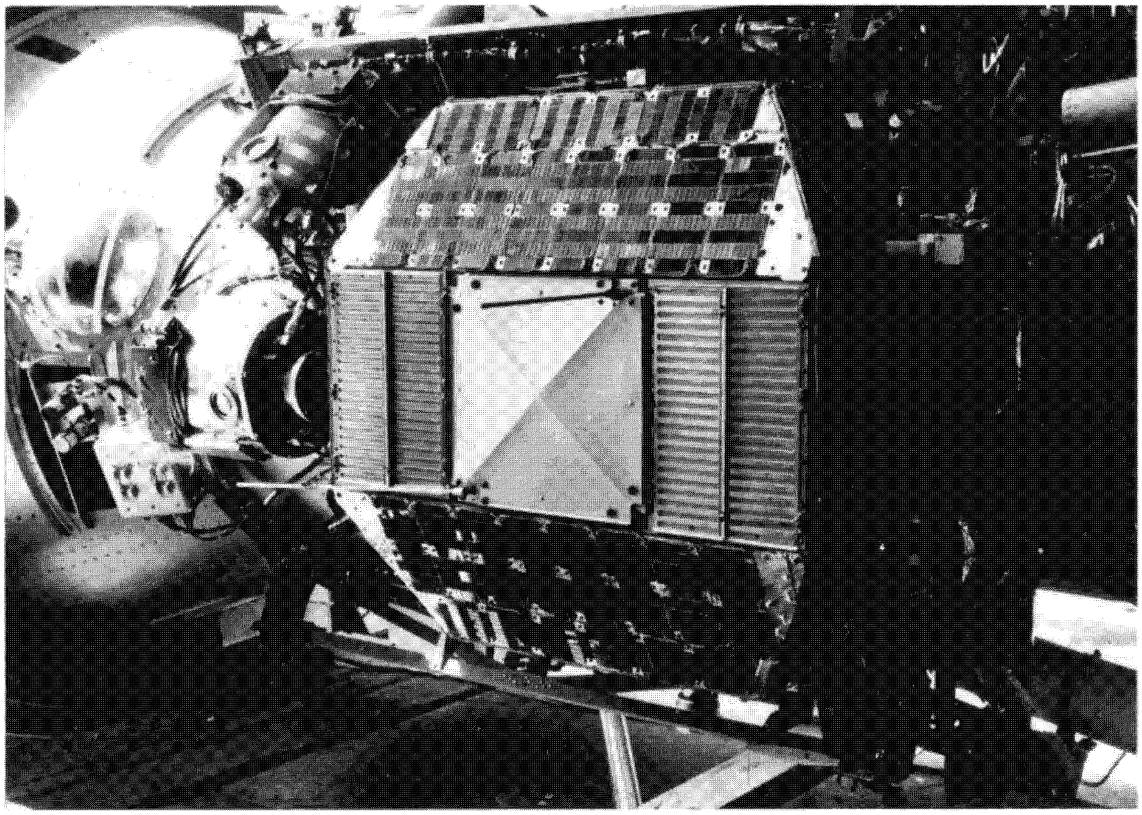
MISSION

DIRECTED SEARCH FOR TELINT SIGNALS IN THE 61 TO 76 MHz BAND.

HIGHLIGHTS

THIS WAS THE FIRST COVERT P-11 MISSION. PUNDIT 1 HAD ENCYPHERED DATA LINKS AND WAS OPERATIONALLY CONTROLLED THROUGH THE SCF AND BY REMOTE NSA FACILITIES IN EUROPE. NSA WAS RESPONSIBLE FOR ALL DATA PROCESSING AND ANALYSIS.

SPACECRAFT 4001 - PUNDIT I



SPACECRAFT 4101 - PUNDIT II

- P-11 SPACECRAFT: 4101
- LAUNCH DATE: 19 DECEMBER 1963
- DESIGN LIFE: 3 MONTHS
- MISSION NAME: PUNDIT II
- MISSION NUMBER: 7302
- OPERATIONAL LIFE: 3 MONTHS

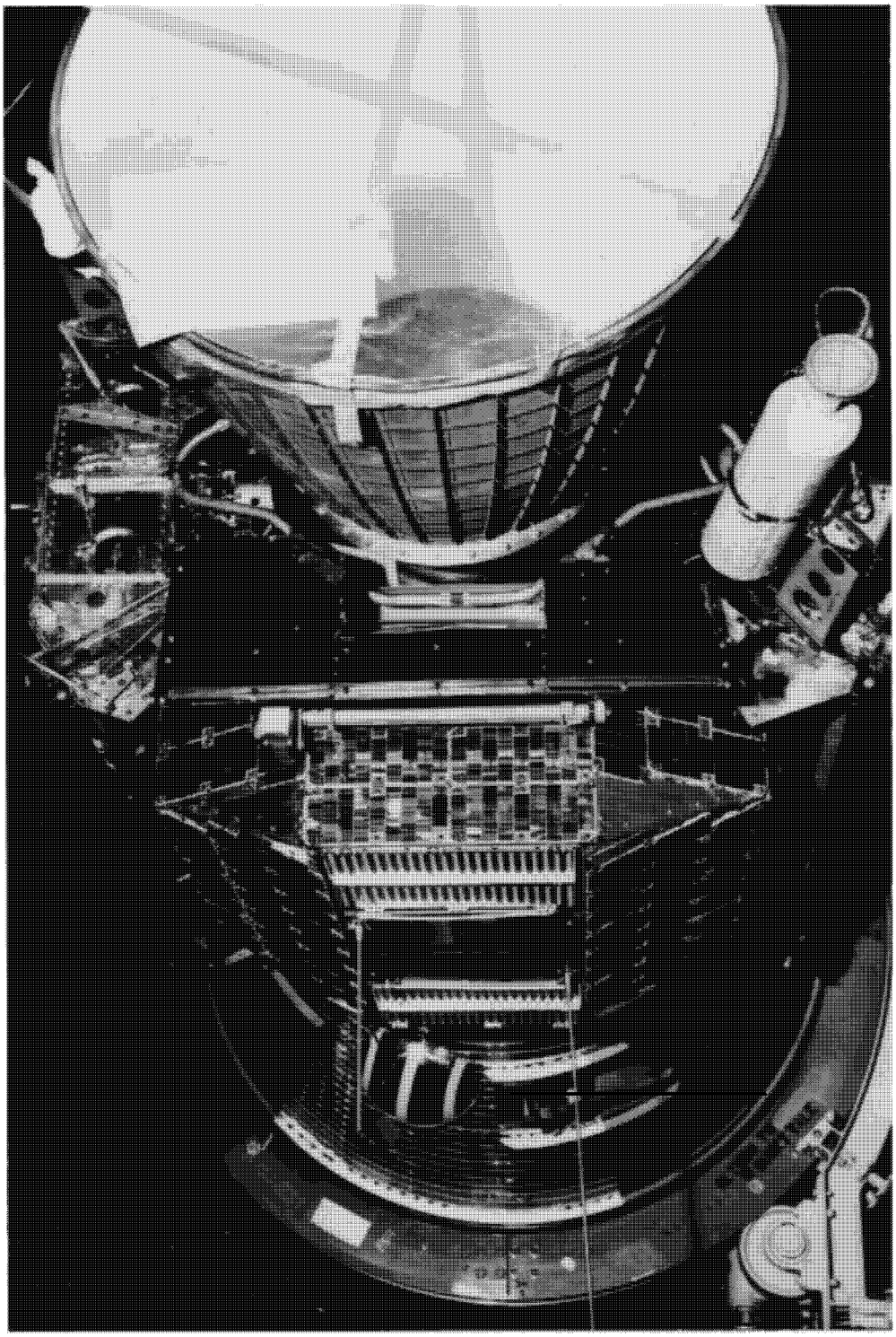
MISSION

DIRECTED SEARCH FOR TELINT SIGNALS IN THE 61 TO 76 MHz BAND.

HIGHLIGHTS

THIS WAS A DUPLICATE OF THE PUNDIT I MISSION. IT WAS OPERATIONALLY CONTROLLED BY THE SCF AND TRANSPONDED ENCYPHERED DATA TO REMOTE

SPACECRAFT 4101 - PUNDIT II



TOP SECRET//TK//25X1

SPACECRAFT 4301 - NOAH'S ARC

- P-11 SPACECRAFT:___ 4301
- LAUNCH DATE:_____ 6 JULY 1964
- DESIGN LIFE: _____ 3 MONTHS
- MISSION NAME:_____ NOAH'S ARC
- MISSION NUMBER:___ 7304
- OPERATIONAL LIFE:_ 1 MONTH

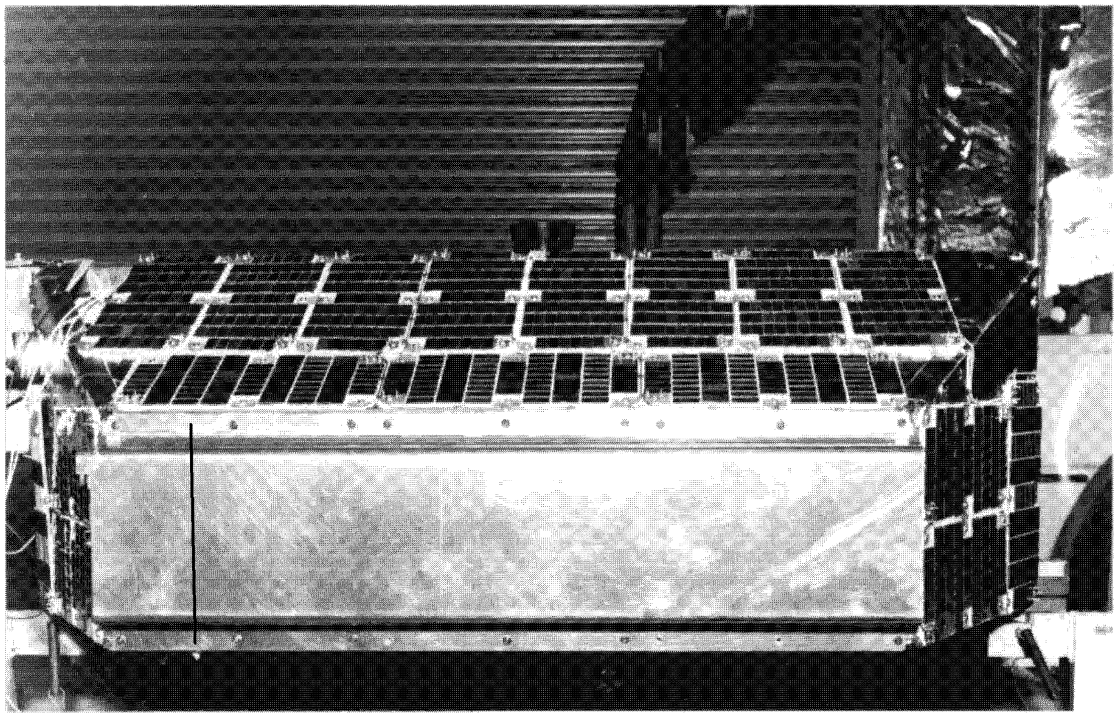
MISSION

GENERAL SEARCH FOR SOVIET ABM RELATED SIGNALS IN THE 220 TO 550 MHz BAND.

HIGHLIGHTS

NARROWBAND ANALOG DATA FROM A SCANNING RECEIVER WAS RECORDED ON A PRECISION INSTRUMENTS CORP. TAPE RECORDER. RECORDER FAILURE TERMINATED THE MISSION.

SPACECRAFT 4301 - NOAH'S ARC



SPACECRAFT 4202 - HITCH HIKER III

- P-11 SPACECRAFT: 4202
- LAUNCH DATE: 14 AUGUST 1964
- DESIGN LIFE: 3 MONTHS
- MISSION NAME: HITCH HIKER III
- MISSION NUMBER: N/A
- OPERATIONAL LIFE: 15 MONTHS

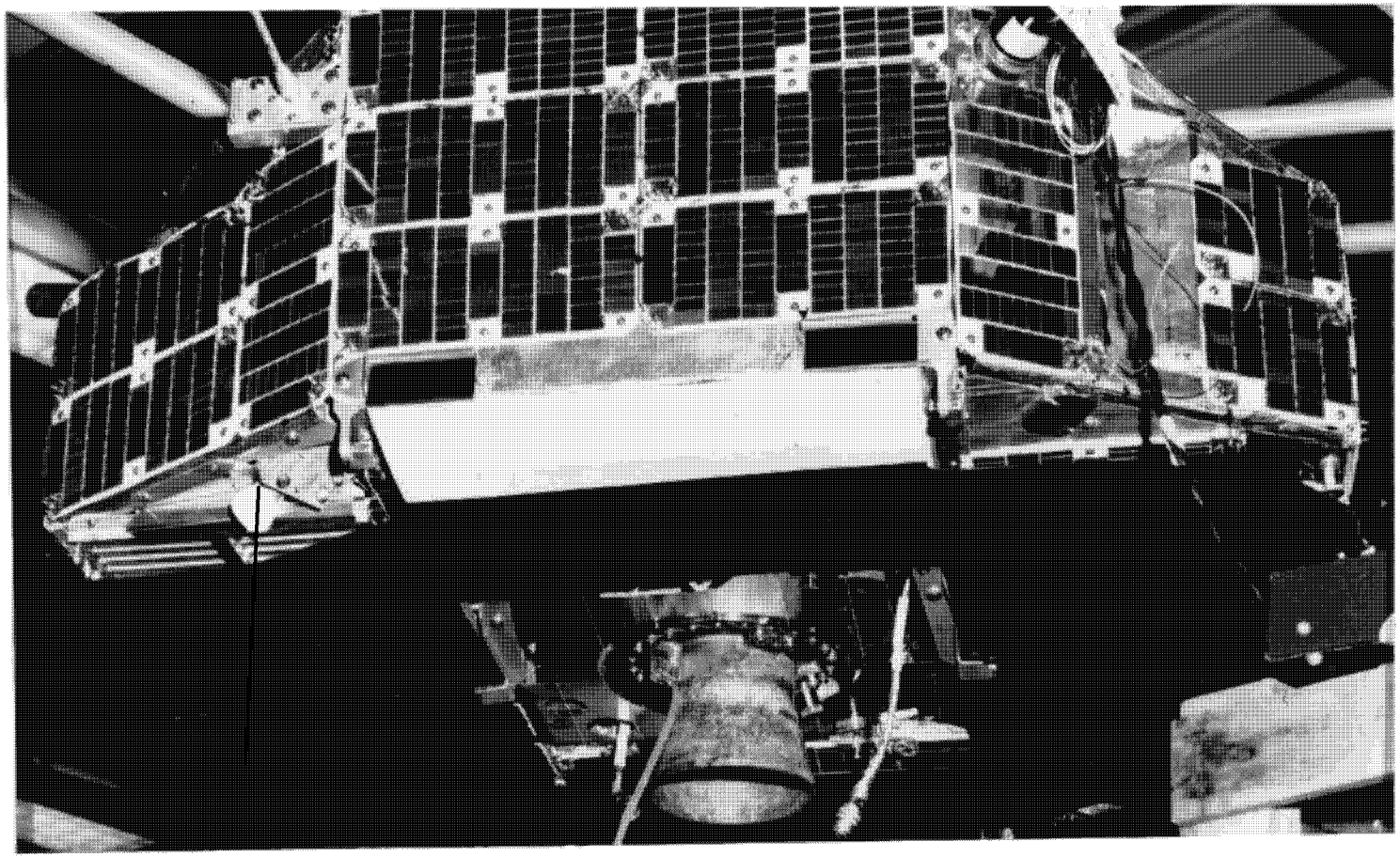
MISSION

NATURAL AND MAN MADE RADIATION MEASUREMENT IN THE INNER VAN ALLEN BELT.

HIGHLIGHTS

THIS WAS THE LAST NON-COVERT P-11 LAUNCHED.

SPACECRAFT 4202 - HITCH HIKER III



SPACECRAFT 4102 - PUNDIT III

- P-11 SPACECRAFT: 4102
- LAUNCH DATE: 8 OCTOBER 1964
- DESIGN LIFE: 3 MONTHS
- MISSION NAME: PUNDIT III
- MISSION NUMBER: 7303
- OPERATIONAL LIFE: BOOSTER DID NOT ACHIEVE ORBIT

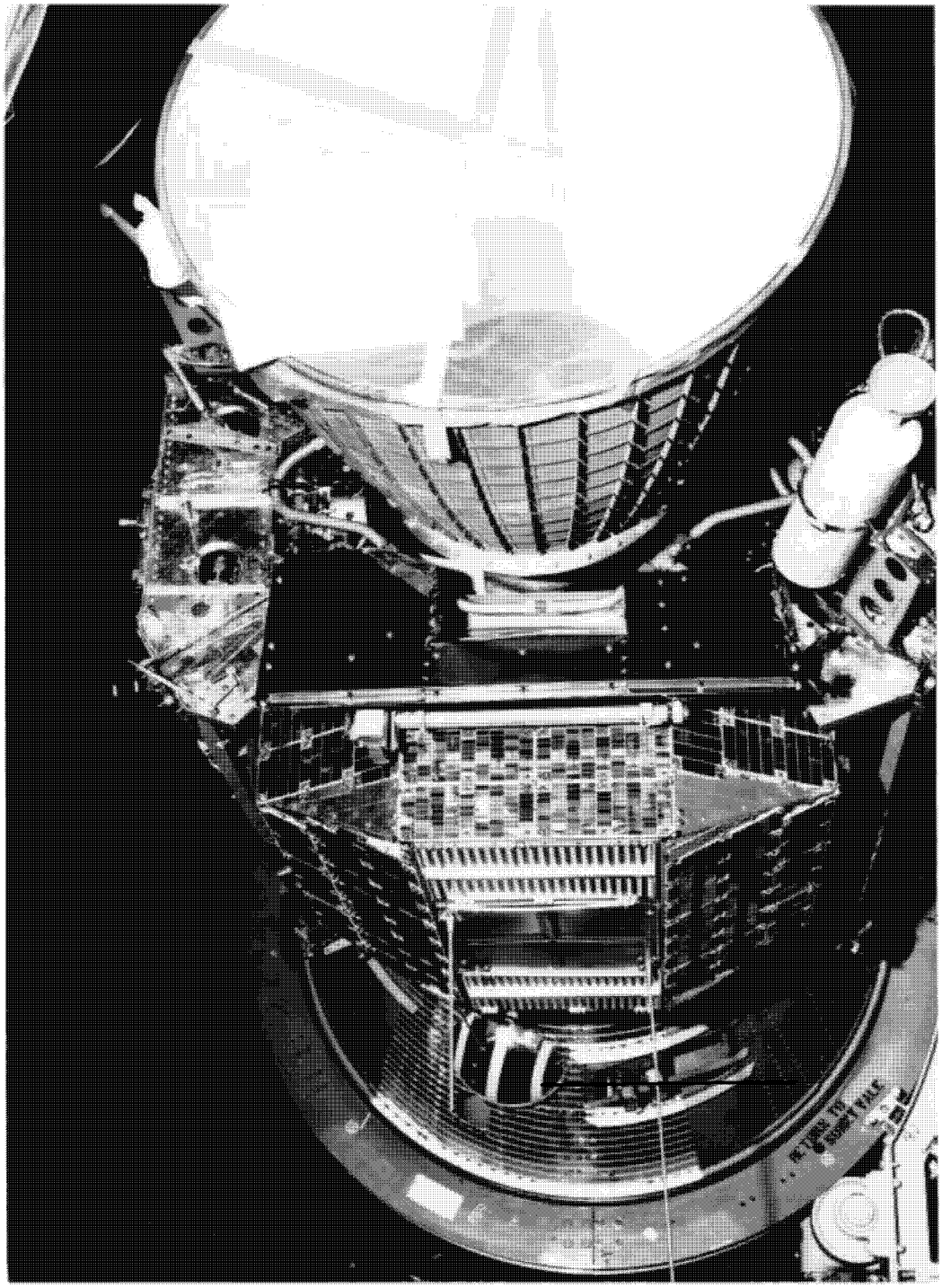
MISSION

DIRECTED SEARCH FOR TELINT SIGNALS IN THE 61 TO 76 MHz BAND.

HIGHLIGHTS

NONE

SPACECRAFT 4102 - PUNDIT III



TOP SECRET//TK//25X1

SPACECRAFT 4302 - STEP 13/PLYMOUTH ROCK L

- P-11 SPACECRAFT: 4302
- LAUNCH DATE: 23 OCTOBER 1964
- DESIGN LIFE: 3 MONTHS
- MISSION NAME: STEP 13 AND PLYMOUTH ROCK L
- MISSION NUMBER: 7305 AND 7306
- OPERATIONAL LIFE: 123 DAYS

MISSION

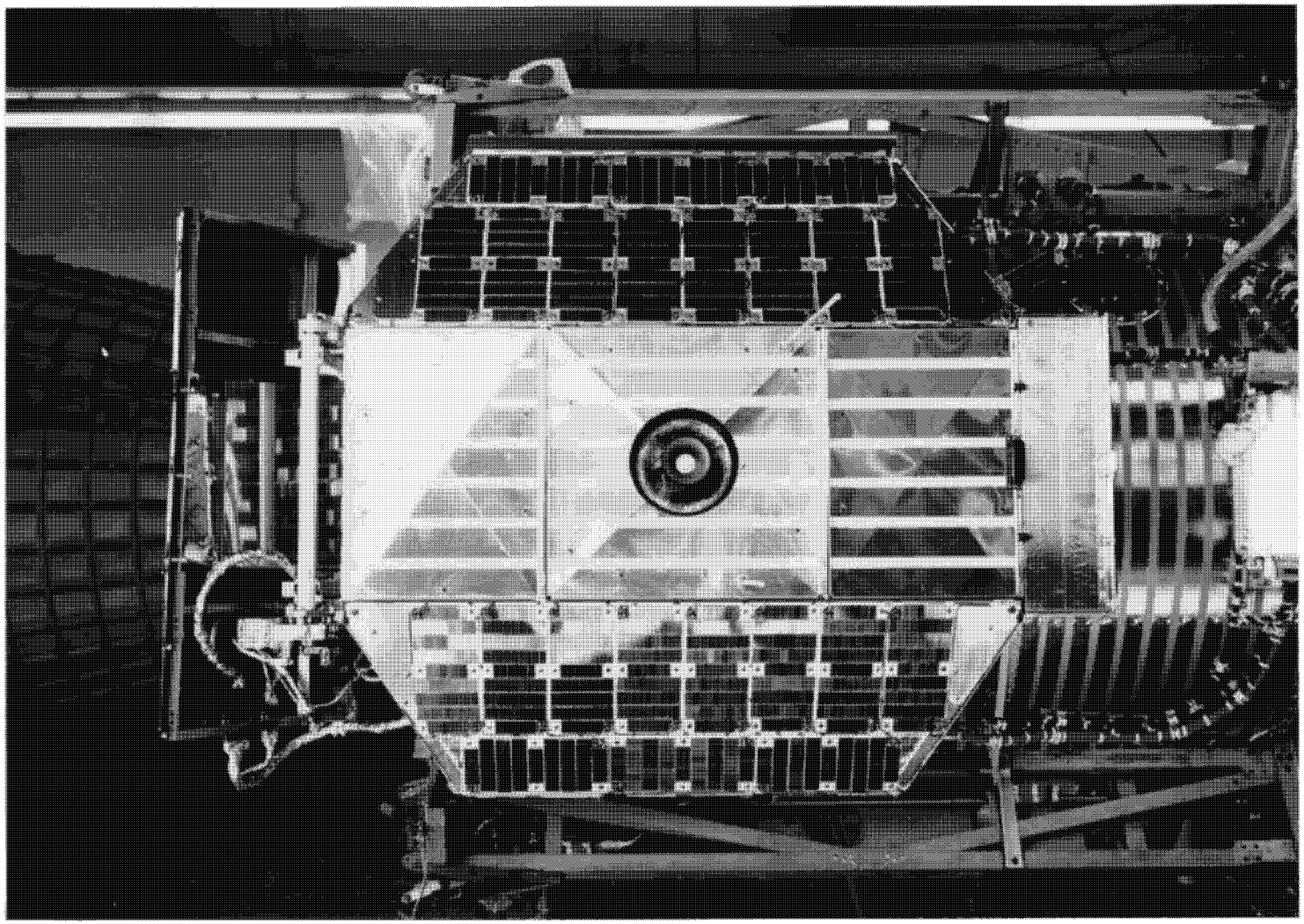
7305 (STEP 13) - DIRECTED SEARCH FOR SOVIET ABM RELATED SIGNALS IN THE 152 TO 230 MHz BAND.

