

Figure 3.12 (p. 78)

Simplified single conversion transponder (bent pipe) for 6/4 GHz band.

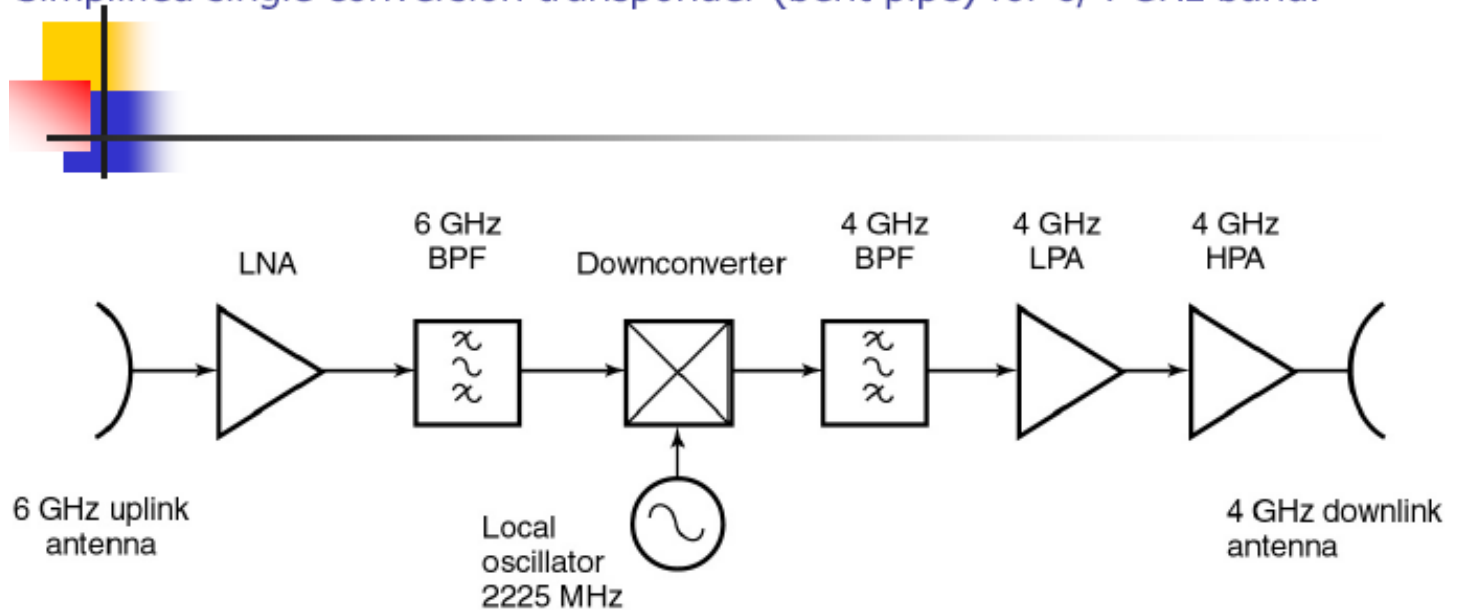
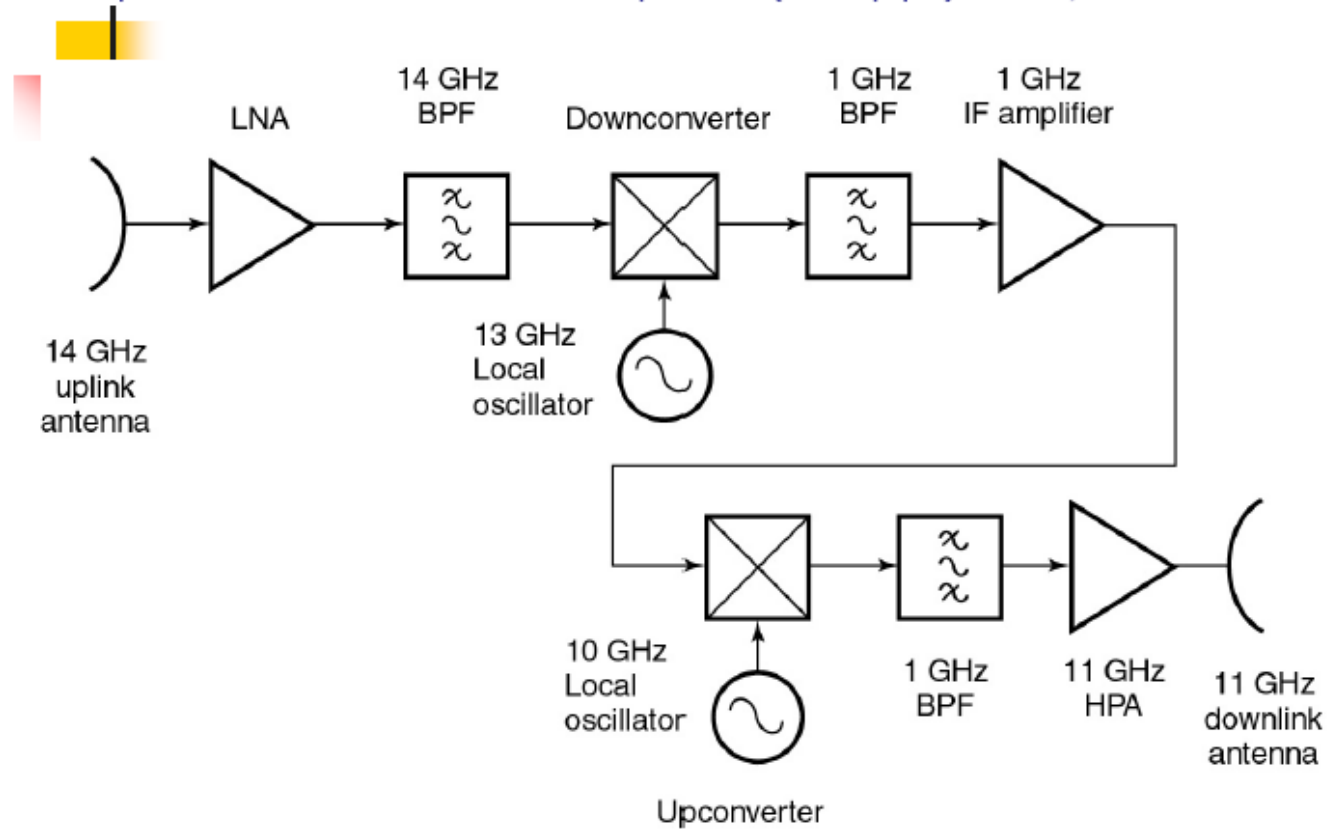


