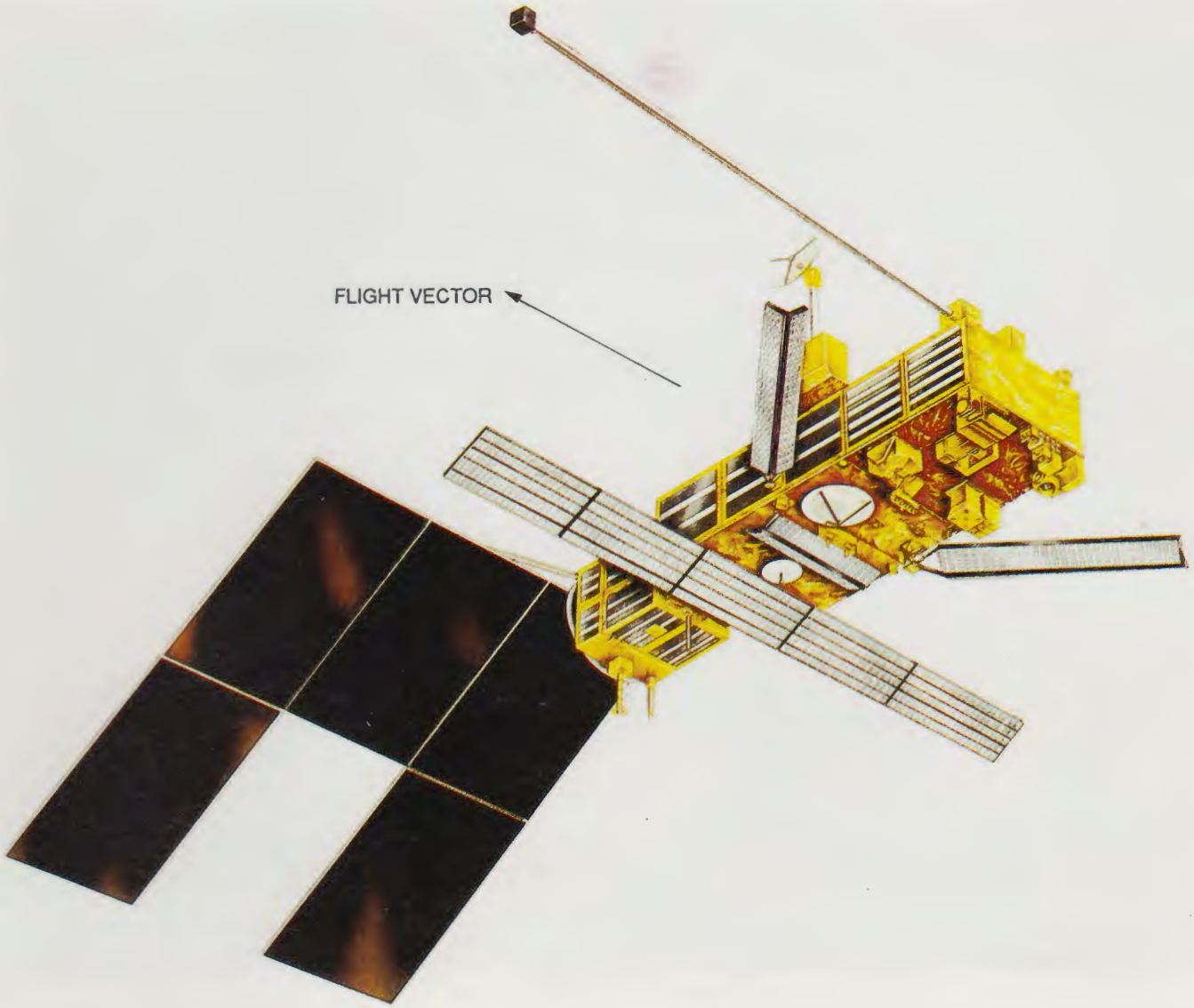
POLAR PLATFORM "B"



Key Requirements and Objectives

- Unmanned vehicle designed for multiple mission payload accommodation.
- Separate partly mission dedicated Utilities Module and mission dedicated Payload Module.
- Flexible payload accommodation capability for multidisciplinary instruments.
- Nominally precise Earth pointing.
- Autonomous operation for periods of up to 24 hours without ground support.
- 4 years minimum lifetime.
- Commonality with other COLUMBUS elements and SPOT-4 / HELIOS, ERS-1.