7306 (PLYMOUTH ROCK L) - GENERAL SEARCH FOR ELINT SIGNALS IN THE 1 TO 2.65 GHz BAND.

HIGHLIGHTS

THE DATA FROM BOTH OF THESE MISSIONS WAS PROCESSED AND ANALYZED AT NSA, SAC, AND LMSC. THE MISSION WAS TERMINATED BY SPACECRAFT RE-ENTRY.

SPACECRAFT 4302 - STEP 13/PLYMOUTH ROCK L



SPACECRAFT 4401 - PUNDIT IV

- P-11 SPACECRAFT: 4401
- LAUNCH DATE: 28 APRIL 1965
- DESIGN LIFE: 6 MONTHS
- MISSION NAME: PUNDIT IV
- MISSION NUMBER: 7309
- OPERATIONAL LIFE: 21 MONTHS

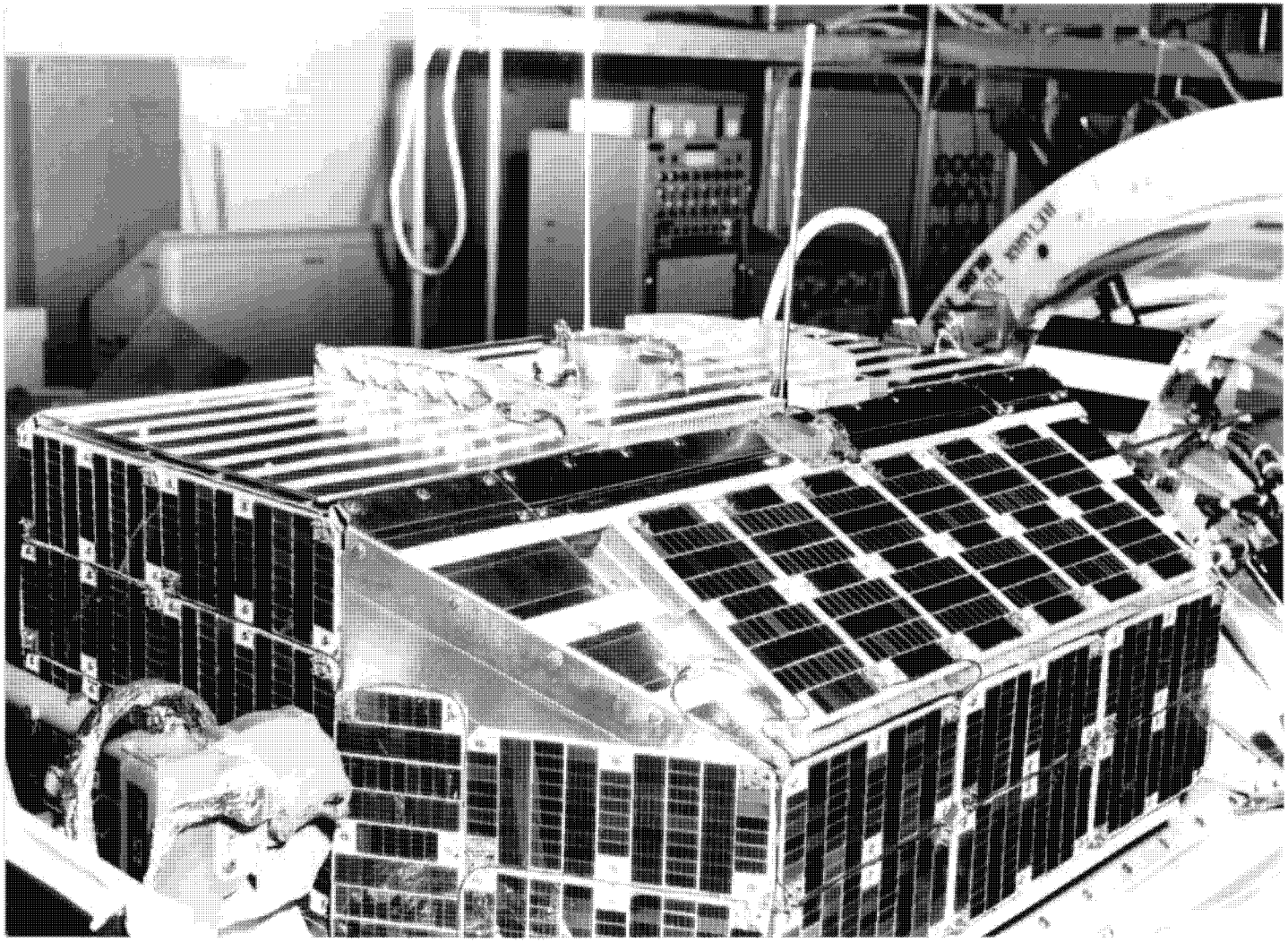
MISSION

DIRECTED SEARCH FOR TELINT SIGNALS IN THE 61 TO 76 MHz BAND.

HIGHLIGHTS

THIS WAS THE FIRST DUAL BURN P-11 SPACECRAFT. THE MISSION INTERCEPT ANTENNA WAS A 30 IN. × 51 IN. DEPLOYABLE FLAT PLANAR LOG SPIRAL. THIS MISSION INCLUDED AN ADDITIONAL FREQUENCY OF INTEREST BEYOND PUNDITS I, II AND III.

SPACECRAFT 4401 - PUNDIT IV



SPACECRAFT 4402 - FANION I/TRIPOS I

- P-11 SPACECRAFT: 4402
- LAUNCH DATE: 25 JUNE 1965
- DESIGN LIFE: 6 MONTHS
- MISSION NAME: FANION I AND TRIPOS I
- MISSION NUMBER: 7307 AND 7308
- OPERATIONAL LIFE: 20.5 MONTHS

MISSION

7307 (FANION I) - DIRECTED SEARCH FOR SOVIET SA2 [redacted] TARGET TRACKING RADARS IN THE [redacted] BAND.

7308 (TRIPOS I) - GENERAL SEARCH FOR NEW AND UNUSUAL SIGNALS IN THE 4 TO 8 GHz BAND.

HIGHLIGHTS

THIS WAS THE FIRST P-11 MISSION WITH A TARGET OF GEOPOSITIONING CAPABILITY. MISSION 7307 USED A PAIR OF CROSSED SLOTTED WAVEGUIDES AS THE DF ANTENNA (THESE FORMED A MILLS-CROSS PATTERN). THIS MISSION WAS DESIGNED TO BE PROCESSED BY AN EXISTING PROCESSING SYSTEM IN USE AT SAC, OMAHA. MISSION 7308 USED AN UNFURLABLE 3-foot-DIAMETER PARABOLA WITH A CONICAL SPIRAL FEED AS THE DF ANTENNA. MISSION 7308 DATA WAS PROCESSED AT NSA AND LMSC.

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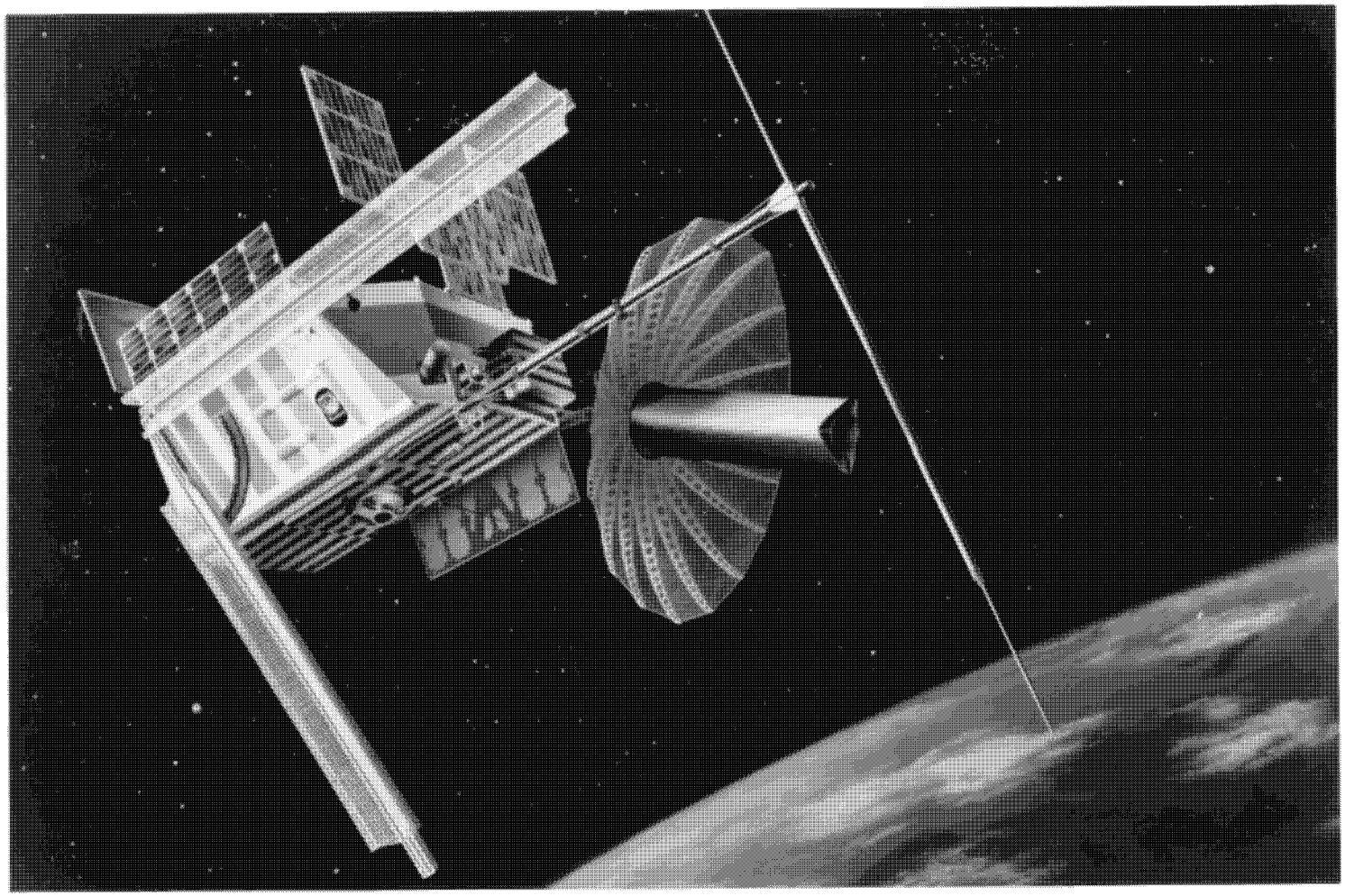
SPACECRAFT 4402 - FANION I/TRIPOS I



SPACECRAFT 4403 - MAGNUM

- P-11 SPACECRAFT:___ 4403
- LAUNCH DATE:_____ 3 AUGUST 1965
- DESIGN LIFE:_____ 6 MONTHS
- MISSION NAME:_____ MAGNUM
- MISSION NUMBER:___ 7312
- OPERATIONAL LIFE:_ 24 MONTHS

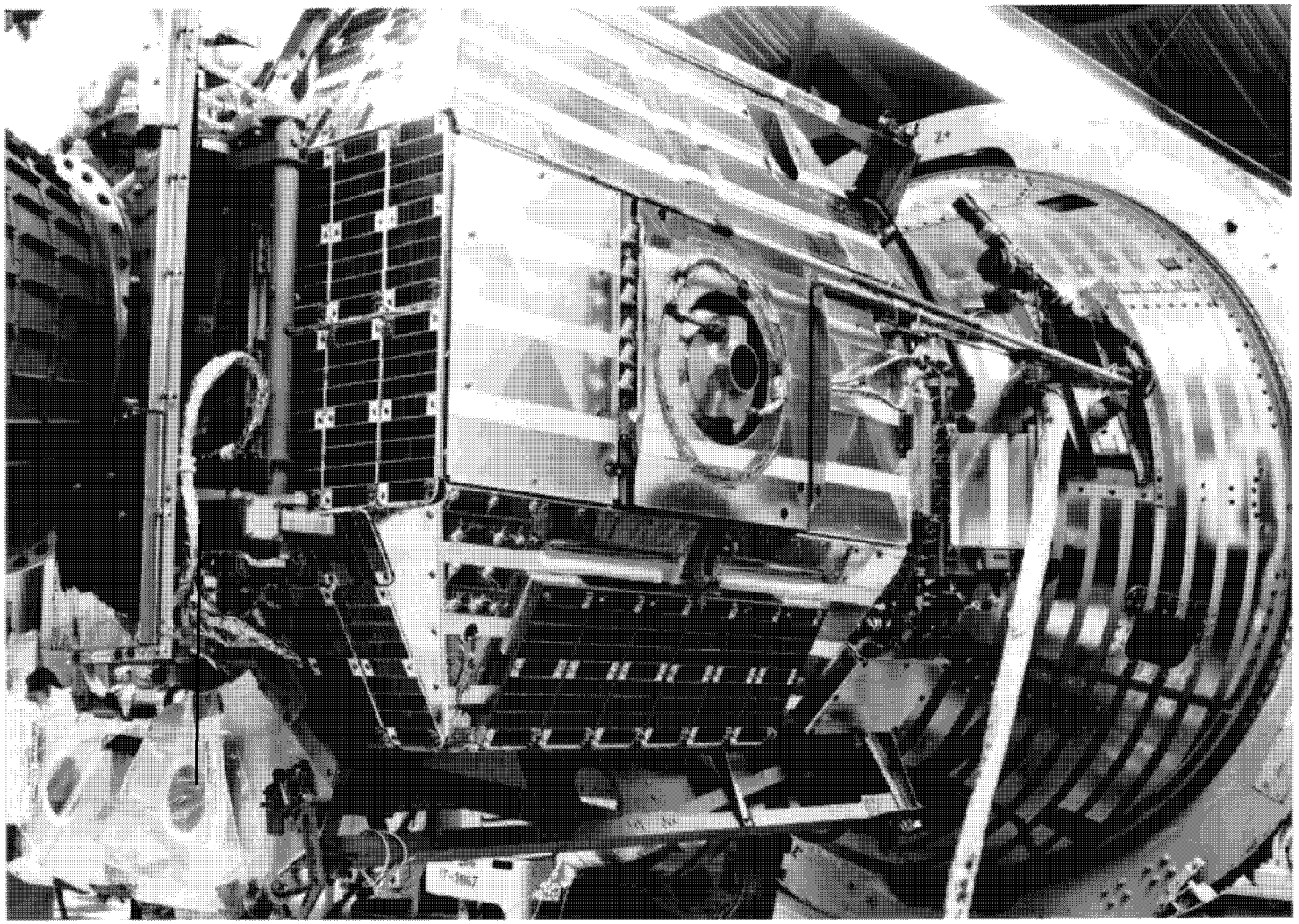
MISSION

GENERAL SEARCH FOR SOVIET ABM RADAR SYSTEMS OPERATING IN THE 100 TO 250 MHz BAND.

HIGHLIGHTS

THIS MISSION PROVIDED EXTREMELY VALUABLE DATA REGARDING THE DEVELOPMENT OF THE SOVIET HEN HOUSE RADAR SYSTEM. DATA WAS PROCESSED AT NSA AND LMSC.

SPACECRAFT 4403 - MAGNUM



SPACECRAFT 4404 - LEIGE/PLICAT

- P-11 SPACECRAFT: 4404
- LAUNCH DATE: 14 MAY 1966
- DESIGN LIFE: 6 MONTHS
- MISSION NAME: LEIGE AND PLICAT
- MISSION NUMBER: 7310 AND 7311
- OPERATIONAL LIFE: COMMAND SYSTEM FAILURE PREVENTED THE READOUT OF TAPE RECORDERS

MISSION

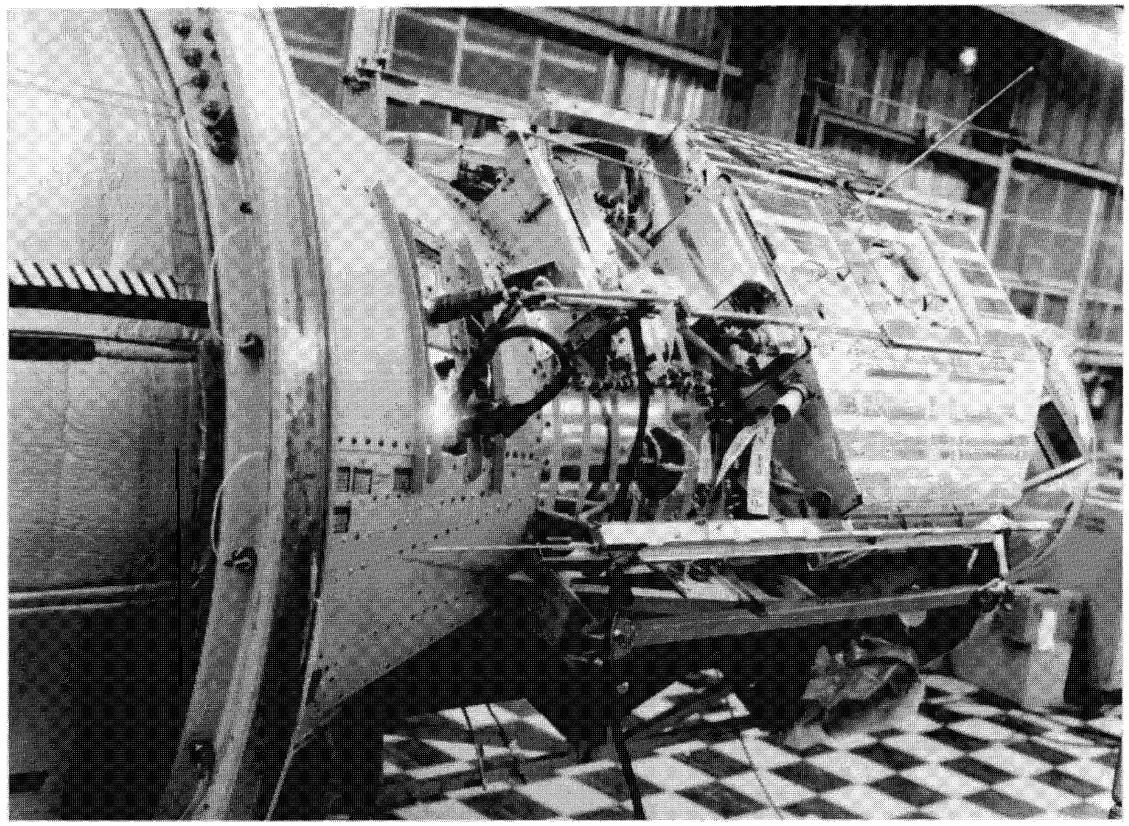
7310 (LEIGE) - DIRECTED SEARCH FOR SOVIET ABM RADARS OF THE HEN HOUSE CLASS OPERATING IN THE 152 TO 162 MHz BAND.

7311 (PLICAT) - DIRECTED SEARCH AND EOB FOR SOVIET TALL KING RADARS OPERATING IN THE 168 TO 178 MHz BAND.

HIGHLIGHTS

MISSION 7311 WAS A LOW FREQUENCY DF MISSION USING A PAIR OF MONOPOLES IN A SPINNING INTERFEROMETER CONFIGURATON. IT IS THE ONLY P-11 THAT COULD NOT BE OPERATED IN ORBIT DUE TO A FAILURE AT INITIAL TURN-ON.

SPACECRAFT 4404 - LEIGE/PLICAT



SPACECRAFT 4405 - SAMPAN I /SOUSEA I

- P-11 SPACECRAFT:___ 4405
- LAUNCH DATE:_____ 16 AUGUST 1966
- DESIGN LIFE:_____ 6 MONTHS
- MISSION NAME:_____ SAMPAN I AND SOUSEA I
- MISSION NUMBER:___ 7314 AND 7315
- OPERATIONAL LIFE:_ 14 MONTHS

MISSION

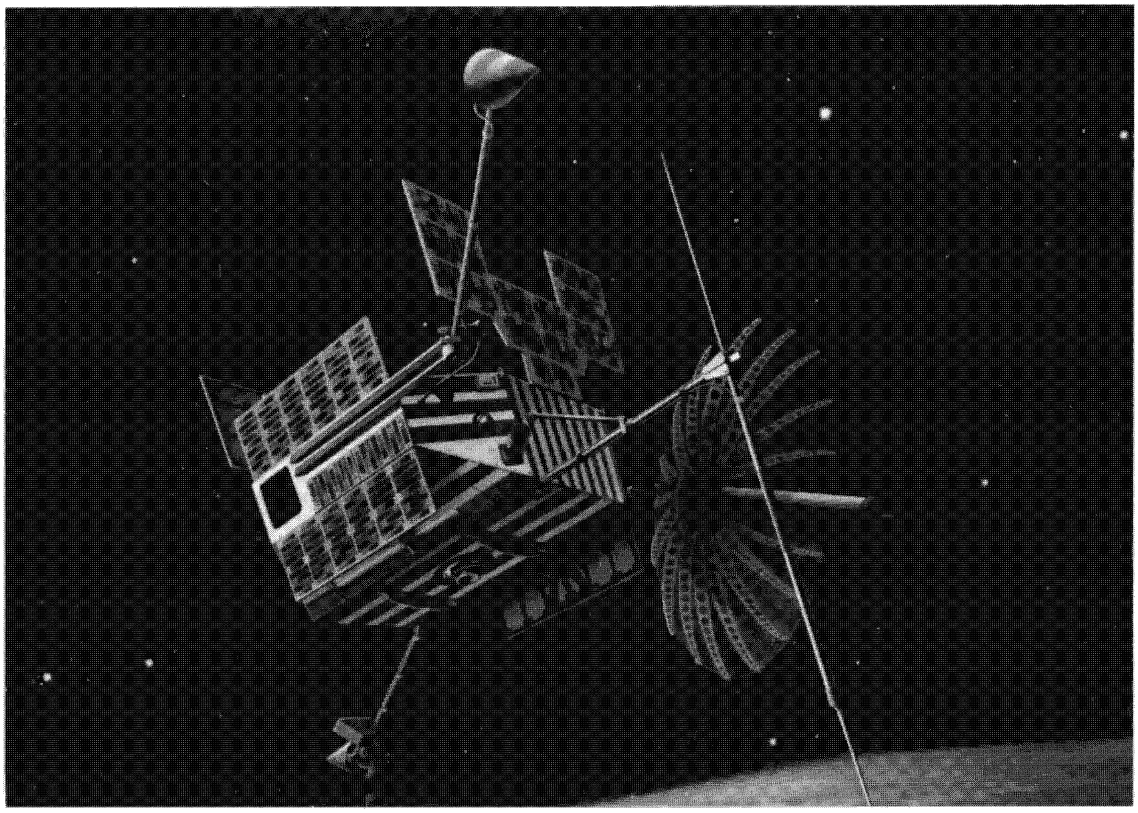
7314 (SAMPAN I) - GENERAL SEARCH FOR NEW AND UNUSUAL SIGNALS IN THE 2.1 TO 4.0 GHz BAND.

7315 (SOUSEA I) - GENERAL SEARCH FOR NEW AND UNUSUAL SIGNALS IN THE 8.0 TO 12.0 GHz BAND.

HIGHLIGHTS

THIS SPACECRAFT USED AN UNFURLABLE THREE FOOT FLEX RIB PARABOLA AS THE DF ANTENNA. LOW GAIN, BROAD BEAMWIDTH ANTENNAS WERE USED FOR THE FIRST TIME AS INHIBIT ANTENNAS. THE DF ASPECTS OF THIS MISSION WERE NOT REALIZED DUE TO THE FAILURE OF A HORIZON SENSOR. DATA WAS PROCESSED AT NSA AND LMSC.