Figure 3.13 (p. 79)

Simplified double conversion transponder (bent pipe) for 14/11 GHz band.



Basic Transponder elements

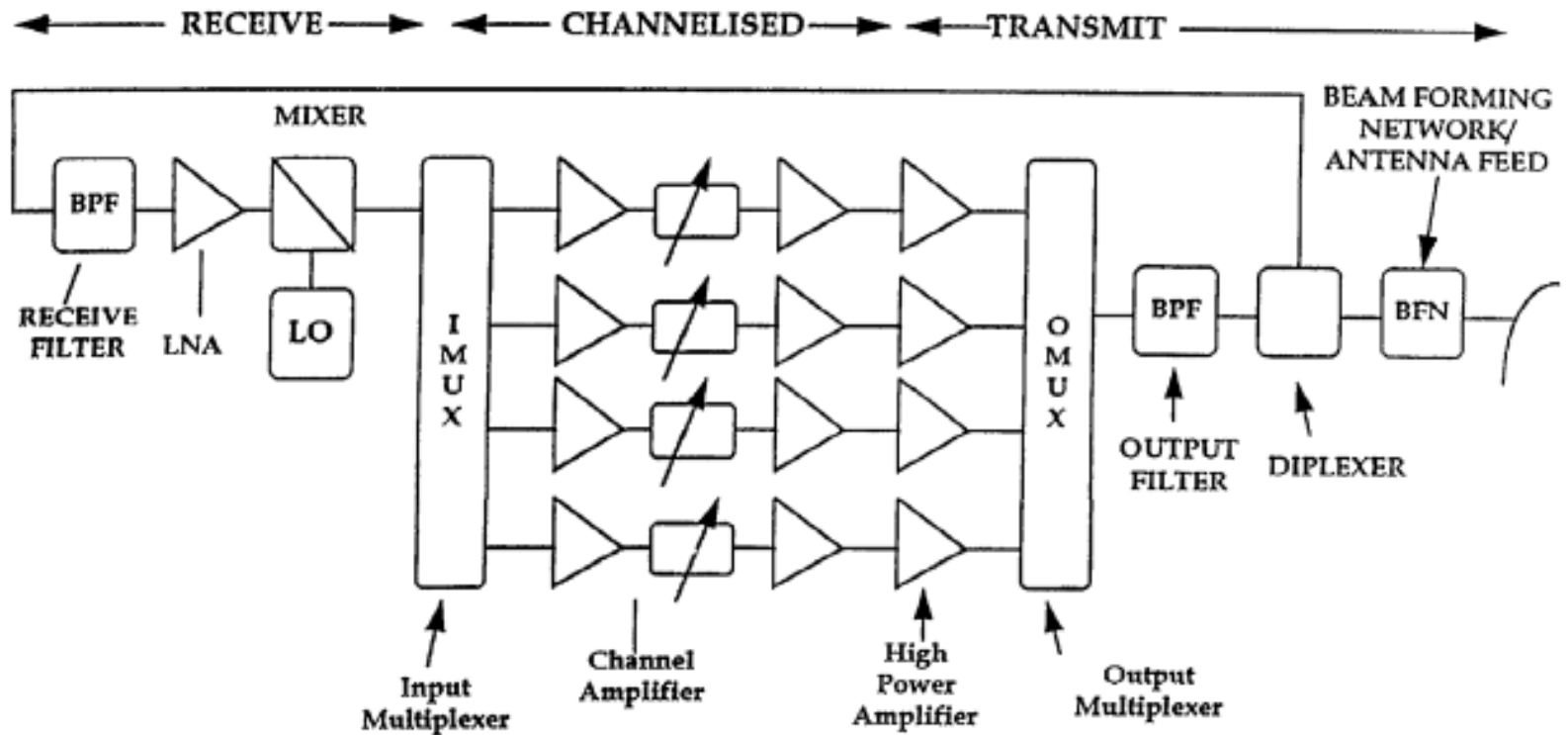
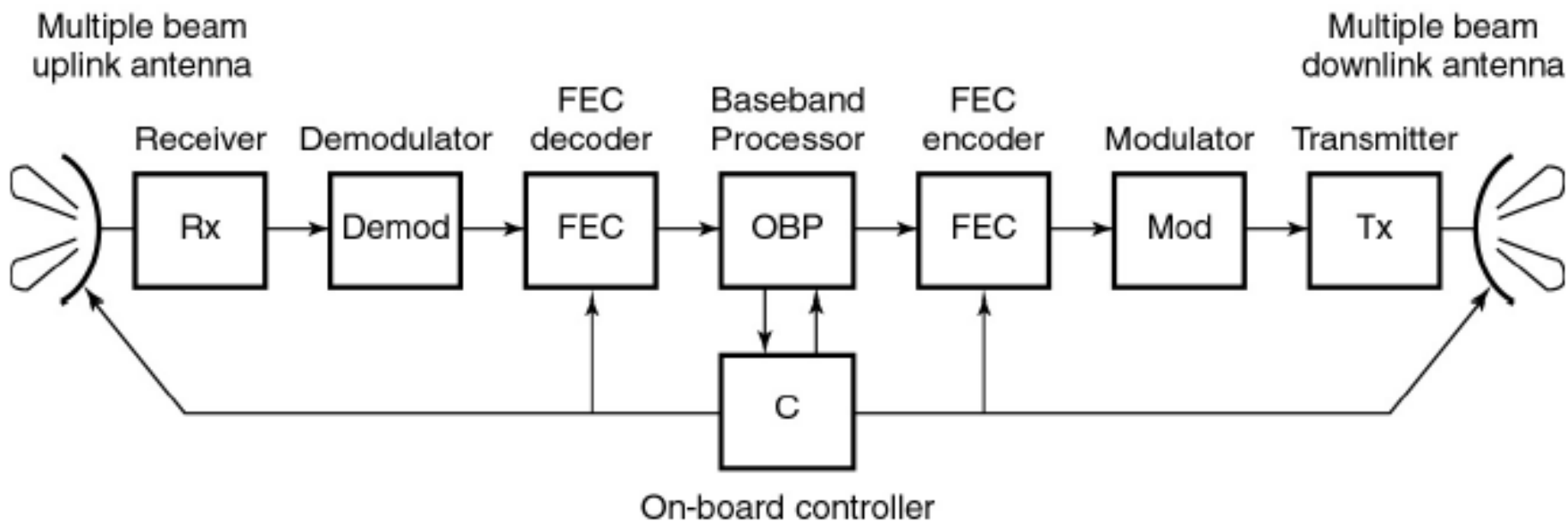
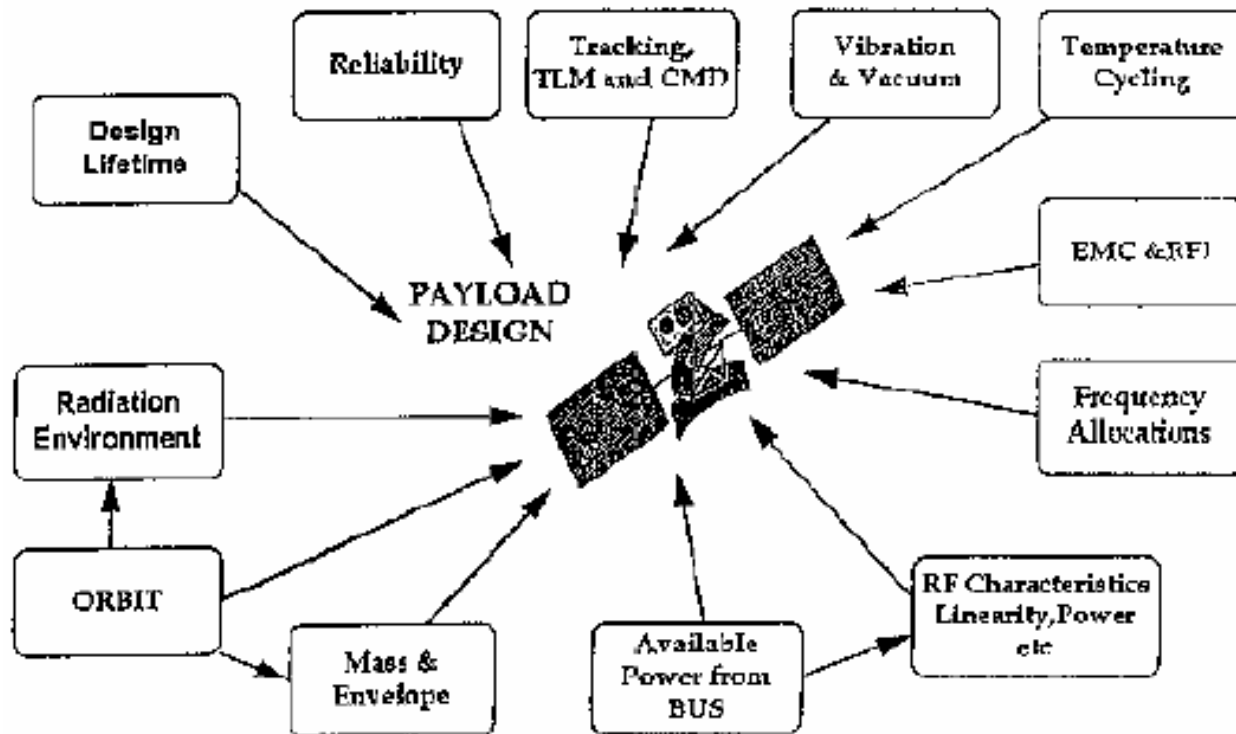