COLUMBUS

Main Design and Performance Features

- LAUNCH:
  - Vehicle: ARIANE 5.
  - Mass: 6200 Kg (incl. 2000 Kg Payload, 311 Kg Propellant).
  - Dimensions: 9,3 m x 2.8 m x 2 m.
- CONFIGURATION:
  - Rectangular Utilities Module.
  - Rectangular Payload Module.
  - One wing solar array.
- ELECTRICAL: POWER
  - 28 VDC and 50 VDC regulated, 28 VDC unregulated
  - 5.5 KW total solar array output power (End of Life); 1.8 KW average for payload.
  - Dedicated power distribution for subsystems and payload.
  - 8 Nickel Cadmium batteries for energy storage.
- GUIDANCE, NAVIGATION AND CONTROL:
  - Data transfer on system bus.
  - Attitude control with 40 Nms reaction wheels and 350 Am^2 magnetorquers.
  - Switchable yaw steering.
  - Attitude measurement: 0.03^0, 0.01^0/sec (3 Sigma).
  - Pointing accuracy: 0.1^0.
- PROPULSION:
  - Sixteen monopropellant 16 N thrusters.
- DATA MANAGEMENT:
  - Decoding and Reconfiguration. Unit for initialisation and safe mode.
  - Independent data acquisition and processing for subsystems and pay
  - Two buses (256 Kbps). (ERS 1 – OBDH and SPOT 4 - OBDH).
  - Scientific low and medium rate data multiplexing and transmission to ground.
  - Automated systems operation incl. failure detection, isolation and recovery for main failures.
  - Data storage: 3 Mbps and 10 Mbps recording; 50 Mbps playback; 30 Gigabits storage.
- COMMUNICATION:
  - Direct and via DRS to/from ground: S-Band (omni-directional).
  - Direct to ground: X-Band (global coverage).
  - Via DRS: Ka-Band, 1.2 m steerable antenna on boom.
- RELIABILITY:
  - 0.72 for 4 years.

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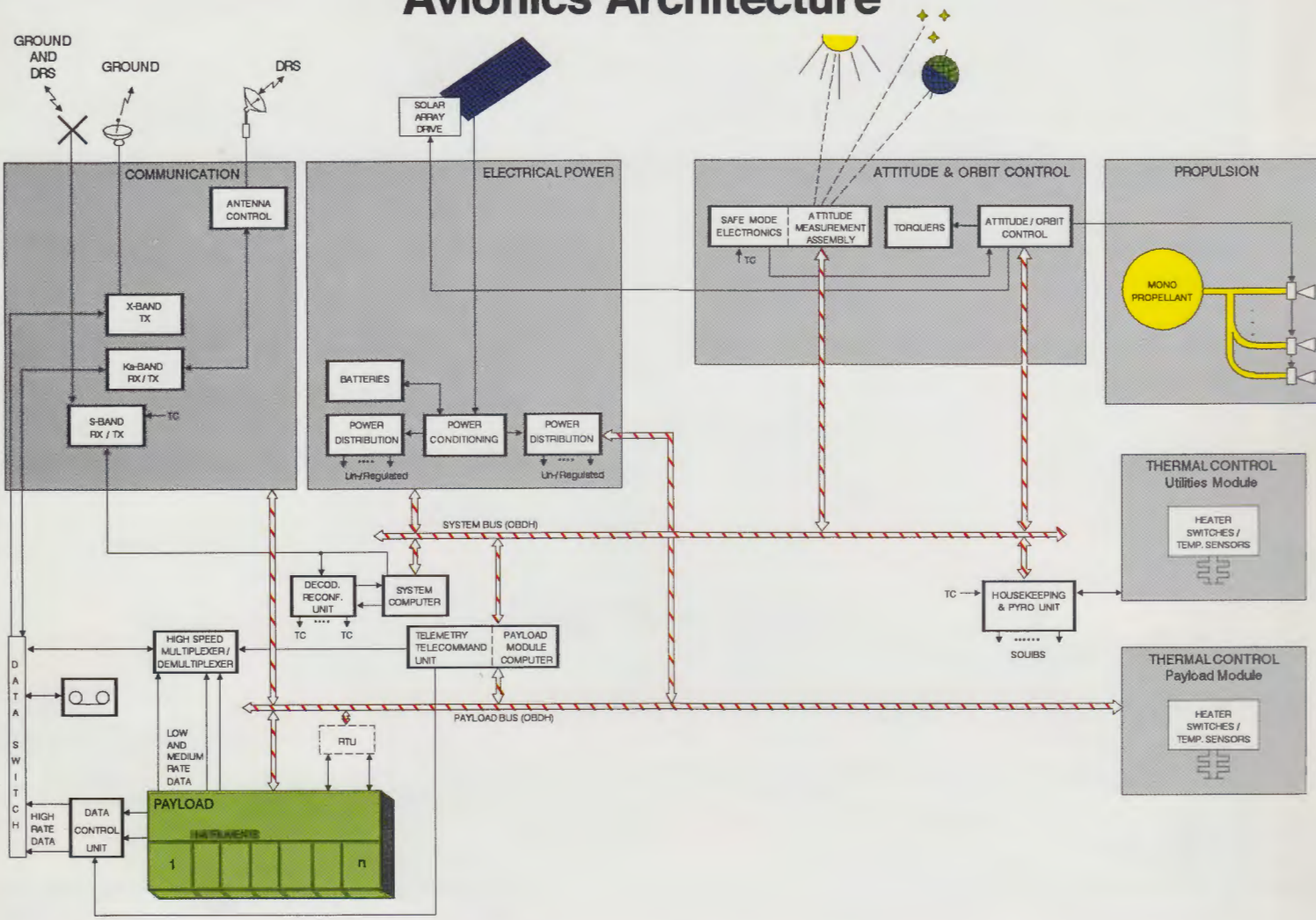
Avionics Architecture