SPACECRAFT 4405 - SAMPAN I /SOUSEA I



SPACECRAFT 4406 - FANION II/TRIPOS II

- P-11 SPACECRAFT: 4406
- LAUNCH DATE: 16 SEPTEMBER 1966
- DESIGN LIFE: 6 MONTHS
- MISSION NAME: FANION II AND TRIPOS II
- MISSION NUMBER: 7317 AND 7318
- OPERATIONAL LIFE: 4 MONTHS

MISSION

7317 (FANION II) - DIRECTED SEARCH FOR SOVIET [redacted] TARGET TRACKING RADARS IN THE [redacted] BAND.

7318 (TRIPOS II) - GENERAL SEARCH FOR NEW AND UNUSUAL SIGNALS IN THE 4 TO 8 GHz BAND.

HIGHLIGHTS

THIS WAS A REPEAT OF THE MISSIONS PERFORMED ON P-11 SPACECRAFT 4402. THE MISSION WAS TERMINATED BY FAILURE OF THE TWO TAPE RECORDERS. MISSION 7317 DATA WAS PROCESSED BY SAC; MISSION 7318 DATA WAS PROCESSED BY NSA AND LMSC.

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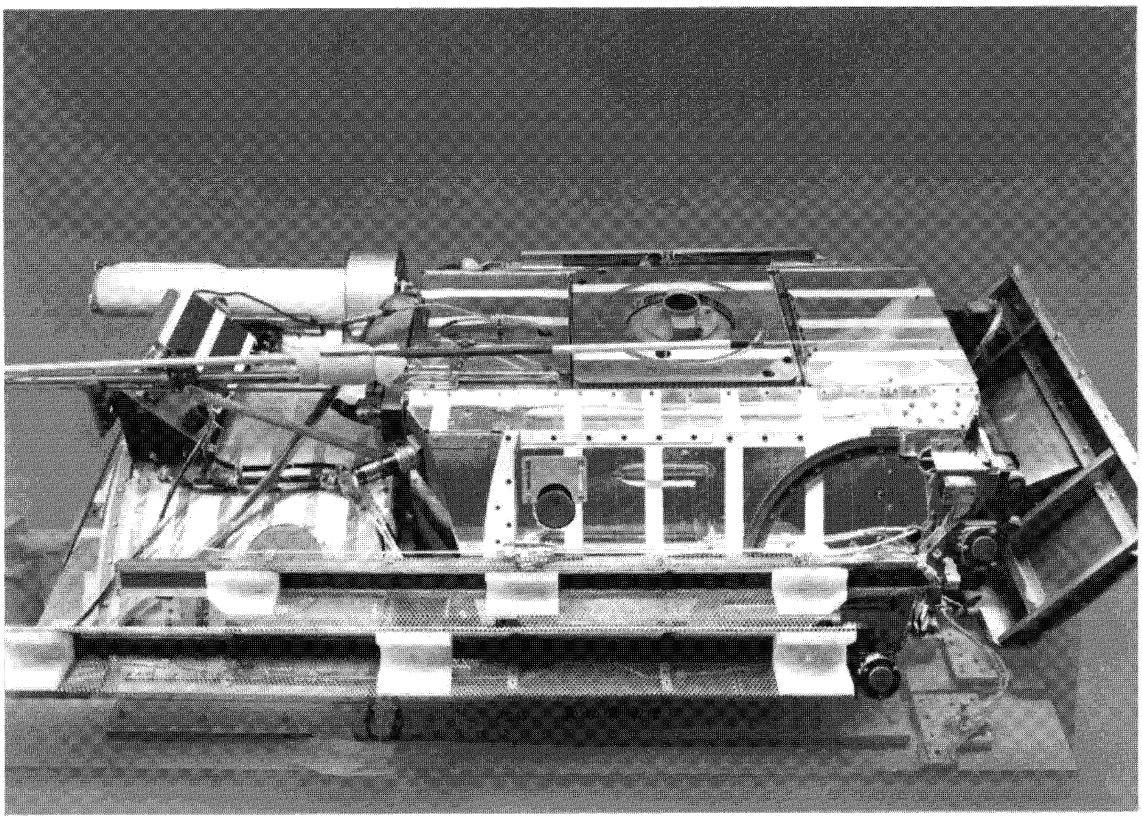
SPACECRAFT 4406 - FANION II/TRIPOS II



SPACECRAFT 4408 - SLEWTO/ FANION III

- P-11 SPACECRAFT:___ 4408
- LAUNCH DATE:_____ 9 MAY 1967
- DESIGN LIFE:_____ 6 MONTHS
- MISSION NAME:_____ SLEWTO AND FANION III
- MISSION NUMBER:___ 7316 AND 7319
- OPERATIONAL LIFE:_ 3 MONTHS

MISSION

7316 (SLEWTO) - DIRECTED SEARCH AND TI FOR SOVIET ABM RADARS OF THE HEN HOUSE CLASS OPERATING IN THE 154 TO 162 MHz BAND.

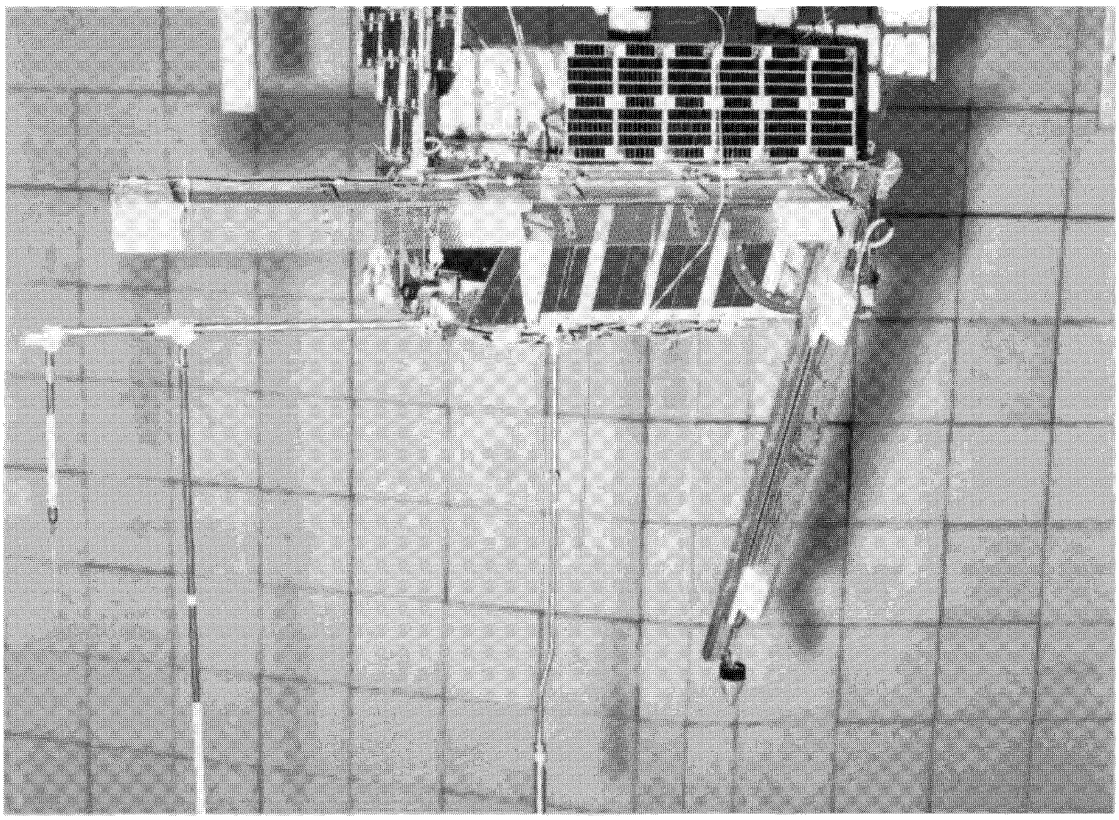
7319 (FANION III) - DIRECTED SEARCH FOR SOVIET [redacted] TARGET TRACKING RADARS IN THE [redacted] BAND.

HIGHLIGHTS

THIS SPACECRAFT WAS THE FIRST TO USE THE 1 MHz BANDWIDTH MINIATURE LEACH CORP. TAPE RECORDER. ITS PURPOSE WAS TO PERMIT PREDETECTION RECORDINGS OF THE HEN HOUSE SIGNAL WAVEFORM.

LOW GAIN BROAD BEAMWIDTH ANTENNAS WERE ADDED TO THE FANION DF ANTENNA TO PROVIDE A SIDELOBE INHIBIT CAPABILITY.

SPACECRAFT 4408 - SLEWTO/ FANION III



SPACECRAFT 4409 - SAVANT I

- P-11 SPACECRAFT: 4409
- LAUNCH DATE: 16 JUNE 1967
- DESIGN LIFE: 6 MONTHS
- MISSION NAME: SAVANT I
- MISSION NUMBER: 7320
- OPERATIONAL LIFE: 16.5 MONTHS

MISSION

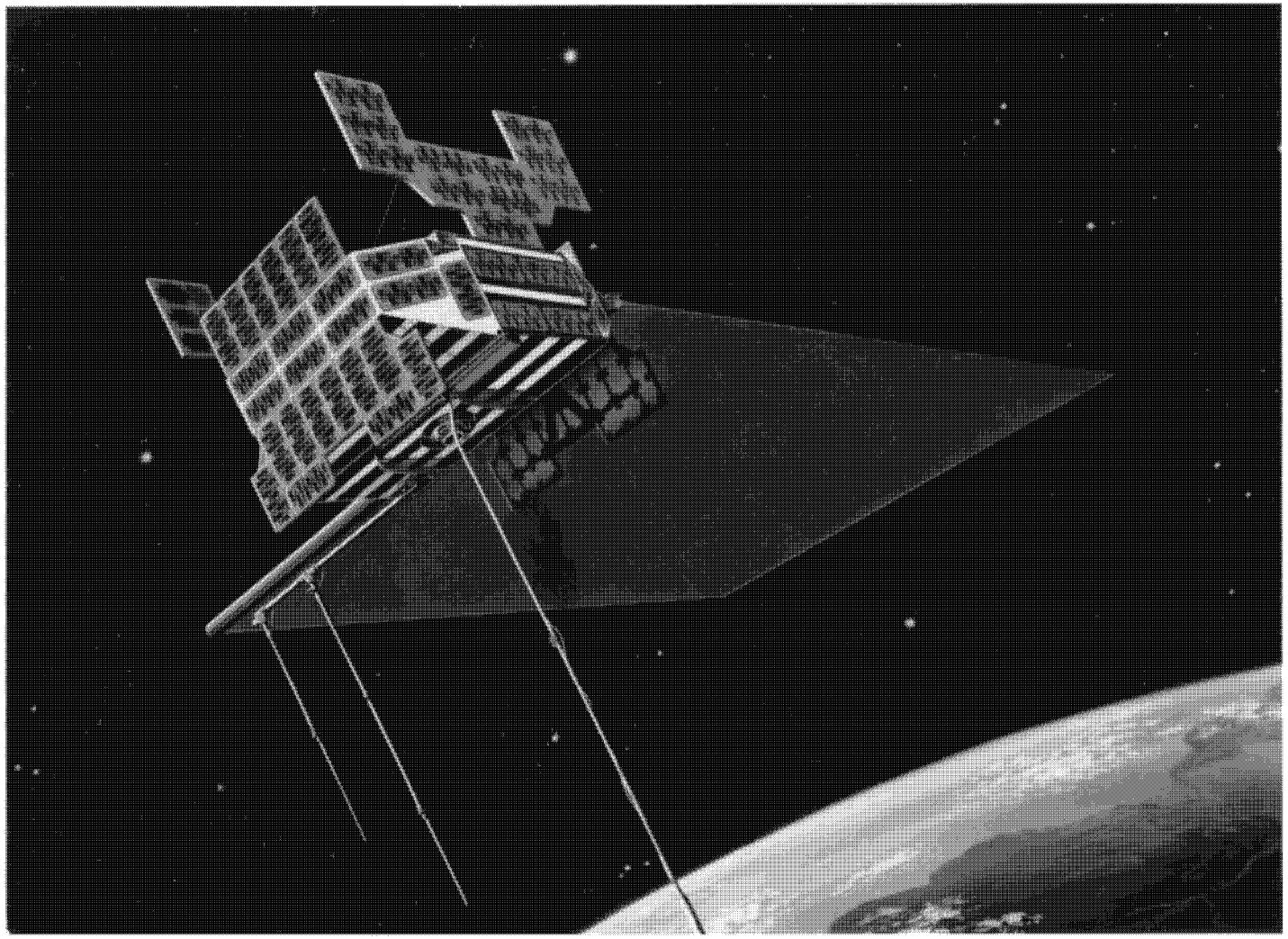
DIRECTED SEARCH FOR SOVIET TELEMETRY SIGNALS AT THE FOLLOWING FREQUENCIES (± 1 MHz): 61, 66, 71, 76, 165, 181, AND 240 MHz.

HIGHLIGHTS

THIS MISSION UTILIZED 1 MHz BANDWIDTH TAPE RECORDERS TO PERMIT PREDETECTION RECORDING OF THE SOVIET TELEMETRY SIGNALS. AUTOMATIC IF SIGNAL INTERFERENCE REJECTION NETWORKS WERE ALSO USED FOR THE FIRST TIME.

THE SPACECRAFT USED SOLID FUEL SPIN ROCKETS FOR THE FIRST TIME. THE INTERCEPT ANTENNA WAS A 60 IN. × 84 IN. FLAT PLANAR LOG SPIRAL. THE MISSION WAS TERMINATED BY SPACECRAFT RE-ENTRY.

SPACECRAFT 4409 - SAVANT I



SPACECRAFT 4410 - FACADE

- P-11 SPACECRAFT: 4410
- LAUNCH DATE: 2 NOVEMBER 1967
- DESIGN LIFE: 9 MONTHS
- MISSION NAME: FACADE
- MISSION NUMBER: 7321
- OPERATIONAL LIFE: 3 MONTHS

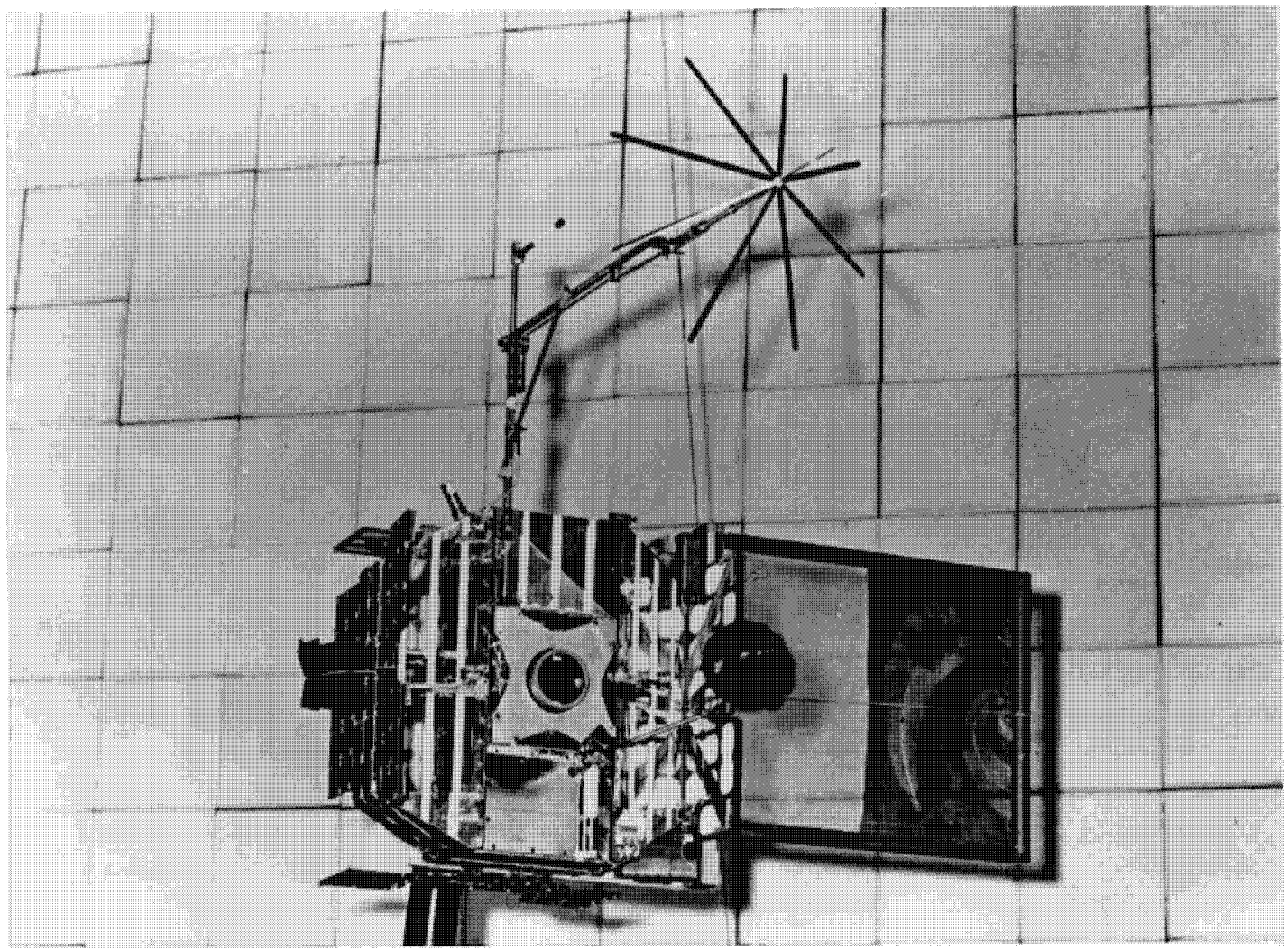
MISSION

GENERAL SEARCH FOR SOVIET ABM AND AES RADARS IN THE FREQUENCY RANGE FROM 250 TO 2200 MHz.

HIGHLIGHTS

THIS WAS THE FIRST IN A SERIES OF SPECIALLY DESIGNED P-11 SPACECRAFT TO RESPOND TO THE NEED FOR OVERHEAD ELINT SYSTEMS TO COLLECT TECHNICAL INFORMATION ON THE DEVELOPING SOVIET ABM RADAR SYSTEM. IT PROVIDED THE INFORMATION THAT THE DOG HOUSE RADAR WAS A [redacted] ALONG WITH ITS SCAN RATE AND SCAN BEAMWIDTH.

SPACECRAFT 4410 - FACADE



SPACECRAFT 4412 - TIVOLI I

- P-11 SPACECRAFT: 4412
- LAUNCH DATE: 24 JANUARY 1968
- DESIGN LIFE: 9 MONTHS
- MISSION NAME: TIVOLI I
- MISSION NUMBER: 7324
- OPERATIONAL LIFE: 14.5 MONTHS

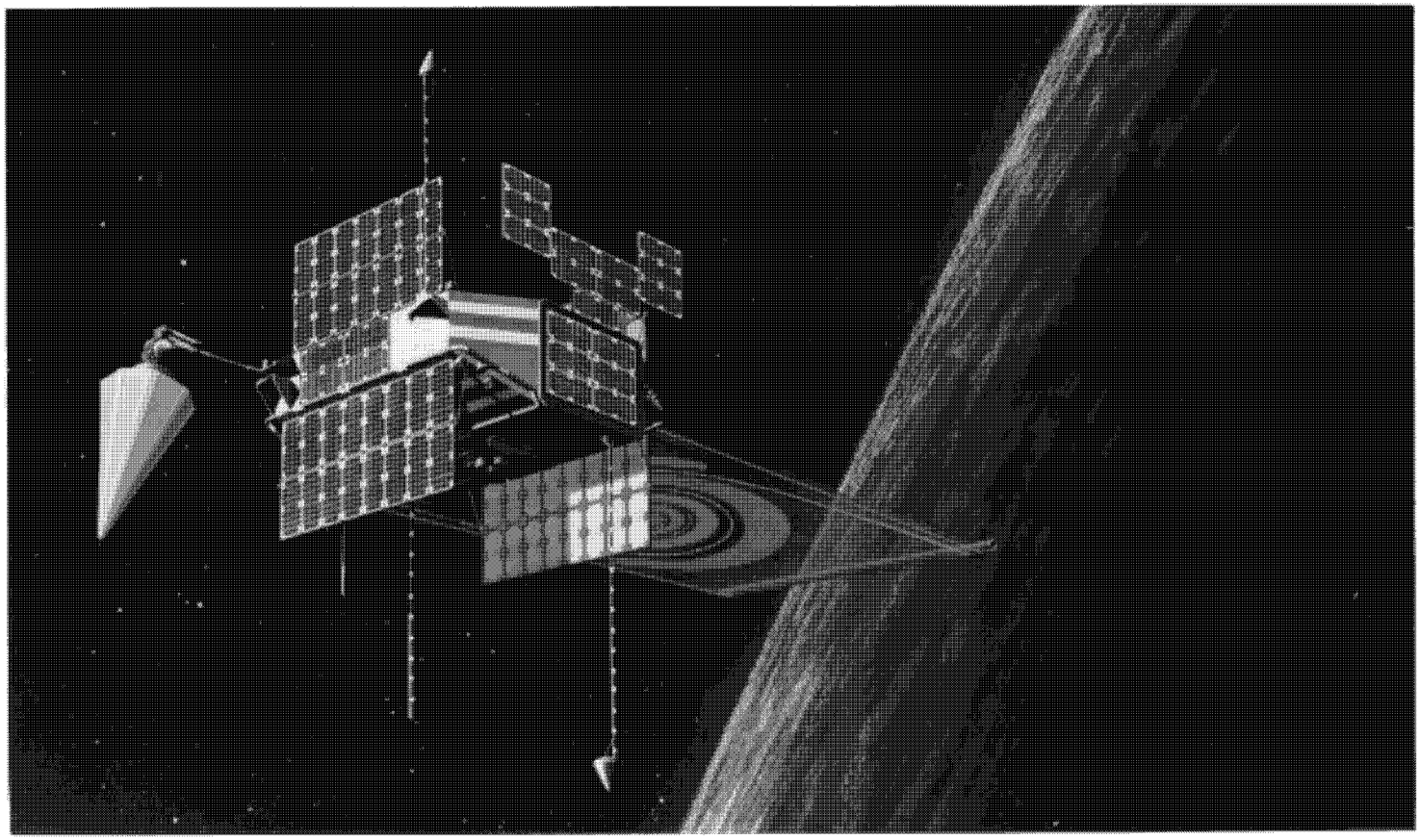
MISSION

DIRECTED SEARCH AND TI FOR PULSED [redacted] SIGNALS OF INTEREST IN THE 0.1 TO 4.0 GHz BAND.

HIGHLIGHTS

THIS MISSION WAS DESIGNED PRIMARILY AS A MAINBEAM COLLECTOR PROVIDING SCAN RATE, BEAMWIDTH, AND APPROXIMATE POWER LEVEL OF TARGET EMITTERS. SIGNAL WAVEFORM PRE-D WAS RECORDED ON A 1 MHz BANDWIDTH TAPE RECORDER. THE TIVOLI SERIES WAS AN EXTREMELY VALUABLE SOURCE OF THIS TYPE OF DATA.