Figure 3.14 (p. 79)
Onboard processing transponder.



Factors affecting payload design





Spacecraft Antennas

- Simple
 - Global beam, $\sim 17^\circ$ beamwidth
 - Low gain, low capacity
- Regional
 - Narrow beam from reflector
 - Antenna, typically $3^\circ \times 3^\circ$ or $3^\circ \times 6^\circ$
- Advanced
 - Multiple narrow beams
 - Stationary, scanned, or “hopped”

Figure 3.15 (p. 80)

Typical satellite antenna patterns and coverage zones. The antenna for the global beam is usually a waveguide horn. Scanning beams and shaped beams require phased array antennas or reflector antennas with phased array feeds.

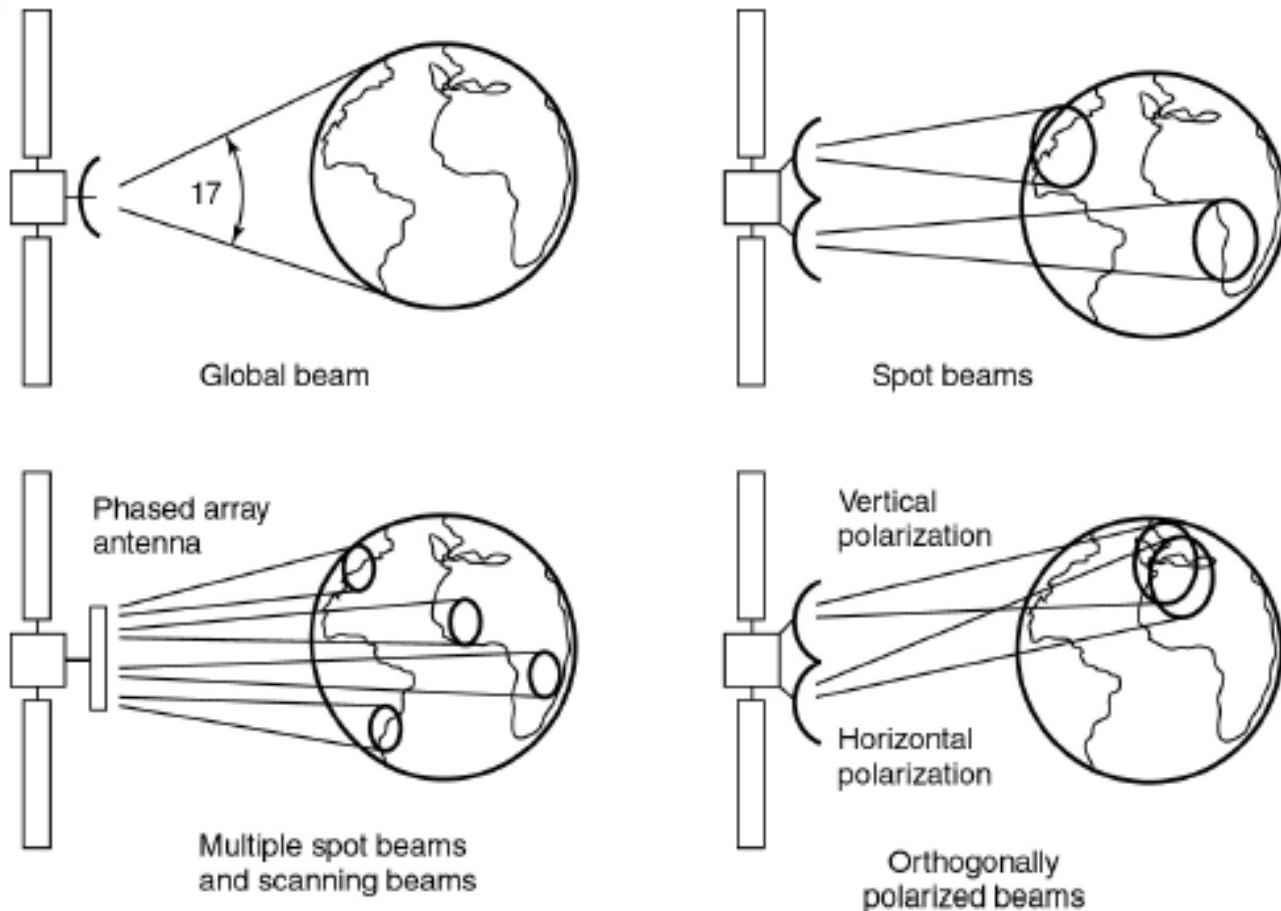


Figure 3.16 (p. 81)

Typical coverage patterns for Intelsat satellites over the Atlantic Ocean.