First Mission Payload Complement

- Fifteen payload instruments on Payload and Utilities Module; fifty RF-transmitter/receiver channels ranging from UHF to 180 GHz; seventy interdependent fields of view.
- Operational Instruments;
  Advanced Minimum Resolution Imaging Radiometer.
  Advanced Microwave Sounding Unit.
  ARGOS Data Collection and Location System.
  Earth Radiation Budget Instrument.
  Search and Rescue.
  NOAA Direct Broadcast.
- Core Instruments:
  Radar Altimeter.
  Wind Scatterometer.
  Synthetic Aperture Radar or Multiband Imaging.
  Microwave Radiometer or Atmospheric LIDAR.
- Space Science Instruments:
  Space Environment Monitor.
  Auroral Imaging Observatory.
  Particles and Field Measurements
  Fabry-Perot Interferometer.
  Global Electrodynamics Monitor

Payload Resources

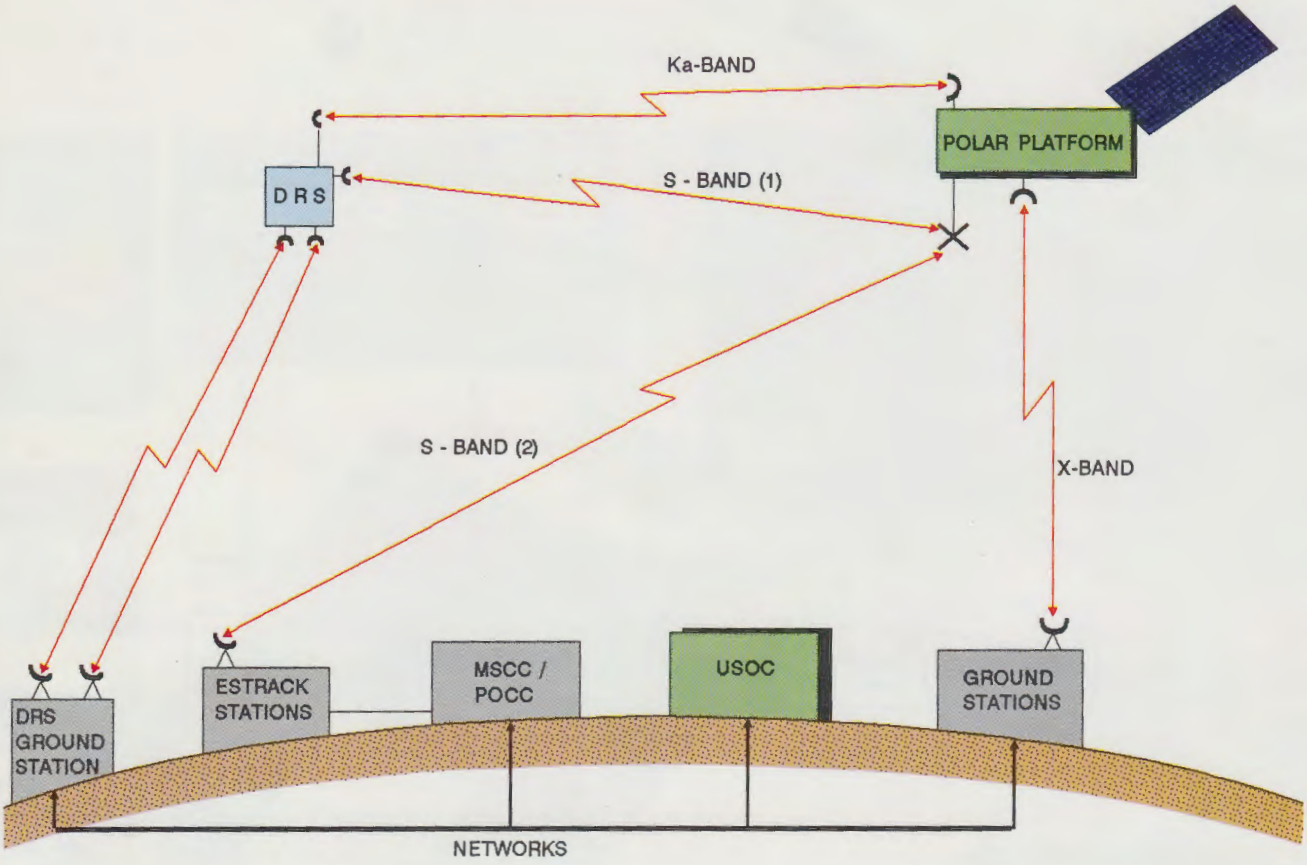
Data/Command Channels	Payload Data Links	Flight Ops Links	On Board Process.
2 High Rate (50 MBPS)	X		
12 Low and Medium Rate (0.01 to 32 MBPS)	X		
Low Rate / Command Channels	X	X	X

- Electrical Power
  - Regulated power outlets: 12 at 280 W, 2 at 28 W, 5 at 14 W
  - Unregulated power outlets: 18 at 220 W, 8 at 22 W, 4 at 11 W
  - Regulation 28 VDC, 50 VDC ± 1%.
- Thermal
  - Up to 400 W transfer between Payload Module and instruments.
  - Interface temperature controlled between 0^0 and 25^0 C.
- Instrument accommodation on honeycomb sandwich panels with flexible accommodation pattern.

Transportation & Launch

- Final Polar Platform integration and test at BAe / Bristol
- Transport to Kourou by ship
- Launch by ARIANE 5, either in single or dual payload configuration, into transfer orbit (operational altitude minus 5 km)