SPACECRAFT 4412 - TIVOLI I



SPACECRAFT 4411 - LAMPAN I /SAMPAN II

- P-11 SPACECRAFT:___ 4411
- LAUNCH DATE:_____ 14 MARCH 1968
- DESIGN LIFE:_____ 9 MONTHS
- MISSION NAME:_____ LAMPAN I AND SAMPAN II
- MISSION NUMBER:___ 7322 AND 7323
- OPERATIONAL LIFE:__ 12 MONTHS

MISSION

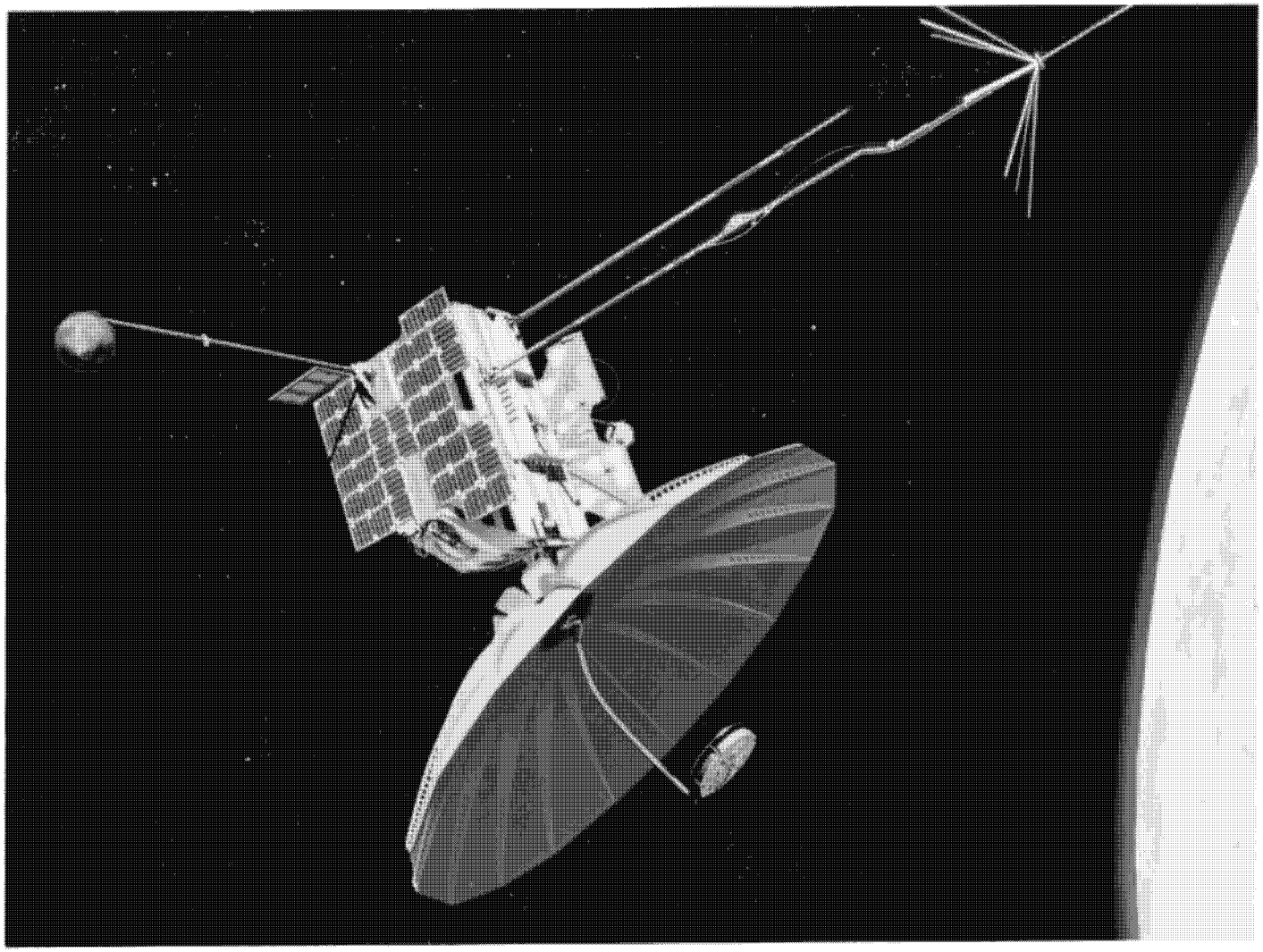
7322 (LAMPAN I) - GENERAL SEARCH FOR NEW AND UNUSUAL PULSED [redacted] SIGNALS IN THE 1.0 TO 2.0 GHz BAND.

7323 (SAMPAN II) - GENERAL SEARCH FOR NEW AND UNUSUAL PULSED SIGNALS IN THE 2.1 TO 4.0 GHz BAND.

HIGHLIGHTS

THIS WAS THE FIRST P-11 SPACECRAFT TO USE A SIX FT DIAMETER, UNFURLABLE, FLEX RIB PARABOLA AS THE DF ANTENNA.

SPACECRAFT 4411 - LAMPAN I /SAMPAN II



SPACECRAFT 4420 - TRIPOS III/SOUSEA II

- P-11 SPACECRAFT:___ 4420
- LAUNCH DATE:_____ 20 JUNE 1968
- DESIGN LIFE:_____ 9 MONTHS
- MISSION NAME:_____ TRIPOS III AND SOUSEA II
- MISSION NUMBER:___ 7326 AND 7327
- OPERATIONAL LIFE:_ 19 MONTHS

MISSION

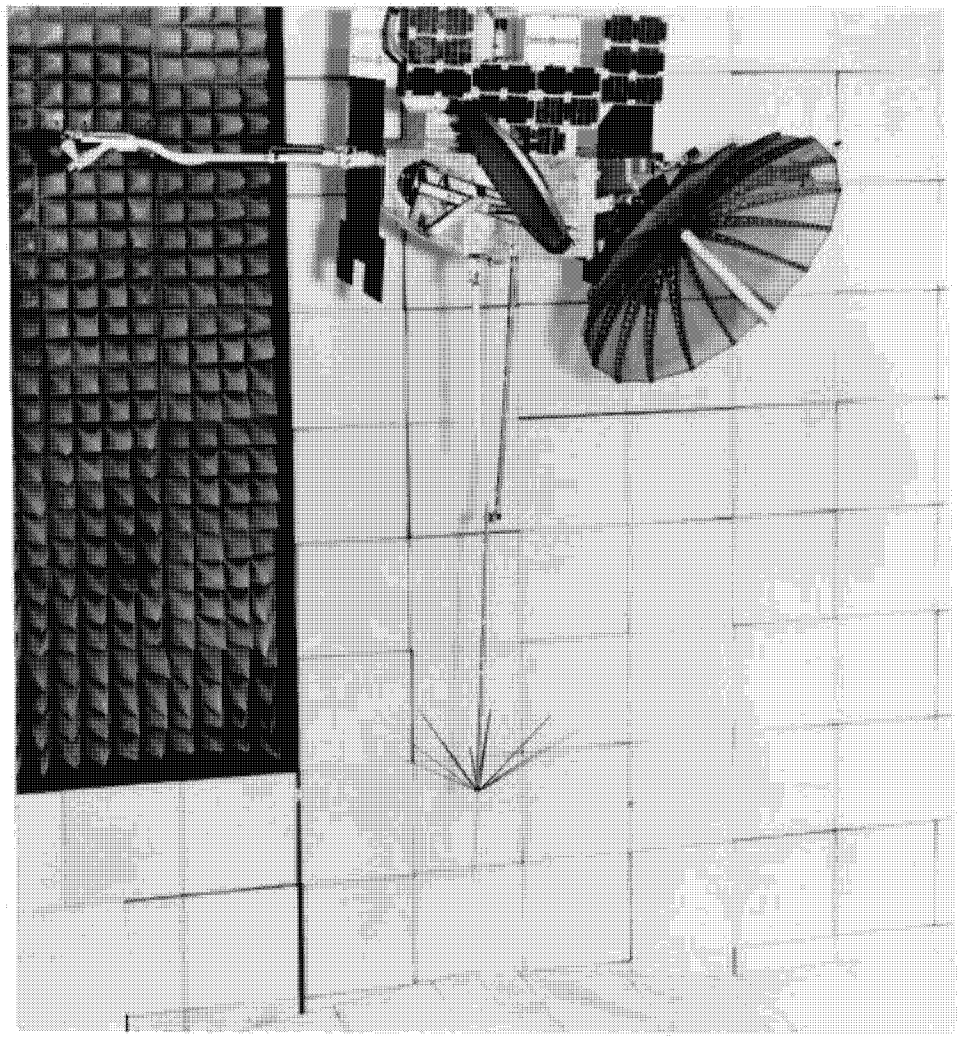
7326 (TRIPOS III) - EOB AND GENERAL SEARCH FOR NEW AND UNUSUAL SIGNALS IN THE 4.0 TO 8.0 GHz BAND.

7327 (SOUSEA III) - EOB AND GENERAL SEARCH FOR NEW AND UNUSUAL SIGNALS IN THE 8.0 TO 12.0 GHz BAND.

HIGHLIGHTS

THIS MISSION ADDED A DIGITALLY ENCODED PCM BIT STREAM TO THE NORMALLY ALL ANALOG OUTPUT FROM THE PAYLOAD. THE MISSION WAS TERMINATED BY SPACECRAFT RE-ENTRY.

SPACECRAFT 4420 - TRIPOS III/SOUSEA II



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SPACECRAFT 4413 - VAMPAN

- P-11 SPACECRAFT: 4413
- LAUNCH DATE: 18 SEPTEMBER 1968
- DESIGN LIFE: 9 MONTHS
- MISSION NAME: VAMPAN
- MISSION NUMBER: 7325
- OPERATIONAL LIFE: 12.5 MONTHS

MISSION

EOB AND GENERAL SEARCH FOR NEW AND UNUSUAL PULSED SIGNALS IN THE 0.1 TO 1.0 GHz BAND.

HIGHLIGHTS

THIS SPACECRAFT UTILIZED TWO LARGE UNFURLABLE FLAT PLANAR WINDOWSHADE ANTENNAS. ONE WINDOWSHADE (48 IN. × 96 IN.) CONTAINED ONE LARGE LOG SPIRAL (0.1 TO 0.4 GHz) AND TWO SMALLER LOG SPIRALS (0.4 TO 1.0 GHz). THE SECOND WINDOWSHADE (48 IN. × 48 IN.) CONTAINED ONE LARGE LOG SPIRAL (0.1 TO 0.4 GHz). THESE SPIRALS PROVIDED A PHASE INTERFEROMETER ANTENNA SYSTEM PERMITTING SIGNAL ANGLE OF ARRIVAL MEASUREMENTS TO BE MADE.

SPACECRAFT 4413 - VAMPAN

SPACECRAFT 4418 - TIVOLI II

- P-11 SPACECRAFT: 4418
- LAUNCH DATE: 19 MARCH 1969
- DESIGN LIFE: 9 MONTHS
- MISSION NAME: TIVOLI II
- MISSION NUMBER: 7330
- OPERATIONAL LIFE: 18 MONTHS

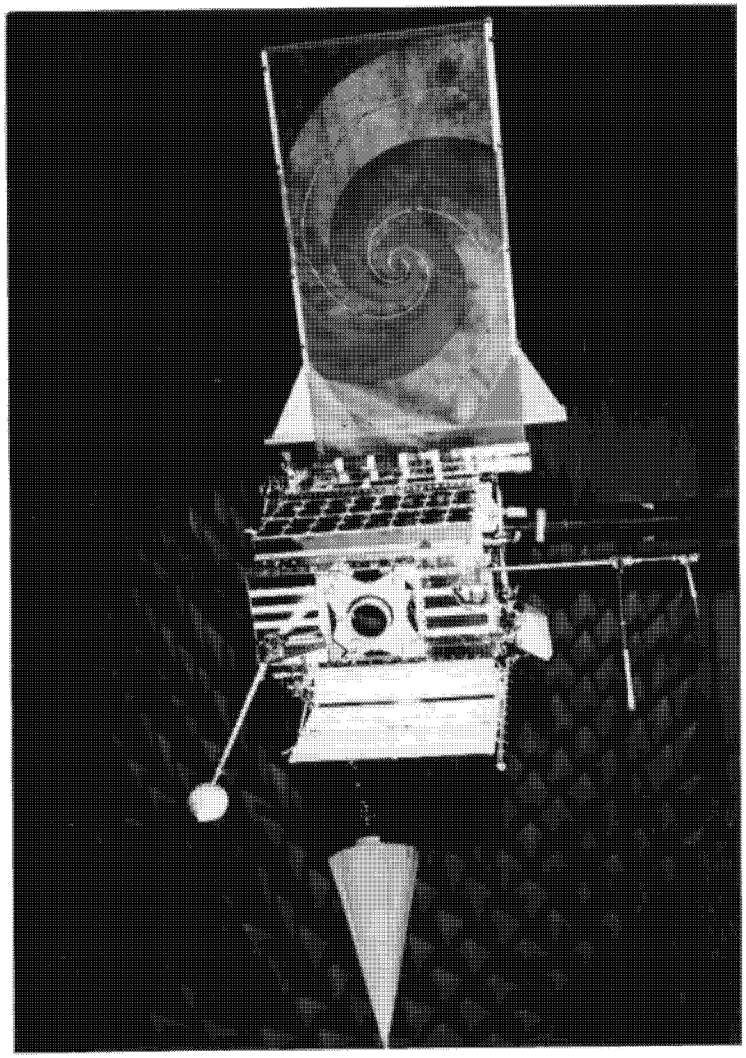
MISSION

DIRECTED SEARCH AND TI FOR PULSED [redacted] OF INTEREST IN THE 0.05 TO 4.0 GHz BAND.

HIGHLIGHTS

THIS WAS A DESIGN DUPLICATE OF THE TIVOLI I SPACECRAFT EXCEPT THAT FREQUENCY COVERAGE WAS EXTENDED DOWN TO 50 MHz TO PROVIDE COVERAGE OF CERTAIN LOW FREQUENCY COMMUNICATION SIGNALS.

SPACECRAFT 4418 - TIVOLI II



SPACECRAFT 4417 - LAMPAN II/ SAMPAN III

- P-11 SPACECRAFT: 4417
- LAUNCH DATE: 1 MAY 1969
- DESIGN LIFE: 9 MONTHS
- MISSION NAME: LAMPAN II AND SAMPAN III
- MISSION NUMBER: 7328 AND 7329
- OPERATIONAL LIFE: 9.5 MONTHS

MISSION

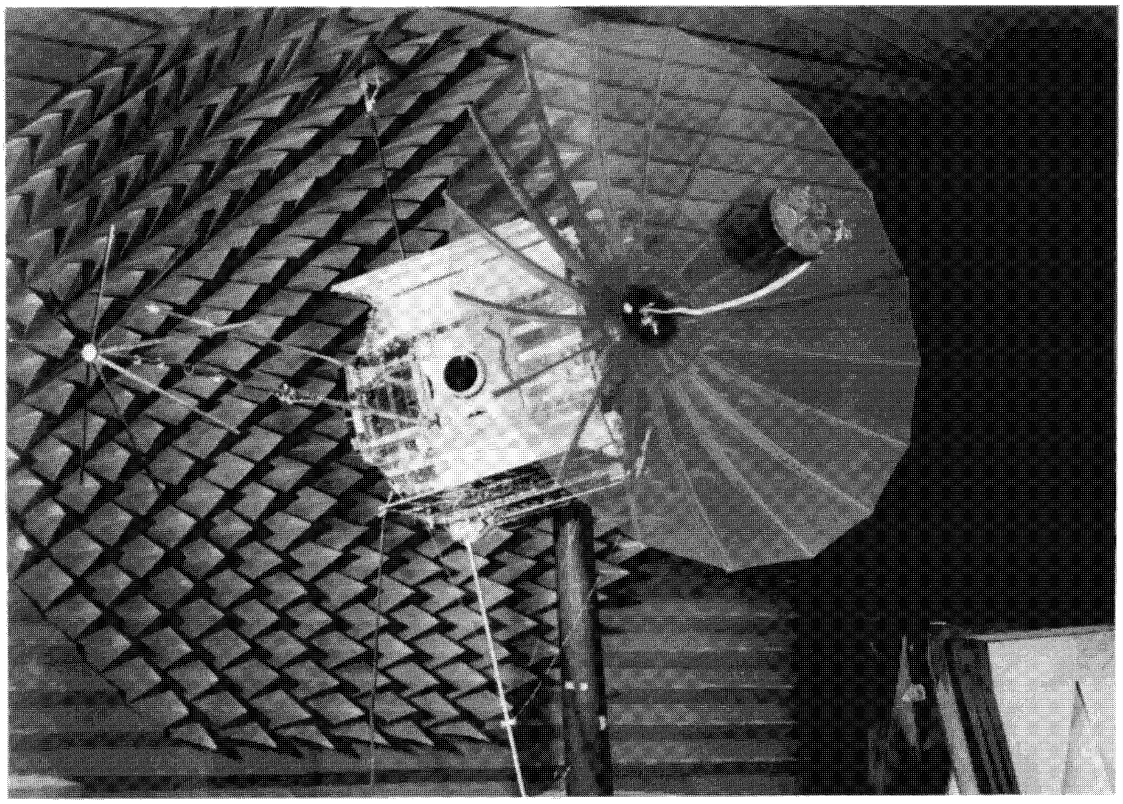
7328 (LAMPAN II) - GENERAL SEARCH FOR NEW AND UNUSUAL PULSED [redacted] SIGNALS IN THE 1.0 TO 2.0 GHz BAND.

7329 (SAMPAN III) - GENERAL SEARCH FOR NEW AND UNUSUAL PULSED SIGNALS IN THE 2.1 TO 4.0 GHz BAND.

HIGHLIGHTS

THESE MISSIONS WERE A REPEAT OF THE 4411 SPACECRAFT MISSIONS AND USED A 6 FT PARABOLIC DISK AS THE DF ANTENNA. THE MISSION WAS TERMINATED BY SPACECRAFT RE-ENTRY.

SPACECRAFT 4417 - LAMPAN II/ SAMPAN III



SPACECRAFT 4419 - SAVANT II

- P-11 SPACECRAFT: ___ 4419
- LAUNCH DATE: _____ 22 SEPTEMBER 1969
- DESIGN LIFE: _____ 9 MONTHS
- MISSION NAME: _____ SAVANT II
- MISSION NUMBER: ___ 7336
- OPERATIONAL LIFE: __ 20 MONTHS

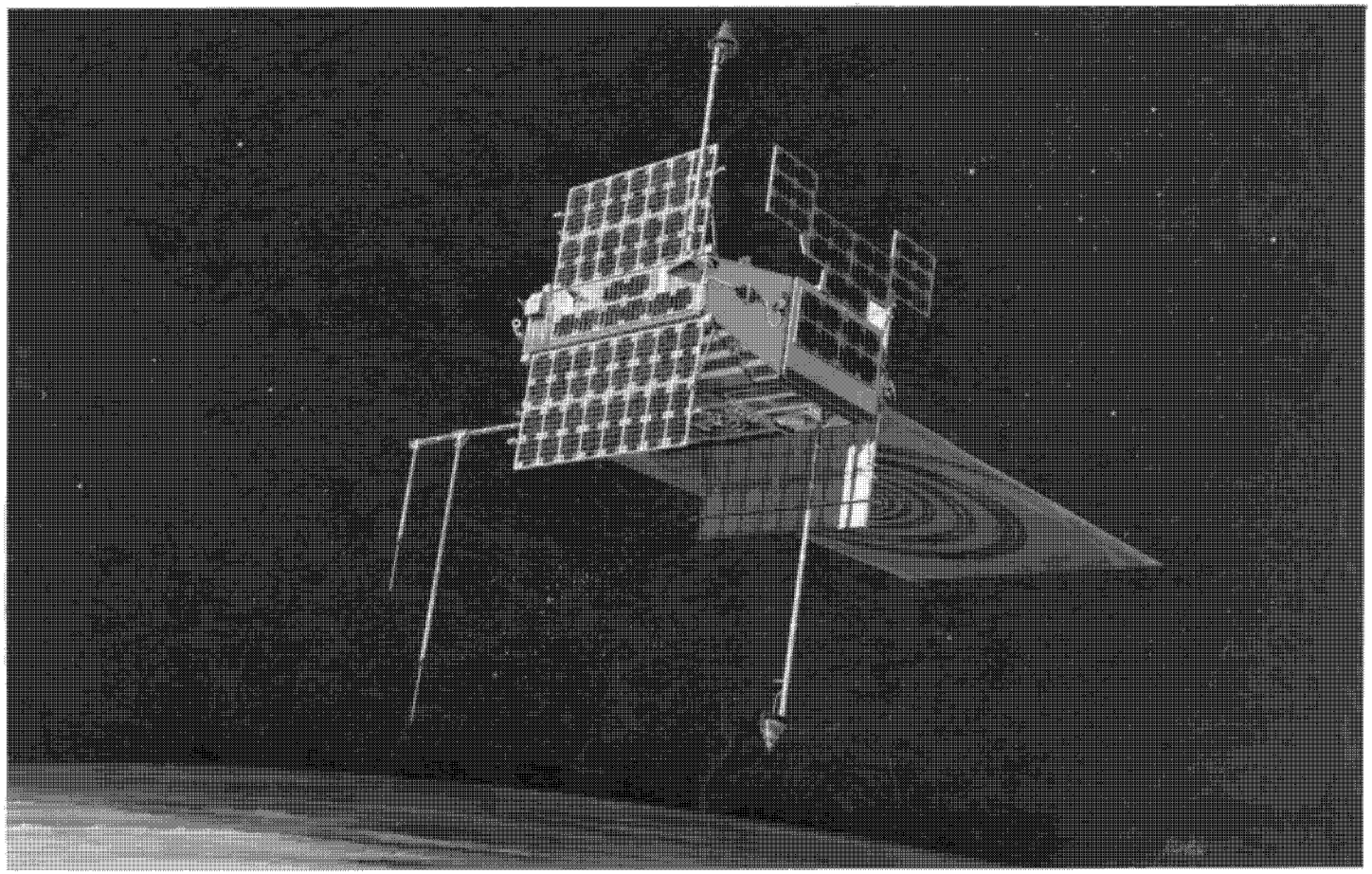
MISSION

DIRECTED SEARCH FOR SOVIET TELEMETRY SIGNALS AT THE FOLLOWING FREQUENCIES (±1 MHz): 61, 66, 71, 76, 148, 165, 181, AND 240 MHz.

HIGHLIGHTS

THIS MISSION WAS A REPEAT OF MISSION 7320 WITH THE ADDITION OF ONE ADDITIONAL TELEMETRY FREQUENCY TO THE TELINT RECEIVER. THE MISSION WAS TERMINATED BY SPACECRAFT RE-ENTRY.

SPACECRAFT 4419 - SAVANT II



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SPACECRAFT 4407 - WESTON

- P-11 SPACECRAFT: 4407
- LAUNCH DATE: 30 SEPTEMBER 1969
- DESIGN LIFE: 6 MONTHS
- MISSION NAME: WESTON
- MISSION NUMBER 7313
- OPERATIONAL LIFE 10.5 MONTHS

MISSION

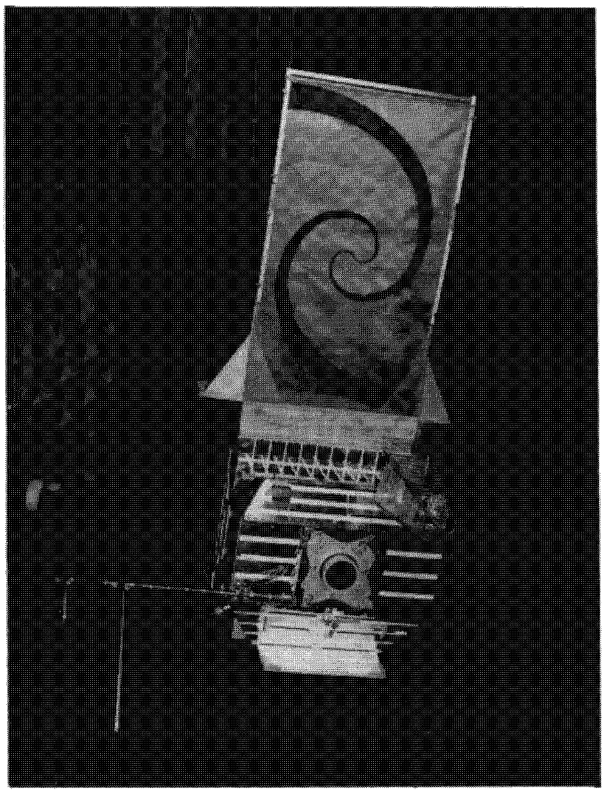
DIRECTED SEARCH FOR SOVIET COMMUNICATION SIGNALS IN THE 60 TO 70 MHz BAND FOR

HIGHLIGHTS

THIS SPACECRAFT UTILIZED AN ENCRYPTED DATA LINK, AND VOICE AND TELETYPE RECOGNIZERS. THE INTERCEPT ANTENNA IN THE 70 TO 80 MHz BAND WAS A 30 IN. × 57 IN. UNFURLABLE PLANAR LOG SPIRAL. A SQUARE, WIRE-WOUND UNFURLABLE CONICAL LOG SPIRAL WAS USED IN THE 360 TO 420 MHz BAND.

THE LAUNCH OF THIS SPACECRAFT WAS DELAYED BY APPROXIMATELY TWO YEARS FROM THE PLANNED DATE BECAUSE OF PAYLOAD FAILURE IN TEST. DATA WAS PROCESSED AT LMSC.