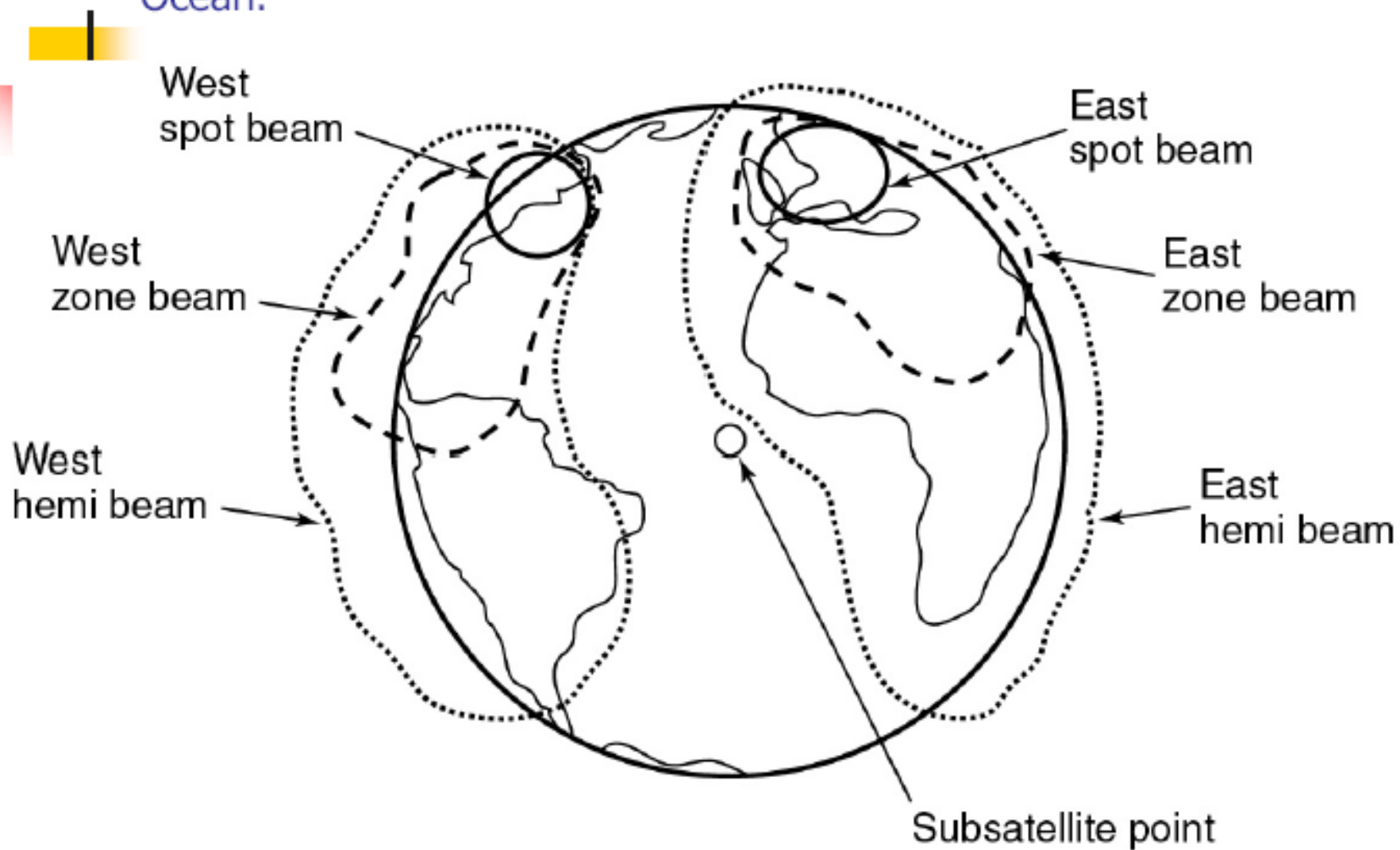


Figure 3.18 (p. 85)
Intelsat VI satellite on station.