Operations Scenario



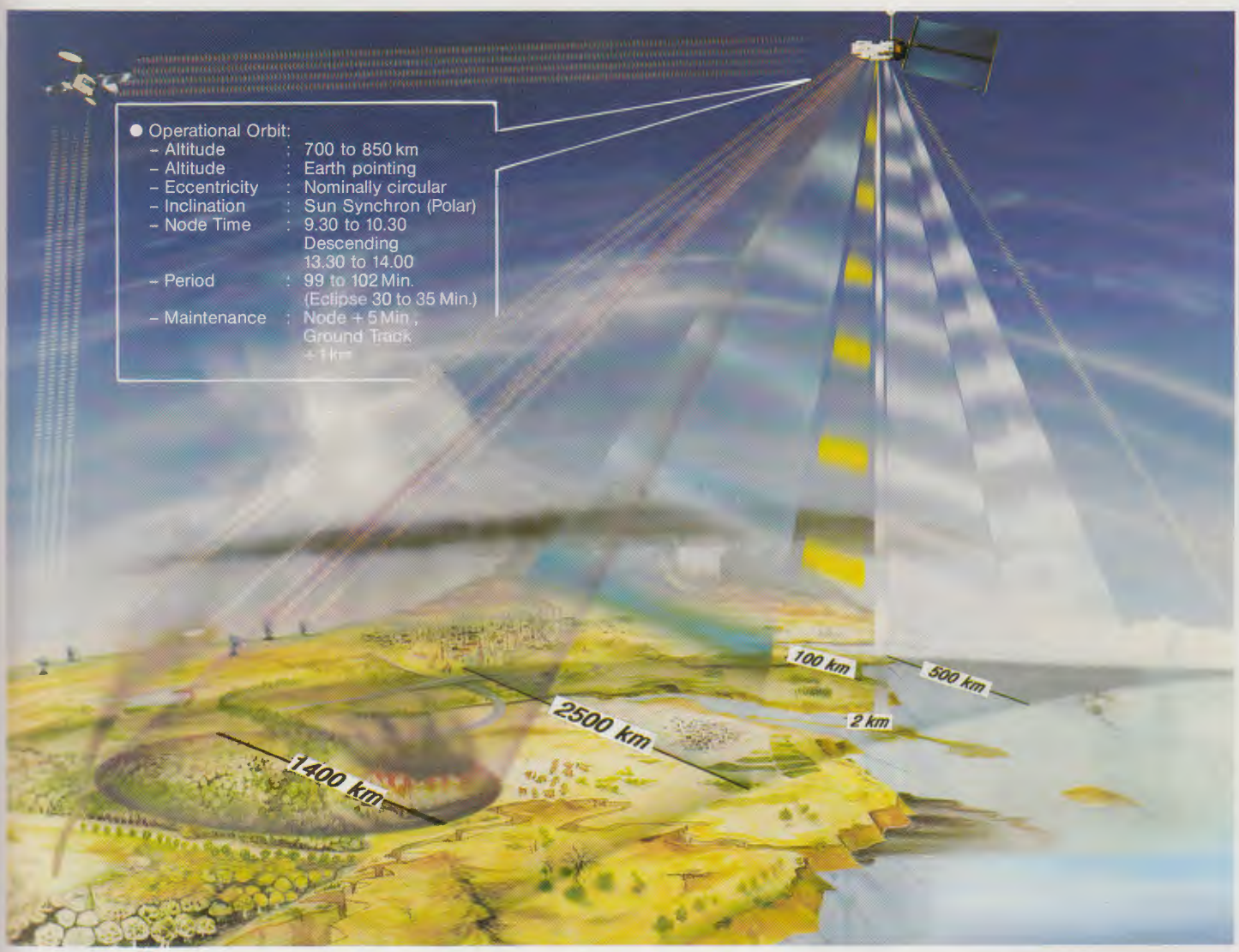
Communications and Tracking

- Nominal Flight Operations
  - Platform system and payload monitoring at 4 Kbps telemetry rate and control at 2 Kbps telecommand rate on S-Band links.
  - Platform tracking by ESA ground stations via S-Band direct to ground link.

- Back-Up Flight Operations
  - Omnidirectional 2 Kbps on S-Band via DRS to/from ground.

- Payload Data Links
  - 10 or 50 Mbps on up to four Ka-Band links via DRS to ground.
  - 5 Kbps on Ka-Band link via DRS from ground.
  - 2 x 50 Mbps on up to three X-Band links direct to ground.

POLAR PLATFORM "B" MISSION SCENARIO



Scientific Mission Objectives

- Investigation of Global Environmental Problems:
  - 'Greenhouse' effect.
  - Ozone depletion.
  - Tropical deforestation.
  - Desertification.
  - Urbanization.
  - Pollution.
- Global Observation of the Earth:
  - Continuous, simultaneous, coherent observation in many spectral bands over long periods of time.
- Zones of Interest:
  - Land.
  - Ocean and ice.
  - Atmosphere and weather.

Figure: 1.1.–2.