SPACECRAFT 4407 - WESTON



SPACECRAFT 4422 - TIVOLI III

- P-11 SPACECRAFT: 4422
- LAUNCH DATE: 4 MARCH 1970
- DESIGN LIFE: 9 MONTHS
- MISSION NAME: TIVOLI III
- MISSION NUMBER: 7335
- OPERATIONAL LIFE: 20 MONTHS

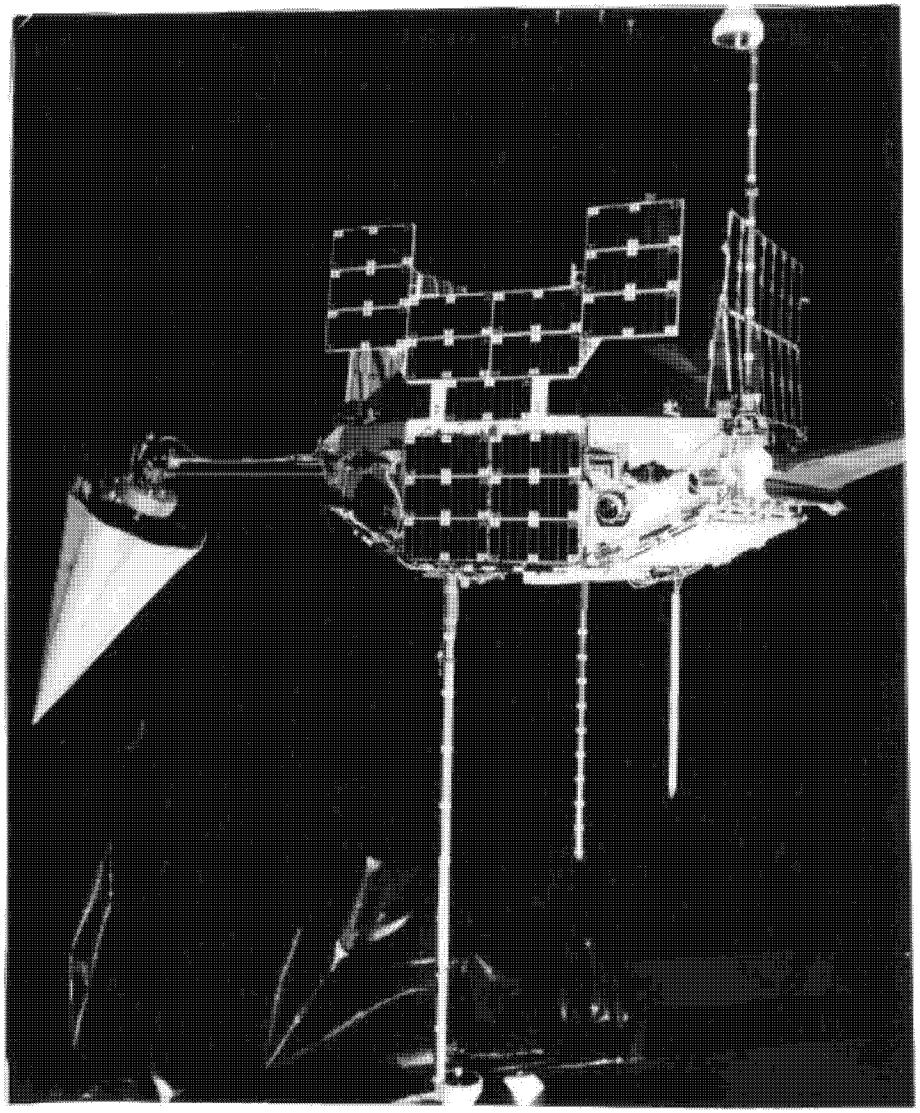
MISSION

DIRECTED SEARCH AND TI FOR PULSED [redacted] SIGNALS OF INTEREST IN THE 0.05 TO 4.0 GHz BAND.

HIGHLIGHTS

THIS MISSION WAS A DESIGN DUPLICATE OF TIVOLI II. OPERATION LIFE WAS TERMINATED BY SPACECRAFT RE-ENTRY.

SPACECRAFT 4422 - TIVOLI III



SPACECRAFT 4421 - TRIPOS IV/SOUSEA III

- P-11 SPACECRAFT: 4421
- LAUNCH DATE: 20 MAY 1970
- DESIGN LIFE: 9 MONTHS
- MISSION NAME: TRIPOS IV AND SOUSEA III
- MISSION NUMBER: 7332 AND 7333
- OPERATIONAL LIFE: 32 MONTHS

MISSION

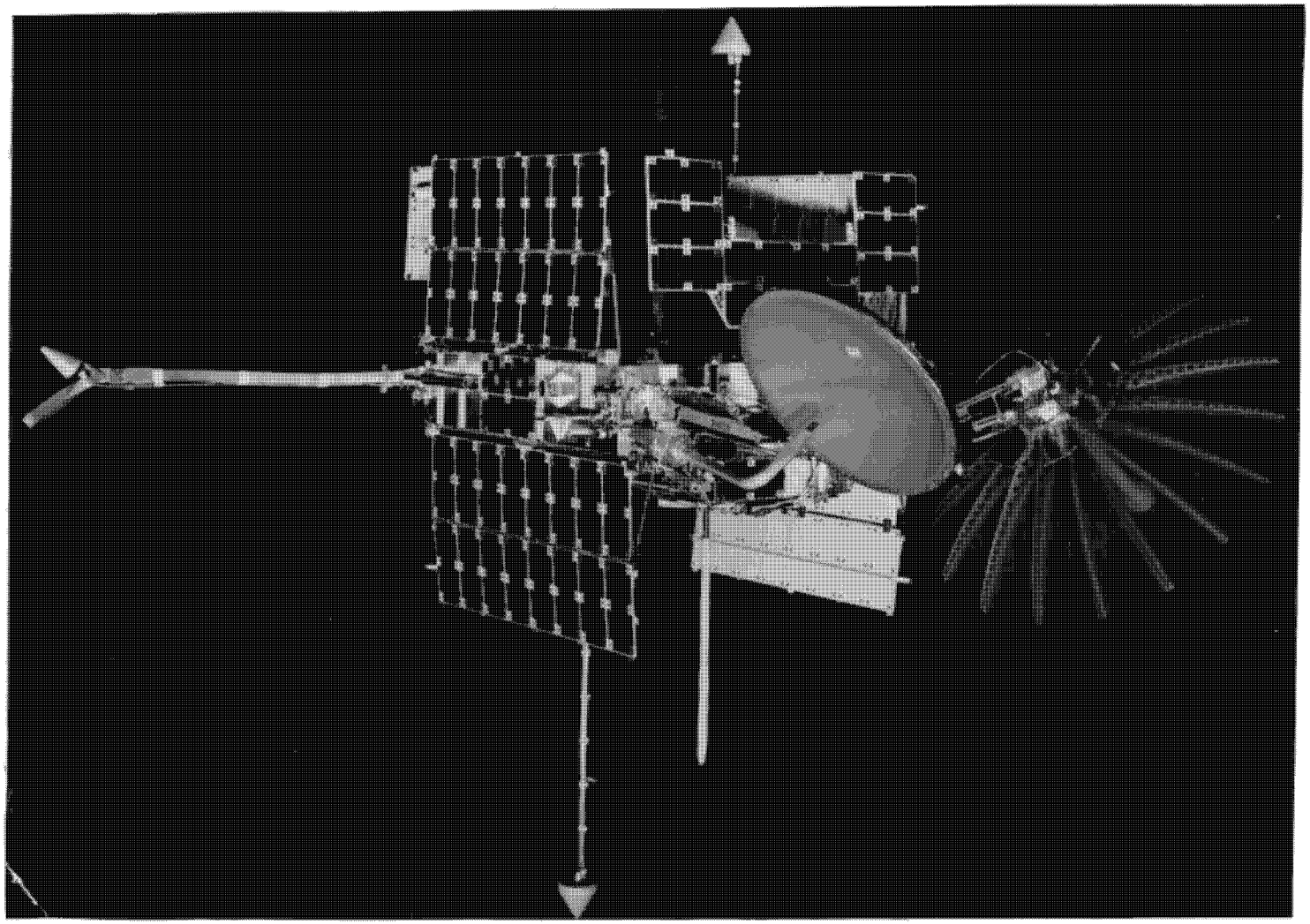
7332 (TRIPOS IV) - EOB AND GENERAL SEARCH FOR NEW AND UNUSUAL SIGNALS IN THE 4.0 TO 8.0 GHz BAND.

7333 (SOUSEA III) - EOB AND GENERAL SEARCH FOR NEW AND UNUSUAL SIGNALS IN THE 8.0 TO 12.0 GHz BAND.

HIGHLIGHTS

THIS WAS THE FIRST P-11 SPACECRAFT THAT DIGITIZED ALL SIGNIFICANT PAYLOAD OUTPUTS TO PERMIT MORE RAPID AND ACCURATE GROUND DATA PROCESSING. IT WAS ALSO THE FIRST P-11 TO USE AN ALL S-BAND DATA TRANSMISSION SYSTEM.

SPACECRAFT 4421 - TRIPOS IV/SOUSEA III



SPACECRAFT 4423 – TOPHAT I

- P-11 SPACECRAFT: 4423
- LAUNCH DATE: 18 NOVEMBER 1970
- DESIGN LIFE: 9 MONTHS
- MISSION NAME: TOPHAT I
- MISSION NUMBER: 7334
- OPERATIONAL LIFE: 44 MONTHS

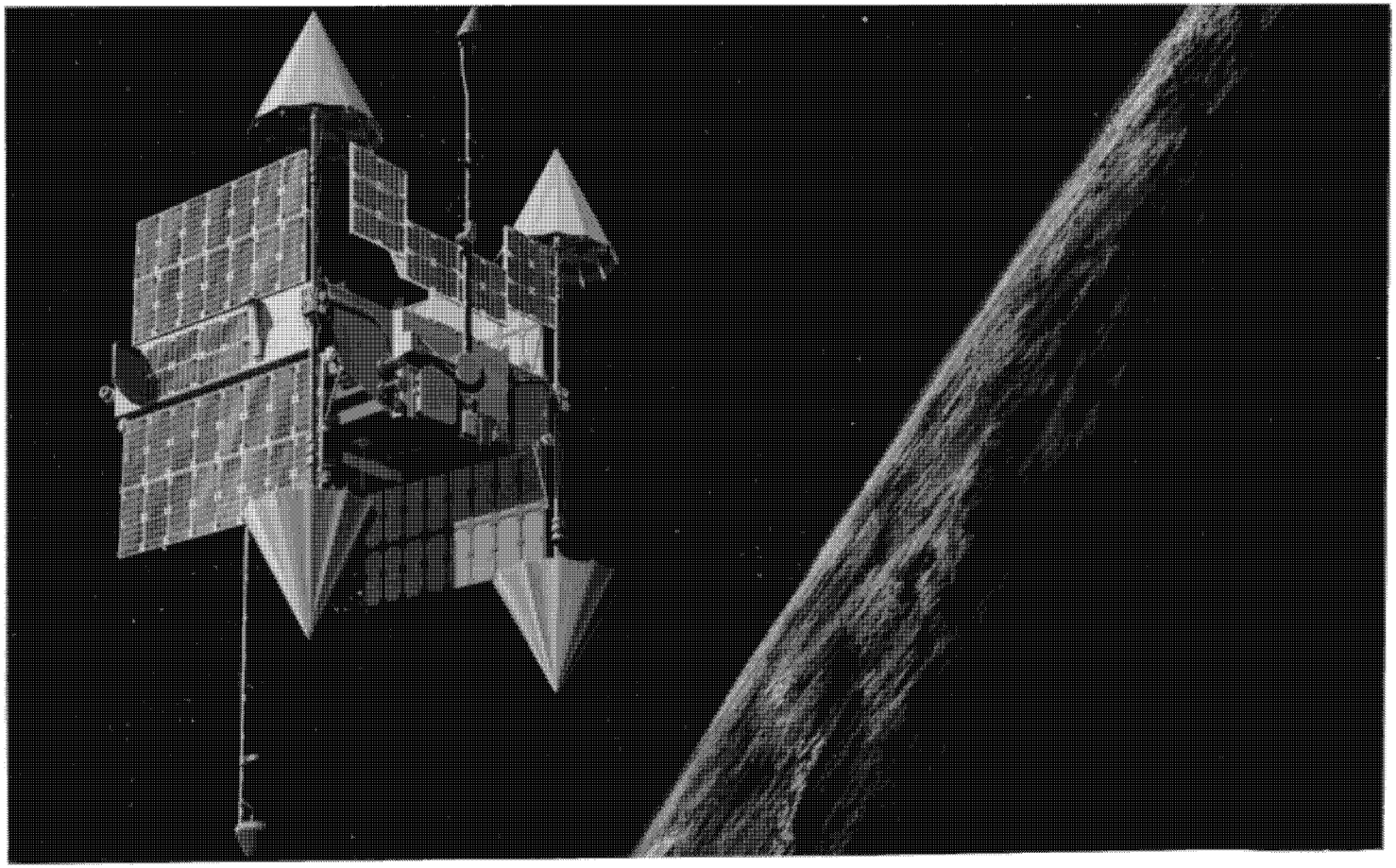
MISSION

DIRECTED SEARCH WITH COPY AND DF OF [redacted] COMMUNICATION SIGNALS IN THE 450 TO 1000 MHz BAND.

HIGHLIGHTS

THIS SPACECRAFT UTILIZED TWO PAIRS OF CONICAL SPIRALS EACH ACTING AS A PHASE INTERFEROMETER TO PROVIDE ANGLE OF ARRIVAL MEASUREMENTS.

SPACECRAFT 4423 – TOPHAT I



SPACECRAFT 4427 - ARROYO

- P-11 SPACECRAFT: 4427
- LAUNCH DATE: 10 SEPTEMBER 1971
- DESIGN LIFE: 9 MONTHS
- MISSION NAME: ARROYO
- MISSION NUMBER: 7337
- OPERATIONAL LIFE: 1 MONTH

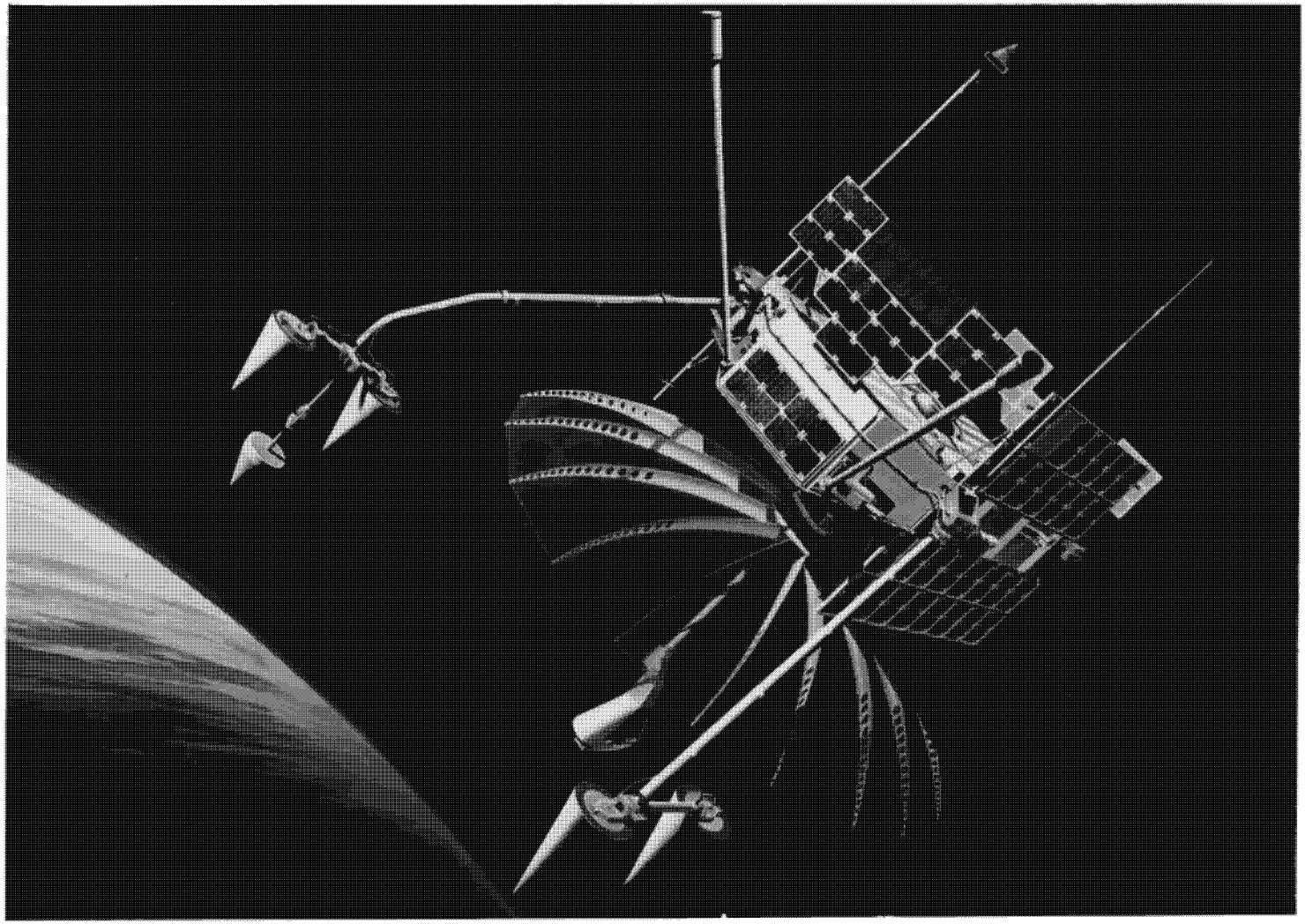
MISSION

DIRECTED SEARCH FOR SPECIFIC POINT-TO-POINT FDM-FM AND PCM-FM COMMUNICATION SYSTEMS IN THE 1.2 TO 2.2 GHz AND 3.6 TO 3.9 GHz BAND.

HIGHLIGHTS

THIS SPACECRAFT UTILIZED A 6 FT PARABOLIC DISH WITH A MONOPULSE FEED FOR EMITTER ZENITH SIDELOBE DF. LOW GAIN INTERFEROMETER SPIRALS WERE ALSO USED TO PROVIDE DF ON EMITTER MAINBEAMS. TWO SPACER BALANCE BOOMS WERE REQUIRED FOR DYNAMIC BALANCE OF THE SPACECRAFT.

SPACECRAFT 4427 - ARROYO



SPACECRAFT 4424 – MABELI

- P-11 SPACECRAFT: 4424
- LAUNCH DATE: 20 JANUARY 1972
- DESIGN LIFE: 9 MONTHS
- MISSION NAME: MABELI
- MISSION NUMBER: 7339
- OPERATIONAL LIFE: 87 MONTHS

MISSION

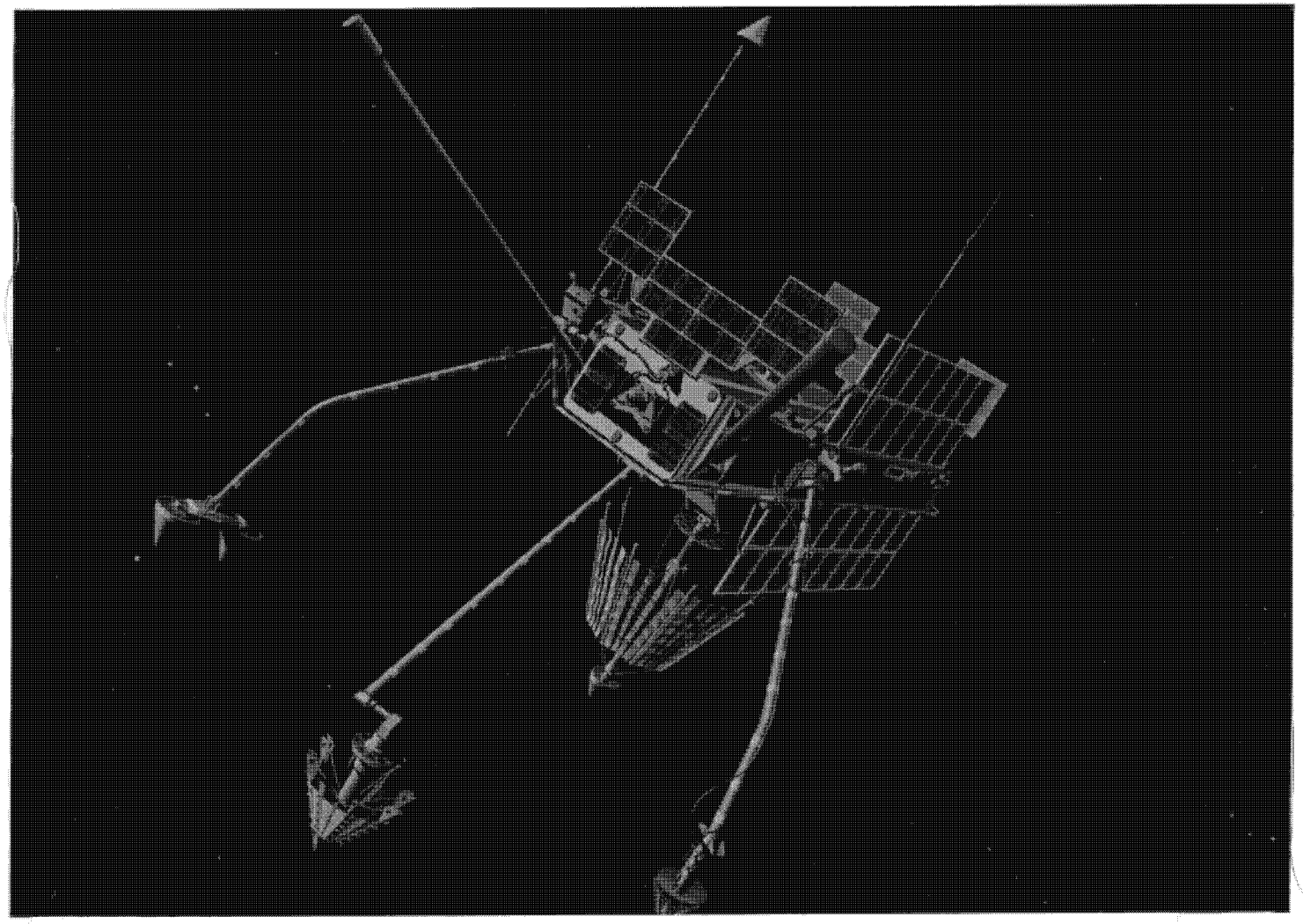
DIRECTED SEARCH AND TI FOR ABM RADAR DEVELOPMENT:

1 - 151 TO 165 MHz: HEN HOUSE
2 - 387 TO 426 MHz: DOG HOUSE
3 -
4 -

HIGHLIGHTS

THIS SPACECRAFT UTILIZED DUAL POLARIZED ANTENNAS TO PERMIT THE MEASUREMENT OF TOTAL RECEIVED SIGNAL POWER, POLARIZATION, AND TILT ANGLE.