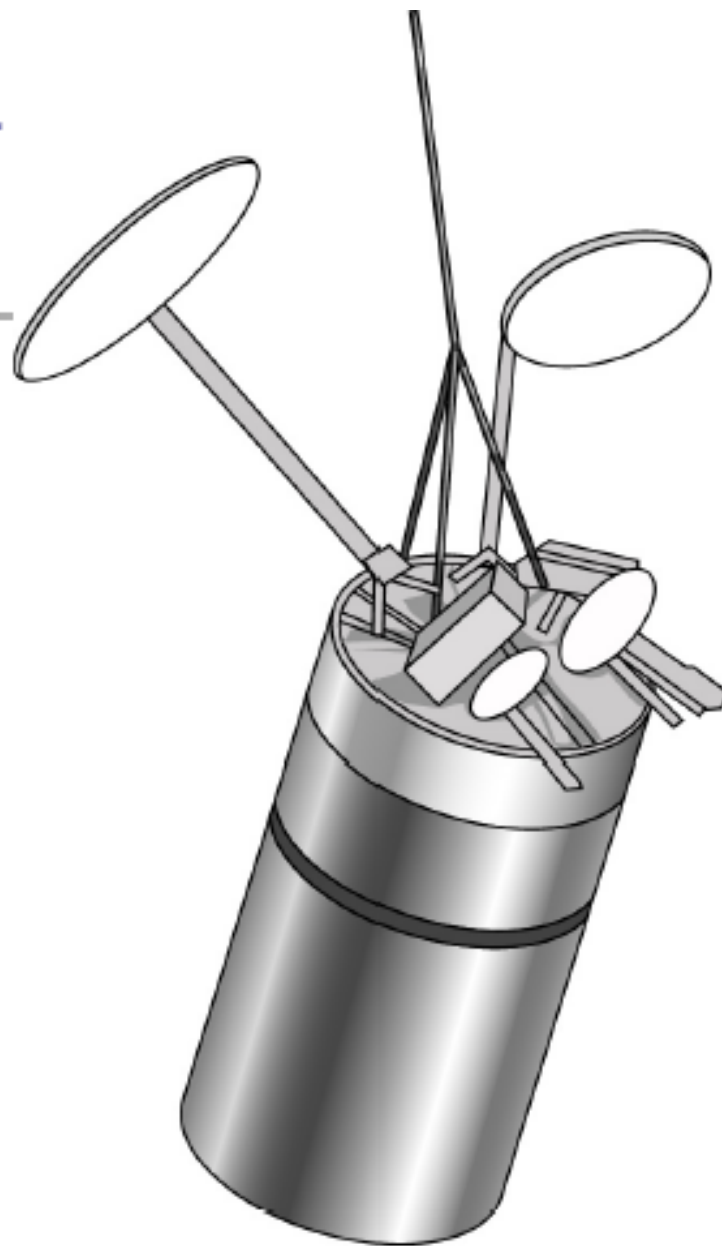
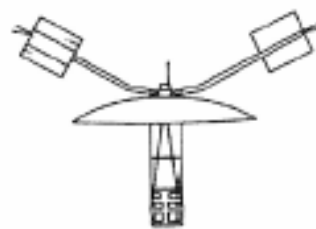
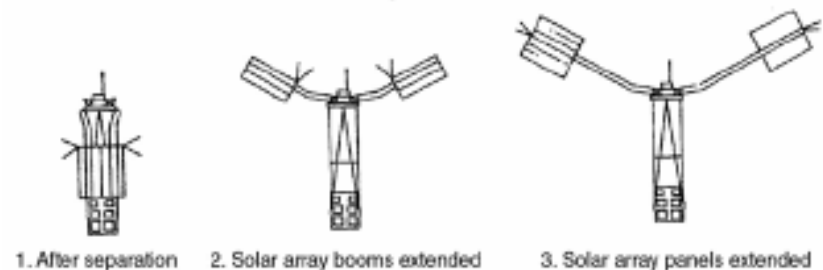
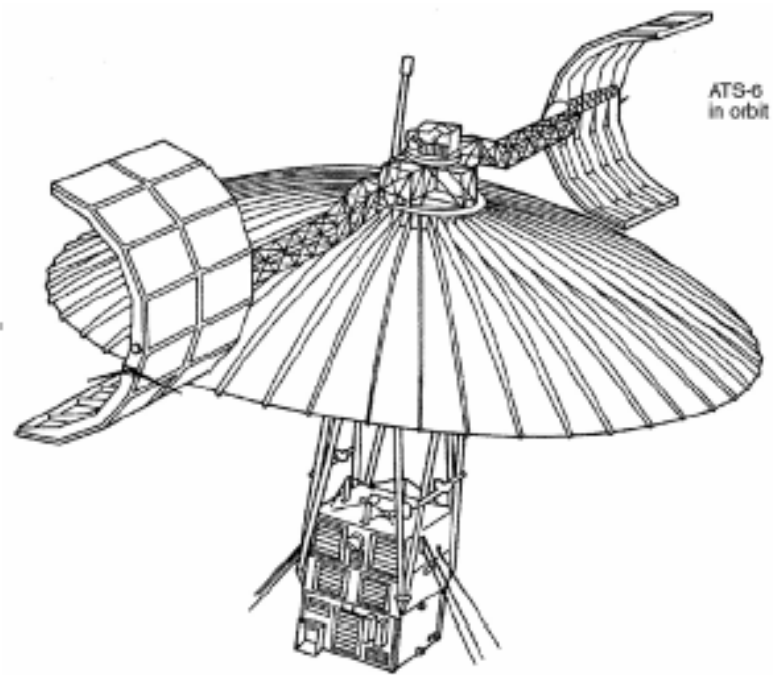