SPACECRAFT 4424 – MABELI



SPACECRAFT 4425 – URSALA I

- P-11 SPACECRAFT: ___ 4425
- LAUNCH DATE: _____ 7 JULY 1972
- DESIGN LIFE: _____ 9 MONTHS
- MISSION NAME: _____ URSALA I
- MISSION NAUMBER: __ 7338
- OPERATIONAL LIFE: __ 70 MONTHS

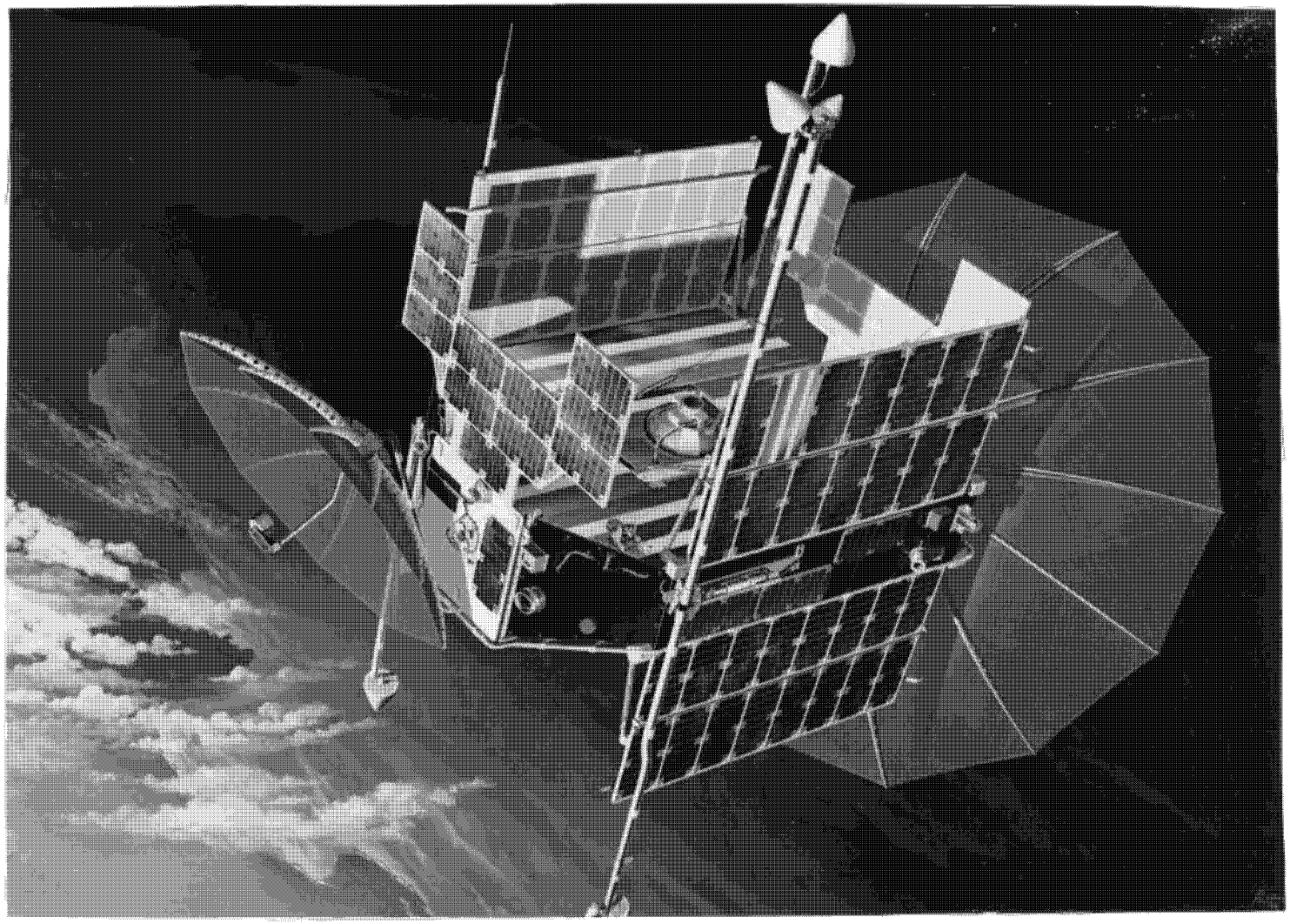
MISSION

EOB, GENERAL SEARCH, AND OPERATONAL SUPPORT FOR PULSED [redacted] EMITTERS IN THE 2.0 TO 12.0 GHz BAND.

HIGHLIGHTS

THIS MISSION UTILIZED BOTH A 6 FT AND A 3 FT PARABOLIC REFLECTOR EACH WITH 4-ARM MULTIMODE SPIRAL MONOPULSE FEED FOR ANGLE OF ARRIVAL MEASUREMENT.

SPACECRAFT 4425 – URSALA I



SPACECRAFT 4426 - URSALA II

- P-11 SPACECRAFT: 4426
- LAUNCH DATE: 10 NOVEMBER 1973
- DESIGN LIFE: 9 MONTHS
- MISSION NAME: URSALA II
- MISSION NUMBER: 7342
- OPERATIONAL LIFE: 61.5 MONTHS

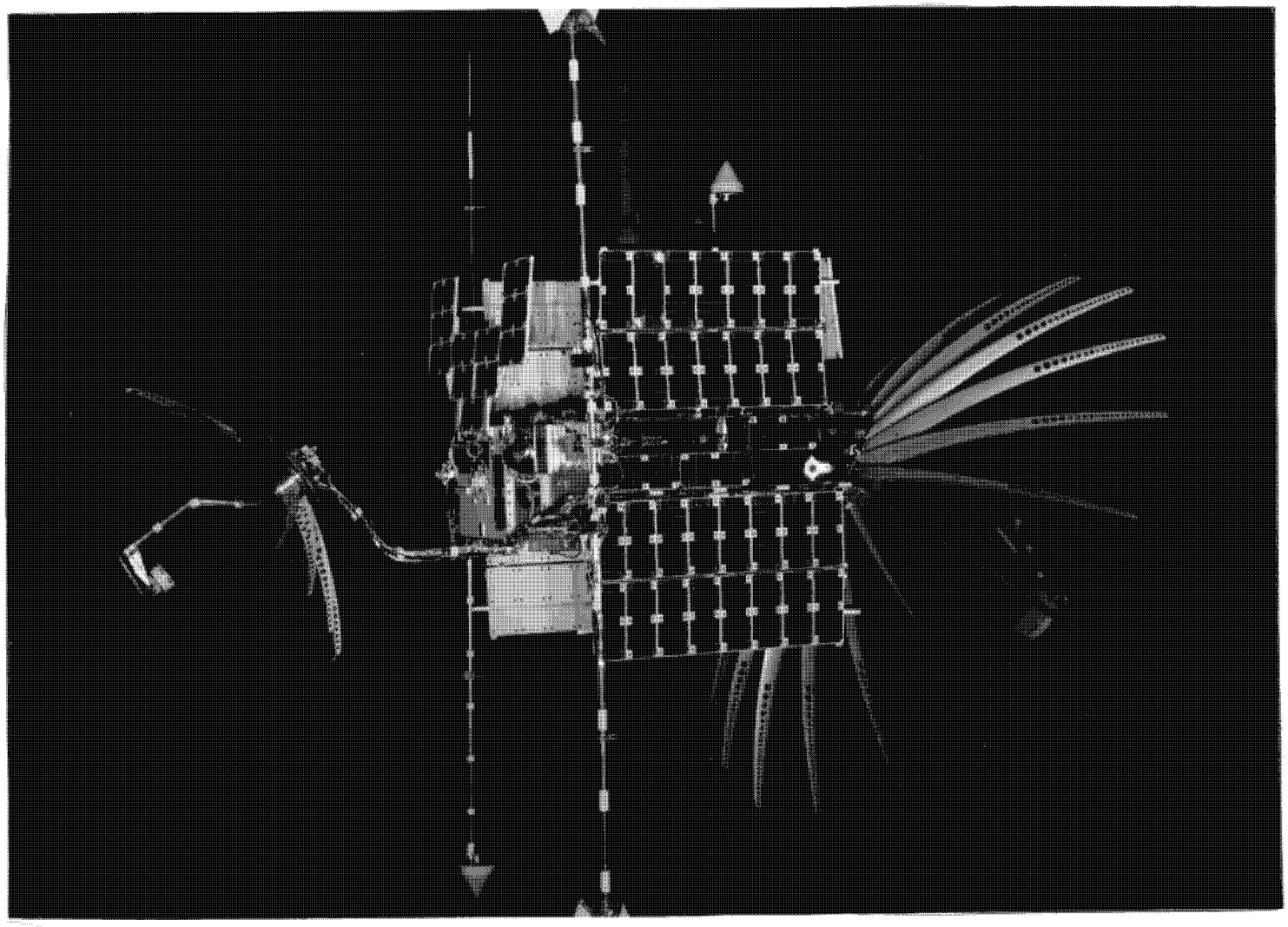
MISSION

EOB, GENERAL SEARCH, AND OPERATIONAL SUPPORT FOR PULSED [redacted] EMITTERS IN THE 2.0 TO 12.0 GHz BAND.

HIGHLIGHTS

THIS SPACECRAFT WAS A DESIGN DUPLICATE OF THE URSALA I SPACECRAFT.

SPACECRAFT 4426 - URSALA II



SPACECRAFT 4428 - TOPHAT II

- P-11 SPACECRAFT: 4428
- LAUNCH DATE: 10 APRIL 1974
- DESIGN LIFE: 18 MONTHS
- MISSION NAME: TOPHAT II
- MISSION NUMBER: 7340
- OPERATIONAL LIFE: 70 MONTHS

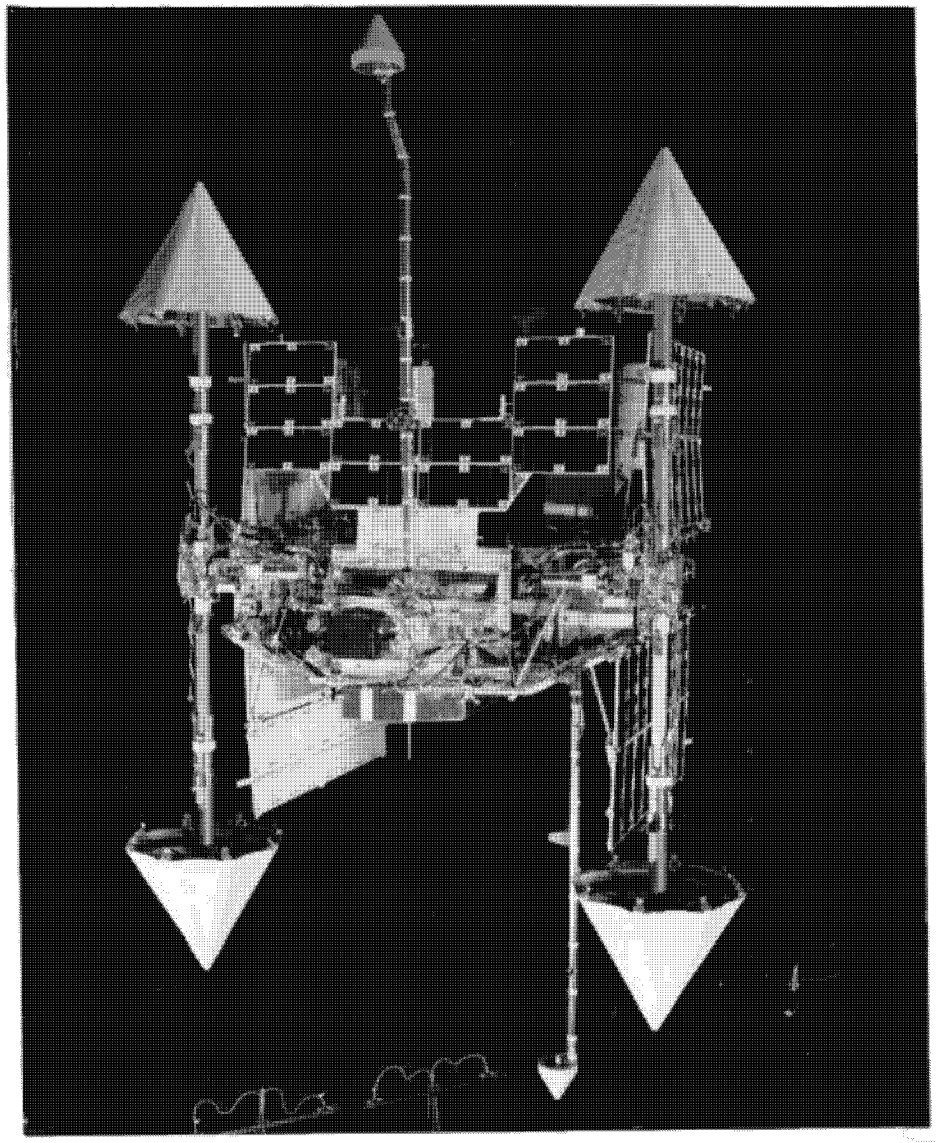
MISSION

DIRECTED SEARCH WITH COPY AND DF OF [redacted] COMMUNICATION SIGNALS AND [redacted] COMMUNICATION SIGNALS IN THE 450 TO 1000 MHz BAND.

HIGHLIGHTS

THIS SPACECRAFT WAS SIMILAR TO THE TOPHAT I SPACECRAFT, HOWEVER ADDED INTERCEPT CAPABILITY WAS INCLUDED TO PERMIT DETECTION AND LOCATION FINDING ON [redacted] COMMUNICATION SIGNALS.

SPACECRAFT 4428 - TOPHAT II



SPACECRAFT 4429 – RAQUEL I

- P-11 SPACECRAFT: 4429
- LAUNCH DATE: 29 OCTOBER 1974
- DESIGN LIFE: 18 MONTHS
- MISSION NAME: RAQUEL I
- MISSION NUMBER: 7341
- OPERATIONAL LIFE: 63 MONTHS

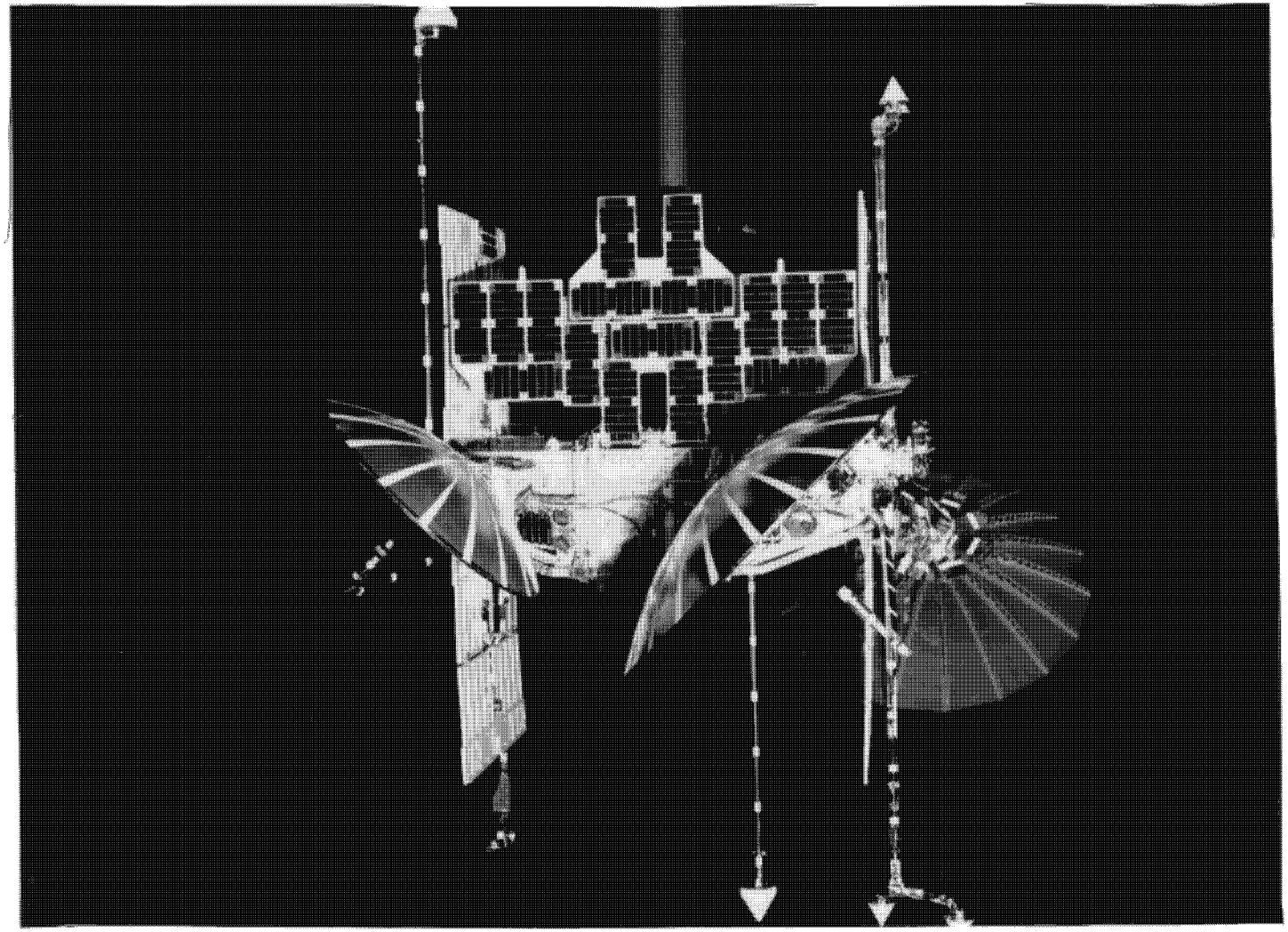
MISSION

EOB, GENERAL SEARCH, AND TI FOR PULSED [redacted] EMITTERS IN THE 4.0 TO 18.0 GHz BAND (SIDELOBES AND MAINBEAMS).

HIGHLIGHTS

THIS SPACECRAFT WAS DESIGNED WITH THREE HIGH GAIN DF ANTENNAS AND A COMPLIMENT OF LOW GAIN MAINBEAM COLLECTION ANTENNAS. THE POSITION OF THE SPIN AXES IN INERTIAL SPACE WAS CONTROLLED TO MAXIMIZE TIME ON TARGET FOR TI ANALYSIS.

SPACECRAFT 4429 – RAQUEL I



SPACECRAFT 4430 - URSALA III

- P-11 SPACECRAFT: 4430
- LAUNCH DATE: 8 JULY 1976
- DESIGN LIFE: 18 MONTHS
- MISSION NAME: URSALA III
- MISSION NUMBER: 7343
- OPERATIONAL LIFE: 95 MONTHS

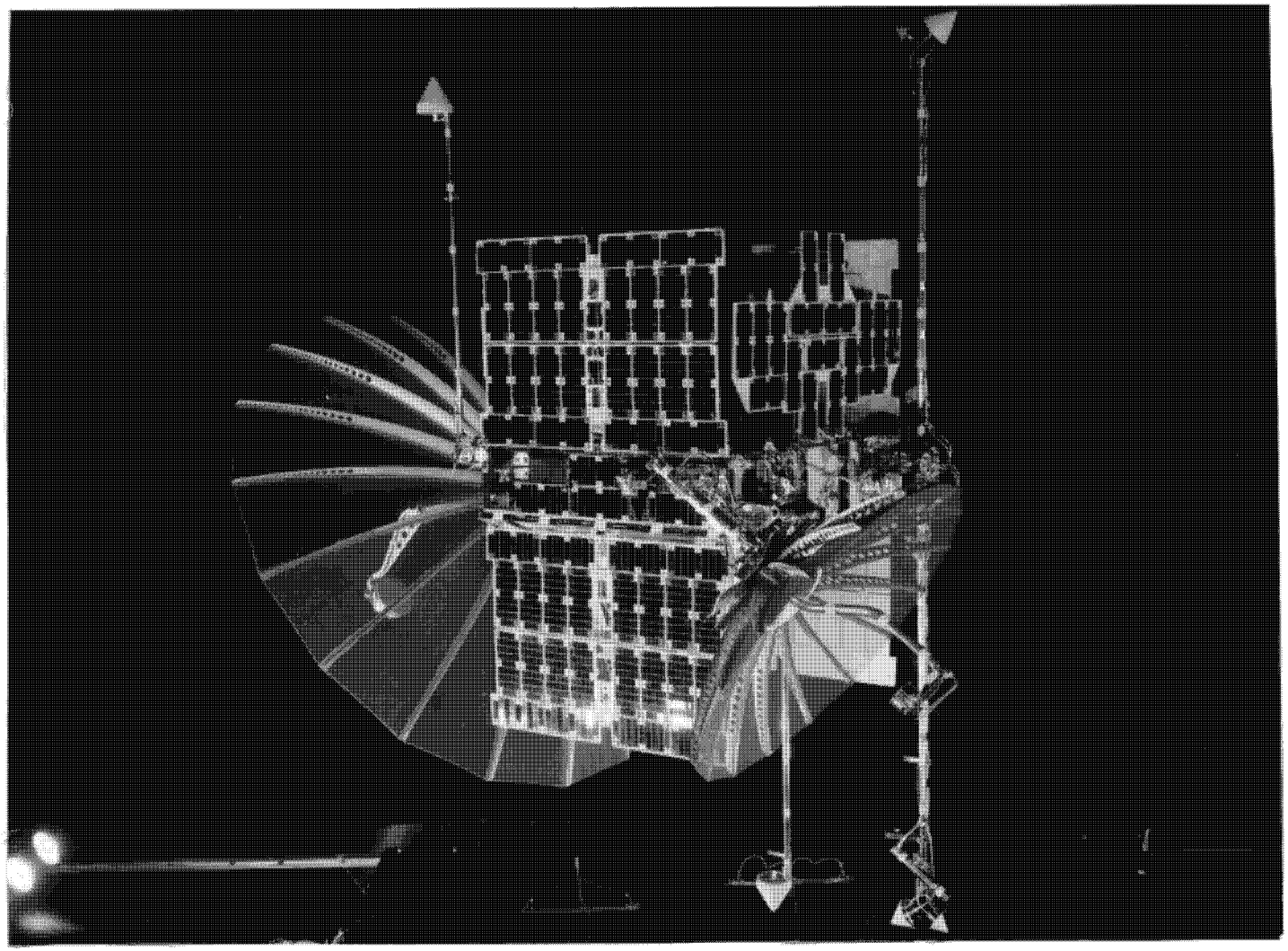
MISSION

EOB, GENERAL SEARCH, AND OPERATIONAL SUPPORT AGAINST PULSED [redacted] EMITTERS IN THE 2.0 TO 12.0 GHz BAND.

HIGHLIGHTS

THE MONOPULSE DF ASPECTS OF THIS MISSION WERE IMPROVED OVER THE URSALA I & II PERFORMANCE. A TOTAL SYSTEM ANGLE OF ARRIVAL MEASUREMENT ERROR LESS THAN 0.5° (95% CONFIDENCE) WAS ACHIEVED. THIS RESULTED IN ERROR ELLIPSES THAT AVERAGED 5.0 NMI × 10.0 NMI. BEST CASE WAS 3.0 × 4.0 NMI.

SPACECRAFT 4430 - URSALA III



SPACECRAFT 4432 - RAQUEL 1A

- P-11 SPACECRAFT: ___ 4432
- LAUNCH DATE: _____ 16 MARCH 1978
- DESIGN LIFE: _____ 18 MONTHS
- MISSION NAME: _____ RAQUEL IA
- MISSION NUMBER: ___ 7345
- OPERATIONAL LIFE: _ 123 MONTHS

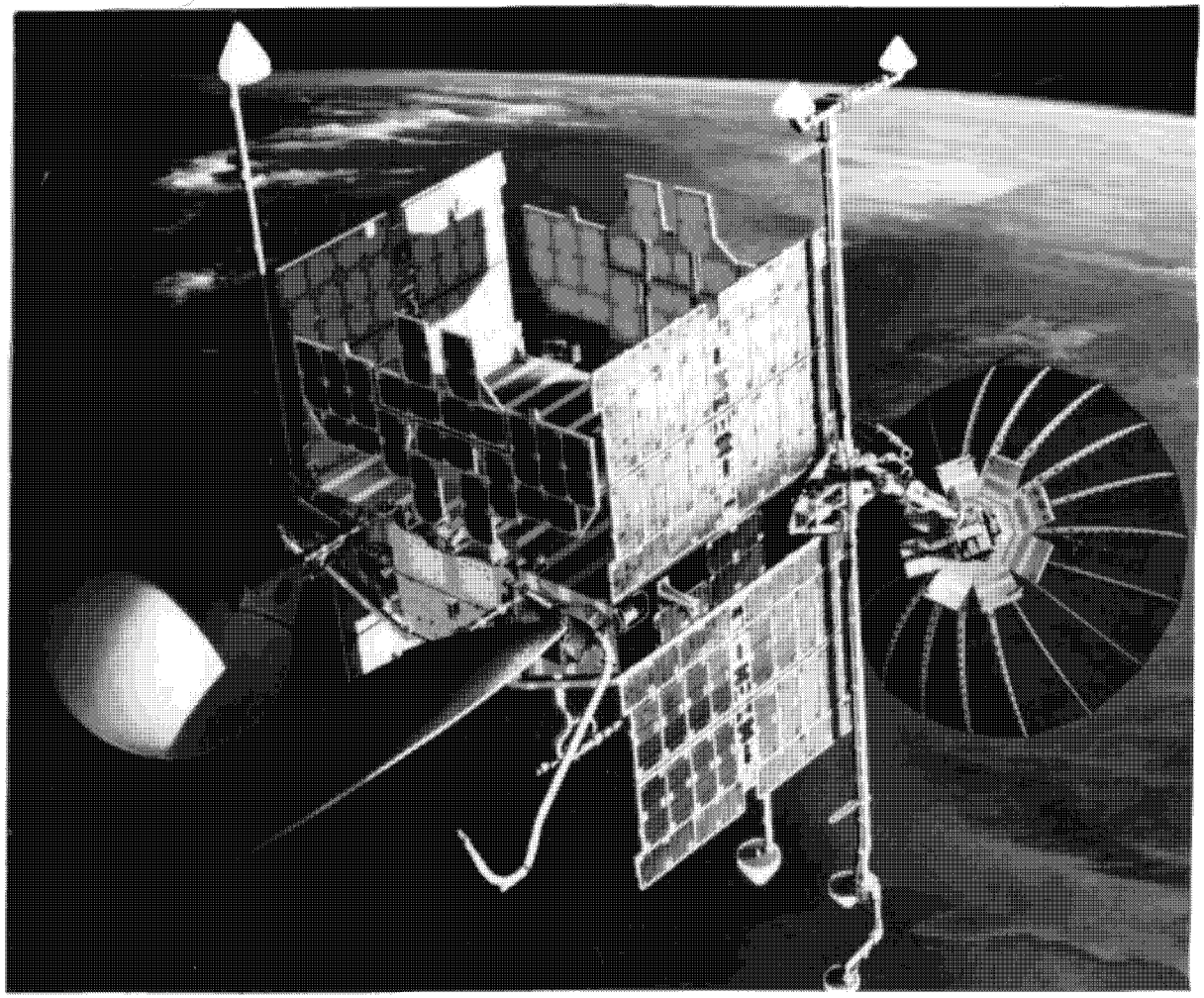
MISSION

EOB, GENERAL SEARCH, AND TI FOR PULSED [redacted] EMITTERS IN THE 4.0 TO 18.0 GHz BAND (SIDELOBES AND MAINBEAMS).

HIGHLIGHTS

THE DESIGN OF THIS SPACECRAFT WAS ESSENTIALLY THE SAME AS RAQUEL I,HOWEVER A NUMBER OF IMPROVEMENTS WERE INCLUDED IN ORDER TO IMPROVE THE TI MISSION SATISFACTION AND THE TASKING AND REPORTING TIMELINESS.

SPACECRAFT 4432 - RAQUEL 1A



SPACECRAFT 4431 - URSALA IV

- P-11 SPACECRAFT: 4431
- LAUNCH DATE: 16 MARCH 1979
- DESIGN LIFE: 24 MONTHS
- MISSION NAME: URSALA IV
- MISSION NUMBER: 7344
- OPERATIONAL LIFE: 42 MONTHS

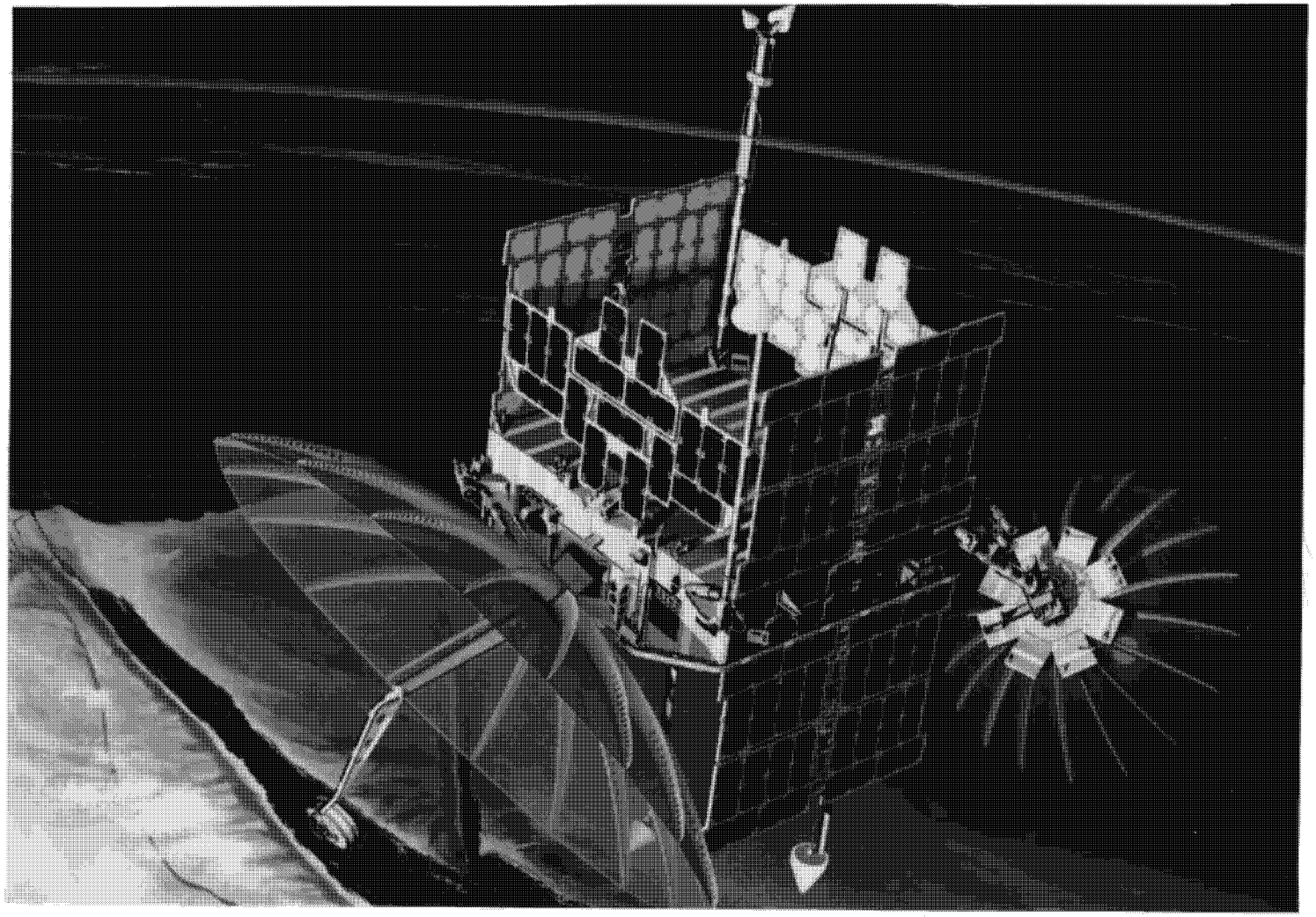
MISSION

EOB, GENERAL SEARCH, AND OPERATIONAL SUPPORT AGAINST PULSED [redacted] EMITTERS IN THE 2.0 TO 12.0 GHz BAND.

HIGHLIGHTS

ADDED MISSION CAPABILITIES INCLUDED IN URSALA IV WERE AN ENCYPHERED DATA LINK PERMITTING REALTIME TRANSPONDING TO REMOTE TACTICAL ELINT VANS. ALSO A NEAR REALTIME DATA PROCESSING SYSTEM WAS INSTALLED IN THE [redacted] PERMITTING INTELLIGENCE DATA TO BE REPORTED. GEOLOCATION ACCURACY WAS IMPROVED [redacted] (95%CONFIDENCE).

SPACECRAFT 4431 - URSALA IV



SPACECRAFT LORRI I

- SPACECRAFT NUMBER: NONE
- LAUNCH DATE: 18 JUNE 1980
- DESIGN LIFE: 6 MONTHS
- MISSION NAME: LORRI
- MISSION NUMBER: 7241
- OPERATIONAL LIFE: 8 MONTHS

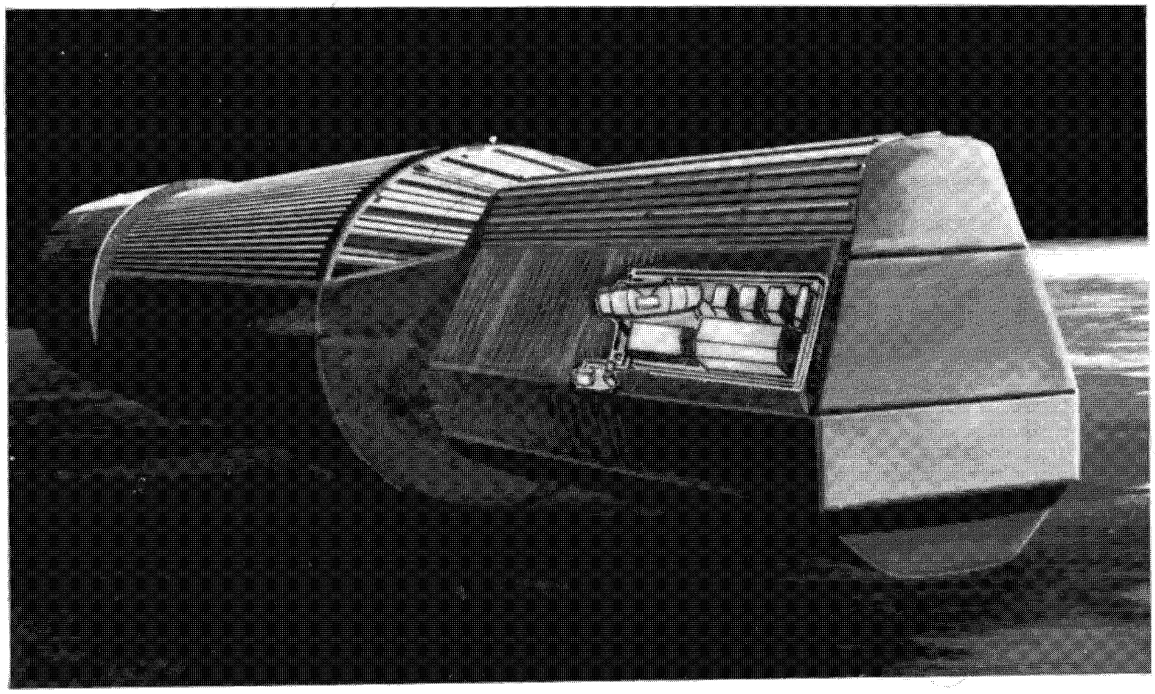
MISSION

GENERAL SEARCH, EOB AND TI FOR PULSED [redacted] EMITTERS IN THE 26 to 42 GHz band.

HIGHLIGHTS

THIS WAS THE FIRST SATELLITE COLLECTOR OF SIGINT IN THIS FREQUENCY RANGE. THE LORRI SYSTEM WAS DESIGNED AS A PALLET TO THE HOST SPACECRAFT, AND UNLIKE THE P-11 SPACECRAFT, REMAINED WITH THE HOST FOR ITS ENTIRE MISSION LIFE OF EIGHT MONTHS. TARGET GEOPOSITION AS WELL AS SIGNAL EXTERNALS WERE MEASURED.

SPACECRAFT LORRI I



SPACECRAFT 4433 – FARRAH I

- P-11 SPACECRAFT: 4433
- LAUNCH DATE: 11 MAY 1982
- DESIGN LIFE: 36 MONTHS
- MISSION NAME: FARRAH I
- MISSION NUMBER: 7346
- OPERATIONAL LIFE: STILL OPERATING AS OF FEBRUARY 1992

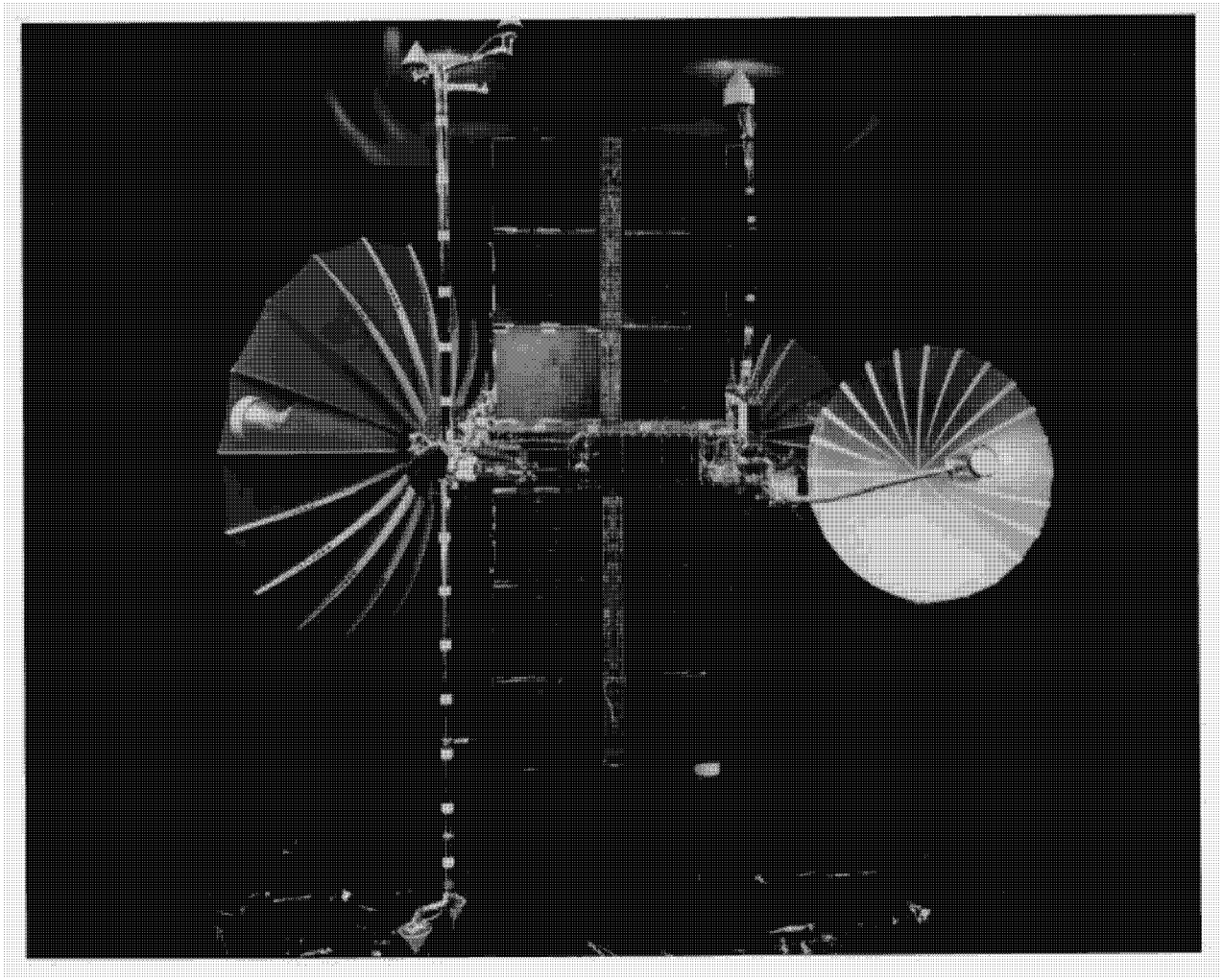
EOB, GENERAL SEARCH, TI, AND DIRECTED SEARCH FOR PULSED [redacted] EMITTERS IN THE 2.0- TO 18.0-GHz BAND (SIDELOBES AND MAINBEAMS).

LIMITED TO TRANSPOND COLLECTION SINCE FINAL TAPE RECORDER FAILURE ON 22 FEBRUARY 1991. RECENT AVERAGE COLLECTION HAS BEEN 110 MINUTES PER DAY.

THIS SPACECRAFT HAS THE COMBINED CAPABILITIES OF THE URSALA AND RAQUEL SPACECRAFT ON A SINGLE PLATFORM. IMPROVED DF AND PARAMETER MEASUREMENT ACCURACIES WERE ACHIEVED. MAJOR INCREASES IN THE POWER SUBSYSTEM AND THE COMMAND AND CONTROL SUBSYSTEM WERE INCLUDED. THE SPACECRAFT CONTAINS AN ONBOARD GENERAL-PURPOSE DIGITAL COMPUTER USED FOR REALTIME ELINT DEINTERLEAVING AND READOUT DIRECTLY TO REMOTE TACTICAL SUPPORT VANS.

FARRAH I WAS DECOMMISSIONED NOVEMBER 1 2004

SPACECRAFT 4433 – FARRAH I



SPACECRAFT 4434 - FARRAH II

- P-11 SPACECRAFT:_____ 4434
- LAUNCH DATE:_____ 25 JUNE 1984
- DESIGN LIFE:_____ 36 MONTHS
- MISSION NAME:_____ FARRAH II
- MISSION NUMBER:_____ 7347
- OPERATIONAL LIFE:_____ STILL OPERATING AS OF FEBRUARY 1992

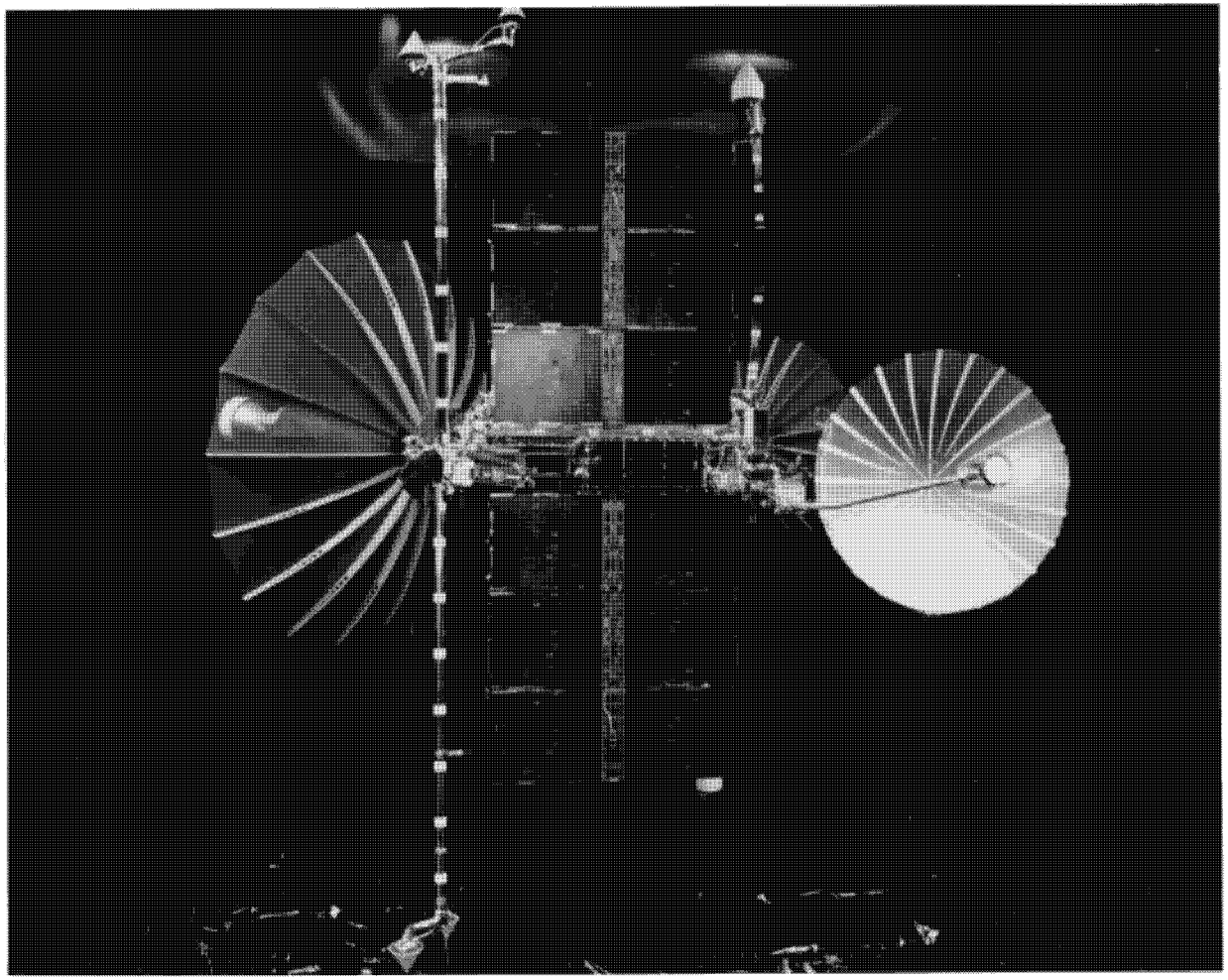
EOB, GENERAL SEARCH, TI, AND DIRECTED SEARCH FOR PULSED [redacted] EMITTERS IN THE 2.0- TO 18.0-GHz BAND (SIDELOBES AND MAINBEAMS).

LIMITED TO TRANSPOND COLLECTION SINCE FINAL TAPE RECORDER FAILURE ON 23 JANUARY 1991.

THIS SPACECRAFT IS A COPY OF FARRAH I. COLLECTION HAS BEEN AS HIGH AS 408 MINUTES PER DAY, WITH A RECENT AVERAGE OF 150 MINUTES PER DAY.

FARRAH II WAS DECOMMISSIONED OCTOBER 6 2004

SPACECRAFT 4434 - FARRAH II



SPACECRAFT LORRI II

- SPACECRAFT NUMBER: NONE
- LAUNCH DATE: 18 APRIL 1986
- DESIGN LIFE: 24 MONTHS
- MISSION NAME: LORRI II
- MISSION NUMBER: 7242
- OPERATIONAL LIFE: HOST VEHICLE FAILED TO ACHIEVE ORBIT

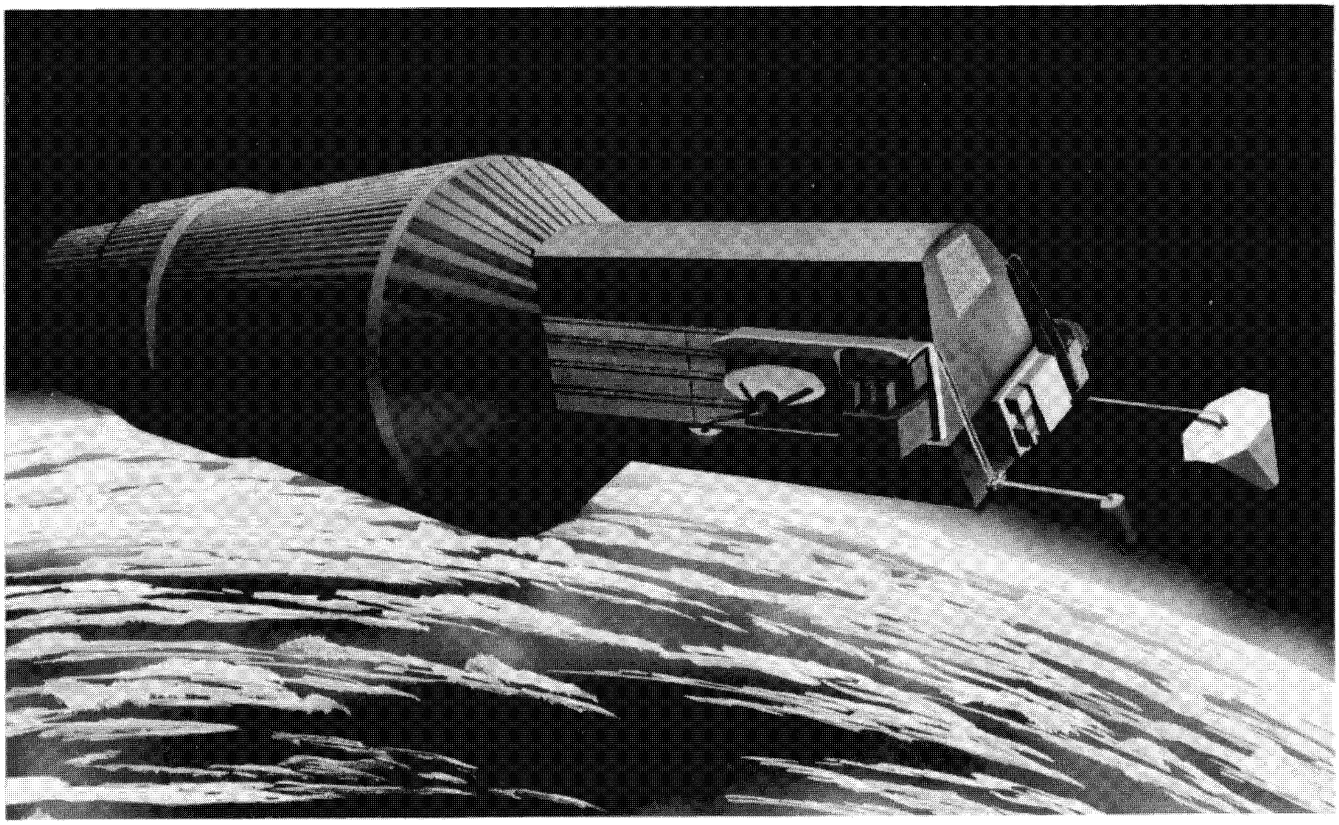
MISSION

- DETECT AND GEOLOCATE RADAR AND COMM EMITTERS IN THE 26- TO 42-GHz FREQUENCY RANGE
- MEASURE MAINBEAM ERP AND POLARIZATION OF PULSED SIGNALS OF INTEREST IN THE 130- TO 180-MHz FREQUENCY RANGE
- INTERCEPT SIGNALS OPERATING IN THE 92- TO 96-GHz RF RANGE WITH SECONDARY COVERAGE OF 70 TO 74 GHz

HISTORY

- HOST VEHICLE FAILED TO ACHIEVE ORBIT

SPACECRAFT LORRI II



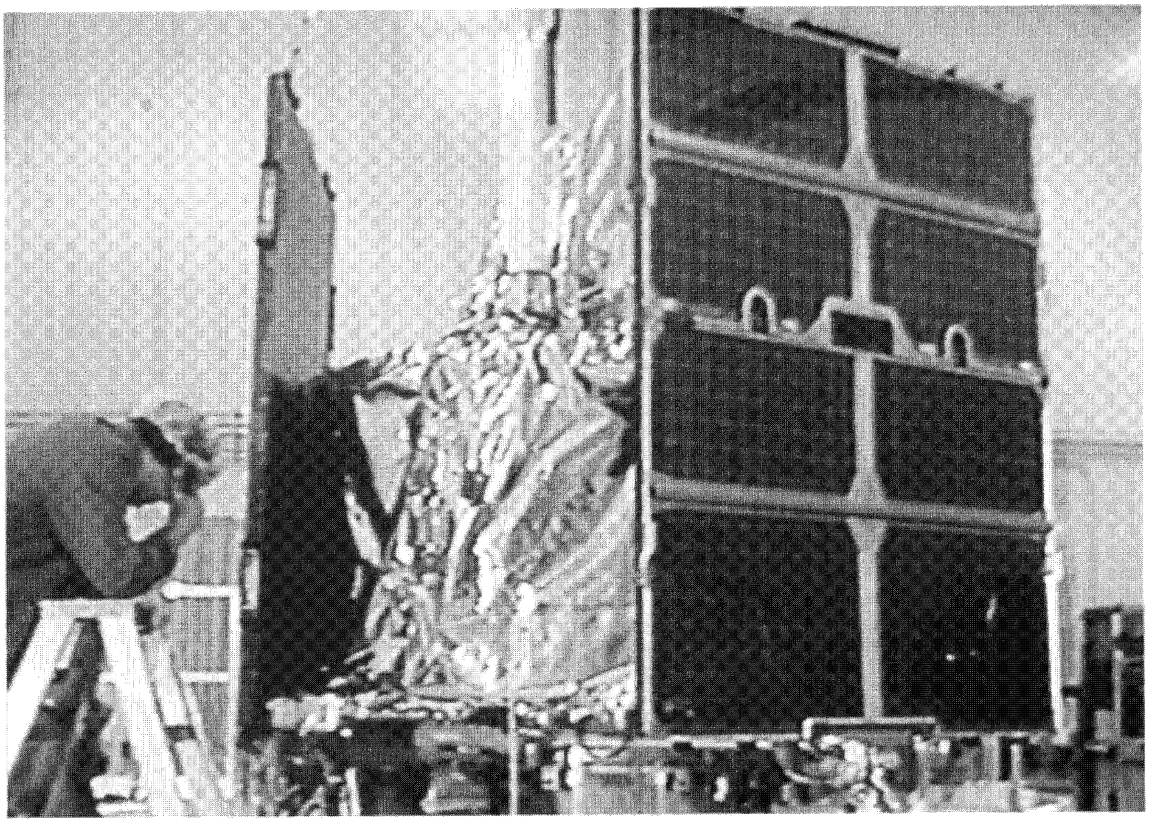
SPACECRAFT 5103 - FARRAH III

- NEW SPACECRAFT:_____ 5103
- LAUNCH DATE:_____ 5 SEPTEMBER 1988
- DESIGN LIFE:_____ 48 MONTHS
- MISSION NAME:_____ FARRAH III
- MISSION NUMBER:_____ 7348
- OPERATIONAL LIFE:_____ STILL OPERATING AS OF FEBRUARY 1992

EOB, GENERAL SEARCH, COMINT MAPPING, TIPOFF, TRANSPOND SUPPORT TO MILITARY OPS, TI, PRECISION MAINBEAM PATTERN MAPPING (INCLUDING 150- TO 165-MHz PALLET), 20- TO 60-MHz SRT PALLET, AND DIRECTED SEARCH FOR PULSED [redacted] EMITTERS IN THE 2.0- TO 18.0-GHz BAND (SIDELOBES AND MAINBEAMS).

THIS IS A NEW, EXPANDED-CAPABILITIES SPACECRAFT. COLLECTION HAS BEEN AS HIGH AS 672 MINUTES PER DAY, WITH A RECENT AVERAGE OF 450 MINUTES PER DAY.

SPACECRAFT 5103 - FARRAH III



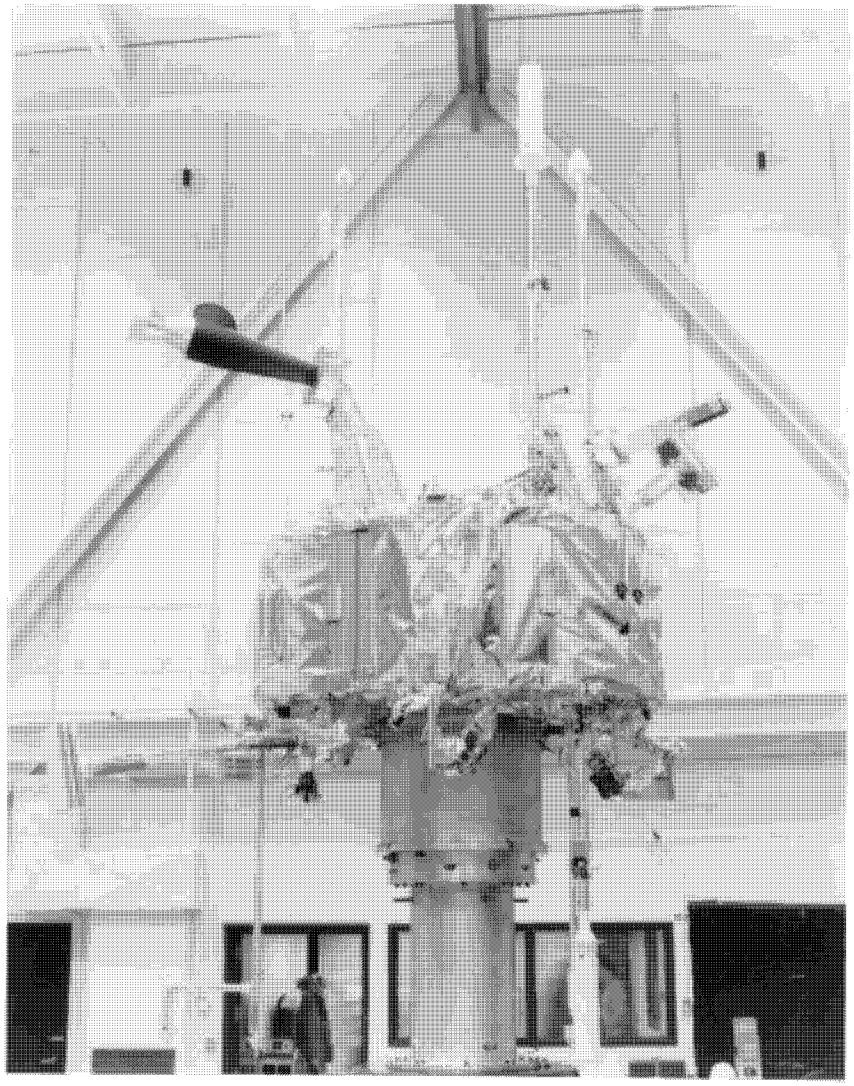
SPACECRAFT 5104 - FARRAH IV

- FARRAH III SPACECRAFT:____ 5104
- LAUNCH DATE:_____ 5 SEPTEMBER 1989
- DESIGN LIFE:_____ 48 MONTHS
- MISSION NAME:_____ FARRAH IV
- MISSION NUMBER:_____ 7349
- OPERATIONAL LIFE:____ INITIAL TOTAL ON-ORBIT FAILURE

EOB, GENERAL SEARCH, COMINT MAPPING, TIPOFF, ONBOARD PROCESSING/TRANSPOND SUPPORT TO MILITARY OPS. TI, PRECISION MAINBEAM PATTERN MAPPING, AND DIRECTED SEARCH FOR PULSED [redacted] EMITTERS IN THE 2.0- TO 18.0-GHz BAND (SIDELOBES AND MAINBEAMS).

THIS SPACECRAFT WAS AN UPGRADE OF FARRAH III. THE TACTICAL ONBOARD PROCESSING SYSTEM WAS A NEW CAPABILITY.

SPACECRAFT 5104 - FARRAH IV



Approved for Release: 2025/06/16 C05142109

C05142109

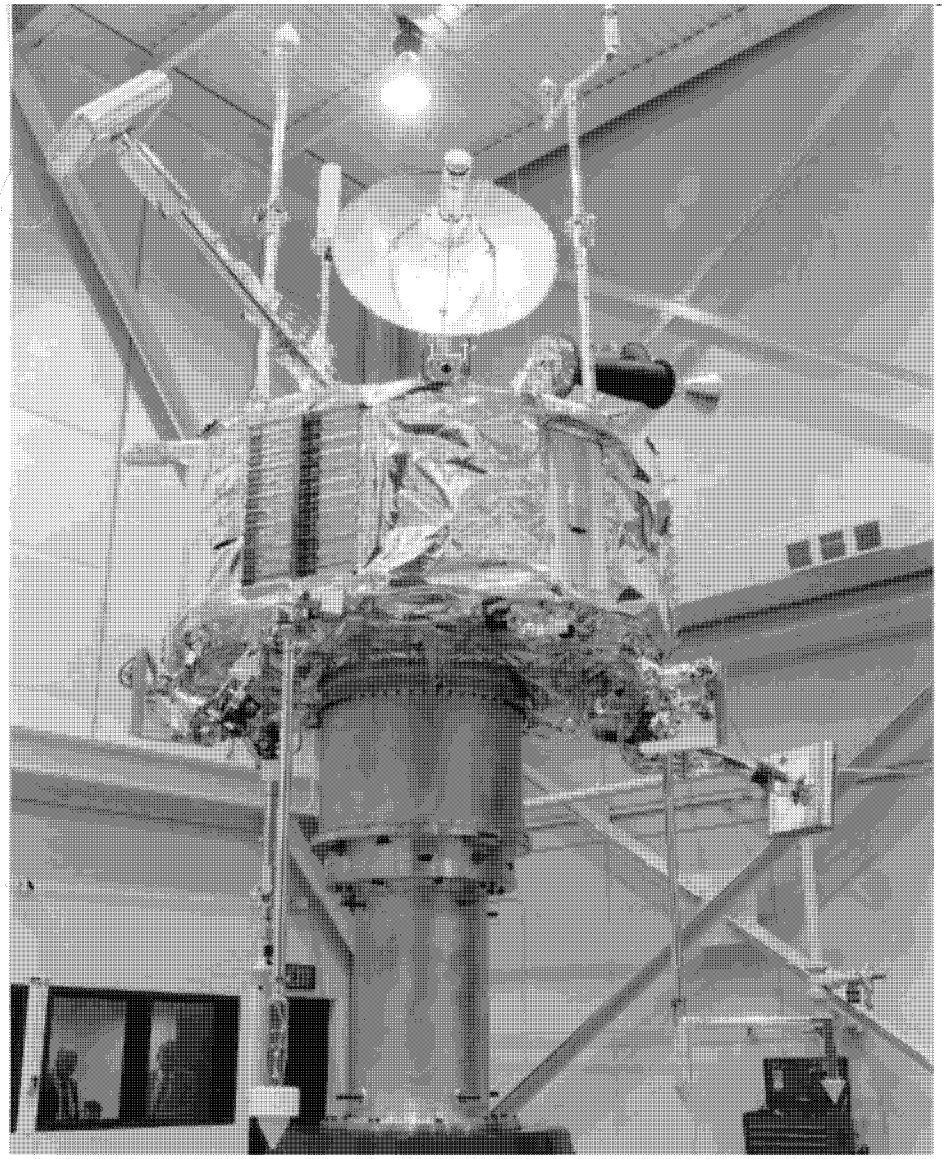
SPACECRAFT 5105 - FARRAH V

- FARRAH III SPACECRAFT:_____ 5105
- LAUNCH DATE:_____ 23 APRIL 1992
- DESIGN LIFE:_____ 48 MONTHS
- MISSION NAME:_____ FARRAH V
- MISSION NUMBER:_____ 7350
- OPERATIONAL LIFE:_____ ON SCHEDULE

EOB, GENERAL SEARCH, COMINT MAPPING AND CHARACTERIZATION, TIPOFF, ONBOARD PROCESSING AND TRANSPOND SUPPORT TO MILITARY OPS, TI, 2.0- TO 18.0-GHz PRECISION MAINBEAM PATTERN MAPPING, SINGLE-EMITTER IDENTIFICATION EXPERIMENT, AND DIRECTED SEARCH FOR PULSED [redacted] EMITTERS IN THE 1.2- TO 18.0-GHz BAND (SIDELOBES AND MAINBEAMS).

THIS SPACECRAFT IS AN UPGRADE OF FARRAH III. NEW CAPABILITIES ARE THE COMINT CHARACTERIZATION, DOWNWARD FREQUENCY EXTENSION FROM 2.0 TO 1.2 GHz (0.8-GHz GOAL), AND SEI EXPERIMENT.

SPACECRAFT 5105 - FARRAH V



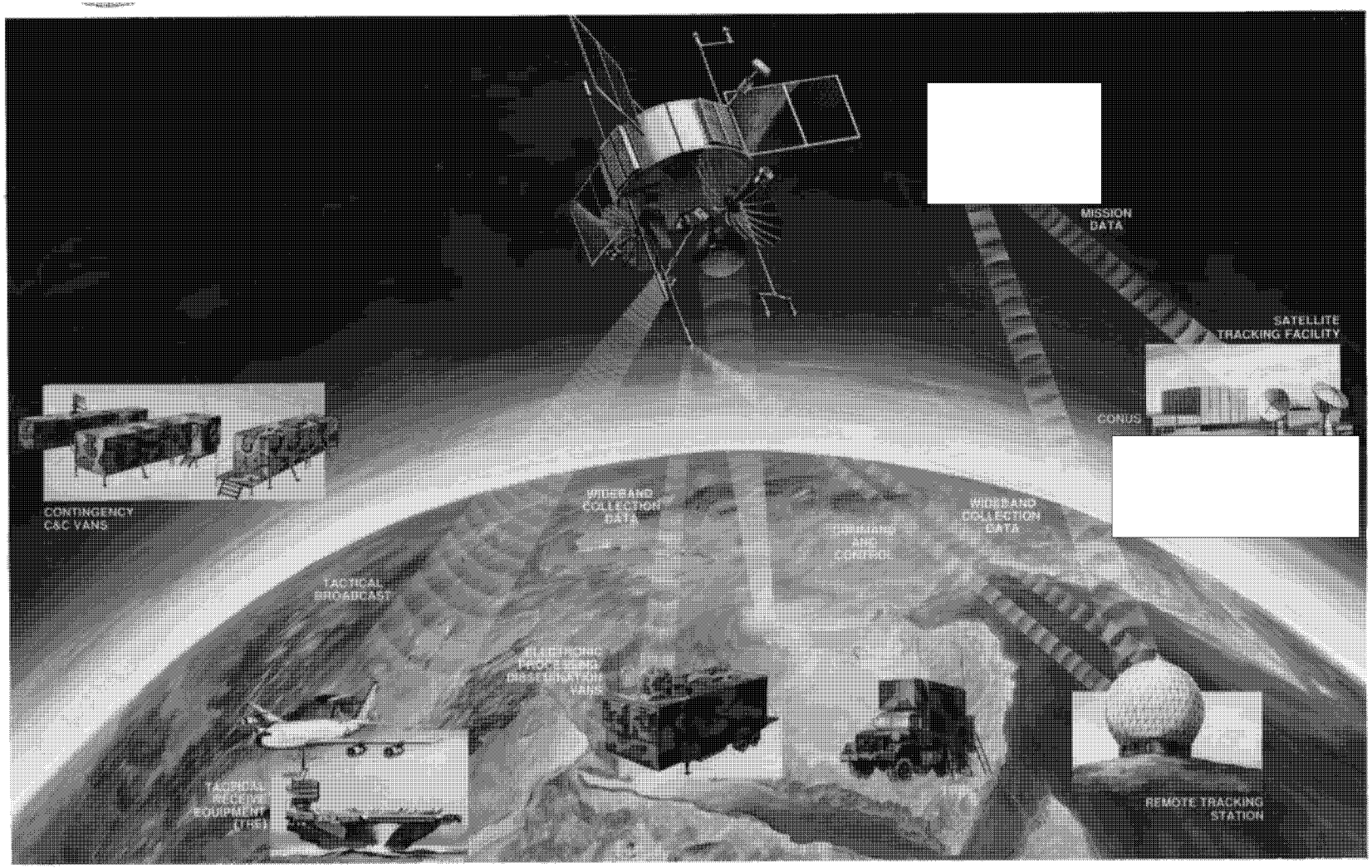
SPACECRAFT 5106 - FARRAH VI

- FARRAH III SPACECRAFT: 5106
- EARLIEST LAUNCH: 1994
- DESIGN LIFE: 48 MONTHS
- MISSION NAME: FARRAH VI
- MISSION NUMBER: 7351
- STATUS: PARTIALLY BUILT (IN STORAGE)

EOB, GENERAL SEARCH, COMINT MAPPING AND CHARACTERIZATION, TRANSPOND SUPPORT TO MILITARY OPS, TI, 2.0- TO 18.0-GHz PRECISION MAINBEAM PATTERN MAPPING, AND DIRECTED SEARCH FOR PULSED [redacted] EMITTERS IN THE 0.8- TO 18.0-GHz BAND (SIDELOBES AND MAINBEAMS).

THIS SPACECRAFT IS AN UPGRADE OF FARRAH V. THE SIDELOBE PULSE COLLECTION RECEIVER IS CHANNELIZED TO ACHIEVE A 6-dB SENSITIVITY IMPROVEMENT FOR LOW-ERP SIGNAL COLLECTION.

JUPITER SYSTEM ARCHITECTURE



MAJOR SYSTEM HARDWARE SUPPLIERS

P-11 No.	MISSION No.	SPACECRAFT	ANTENNAS	PAYLOAD	TAPE RECORDERS
4001	7301	LMSC	LMSC	EDL	LEACH
4101	7302	LMSC	LMSC	EDL	LEACH
4102	7303	LMSC	LMSC	EDL	LEACH
4301	7304	LMSC	LMSC	ATI	PIC
4302	7305	LMSC	LMSC	ATI	
	7306			SEL	LEACH
4402	7207	LMSC	LMSC	SEL	LEACH
	7308			ATI	
4401	7309	LMSC	LMSC	EDL	LEACH
4404	7310	LMSC	LMSC	ATI	LEACH
	7311	LMSC	LMSC	ATI	
4403	7312	LMSC	LMSC	ATI	LEACH
4407	7313	LMSC	LMSC	HRB	LEACH
4405	7314	LMSC	LMSC	SEL	LEACH
	7315			ATI	
4408	7316	LMSC	LMSC	ESL	LEACH
	7319			EDL	LEACH
4406	7318	LMSC	LMSC	SEL	LEACH
	7318			ATI	LEACH
4409	7320	LMSC	LMSC	ESL	LEACH
4410	7321	LMSC	LMSC	EDL	LEACH
4411	7322	LMSC	LMSC	ATI	LEACH
	7323			SEL	LEACH
4412	7324	LMSC	LMSC	ESL	LEACH
4413	7325	LMSC	LMSC	EDI	LEACH
4420	7326	LMSC	LMSC	ATI	LEACH
	7327			ATI	LEACH
4417	7328	LMSC	LMSC	ATI	LEACH
	7329			ATI	LEACH

10/P20025-023

P-11 No.	MISSION No.	SPACECRAFT	ANTENNAS	PAYLOAD	TAPE RECORDERS
4418	7330	LMSC	LMSC	ESL	LEACH
4421	7332			ATI	LEACH
	7333			AIL	LEACH
4423	7334	LMSC	LMSC	E-SYSTEMS	LEACH
4422	7335	LMSC	LMSC	ESL	LEACH
4419	7336	LMSC	LMSC	ESL	LEACH
4427	7337	LMSC	LMSC	AIL	LEC
4425	7338	LMSC	LMSC	MOTOROLA	LEACH
4424	7339	LMSC	LMSC	ESL	LEACH
4428	7340	LMSC	LMSC	E-SYSTEMS	LEC
4429	7341	LMSC	LMSC	E-SYSTEMS	LEC
4426	7342	LMSC	LMSC	MOTOROLA	LEACH
4430	7343	LLSC	LMSC	MOTOROLA	LEC
4431	7344	LMSC	LMSC	MOTOROLA	LEC
4432	7345	LMSC	LMSC	E-SYSTEMS	LEC
4433	7346	LMSC	LMSC	MOTOROLA	LEC
4434	7347	LMSC	LMSC	MOTOROLA	LEC
LORRI	7241	LMSC	LMSC	ARGOSYSTEMS	LEACH
LORRI II	7242	LMSC	LMSC	ARGOSYSTEMS	LEC
5103	7348	LMSC	LMSC	MOTOROLA	LEC
5104	7349	LMSC	LMSC	MOTOROLA	LEC
5105	7350	LMSC	LMSC	MOTOROLA	LSI
5106	7351	LMSC	LMSC	MOTOROLA	LSI

EDL = SYLVANIA ELECTRONIC DEFENSE LABORATORY, MOUNTAIN VIEW, CA
ATI = APPLIED TECHNOLOGY INC., PALO ALTO, CA
SEL = STANFORD ELECTRONICS LABORATORY, PALO ALTO, CA
HRB = HAMMER, RAYMOND, AND BROWN, STATE COLLEGE, PA
ESL = ELECTROMAGNETIC SYSTEMS LABORATORY, SUNNYVALE, CA
AIL = AIRBORNE INSTRUMENTS LABORATORY, MELVILLE, NY
LSI = LOCKHEED ELECTRONICS CO., PLAINFIELD, NY
LSI = LOCKHEED SANDERS, NASHUA, NH

10/P20025-023a

Termination of FARRAH-2 (Mission 7347) Mission Operations

The National Reconnaissance Office ceased operations of FARRAH-2 (Mission 7347) on 6 October 2004. After coordination with the Intelligence Community, I directed the decommissioning of the FARRAH-2 Signals Intelligence spacecraft from mission operations due to its degraded state of health and low data output. This spacecraft far outperformed the planned mean mission duration of 2.5 years, providing 20 years of intelligence data. FARRAH-2 was placed in a non-recoverable state and will remain on orbit in excess of 50 years.

F5 L 4/26/1992
F3 L 9/05/1988
F2 L 6/25/1984. Killed 10/6/2004
F1 L 5/11/1982. Killed 11/3/2004