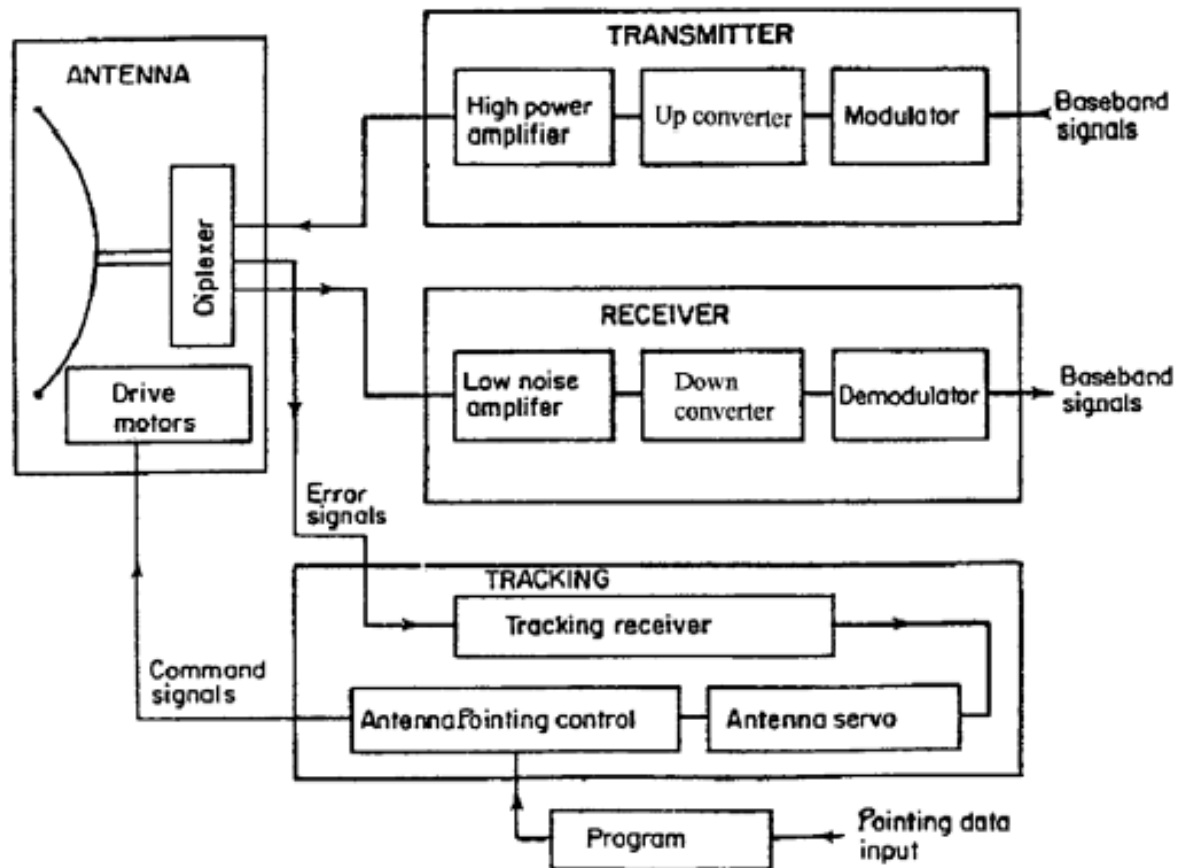


Figure 3.19 (p. 86)

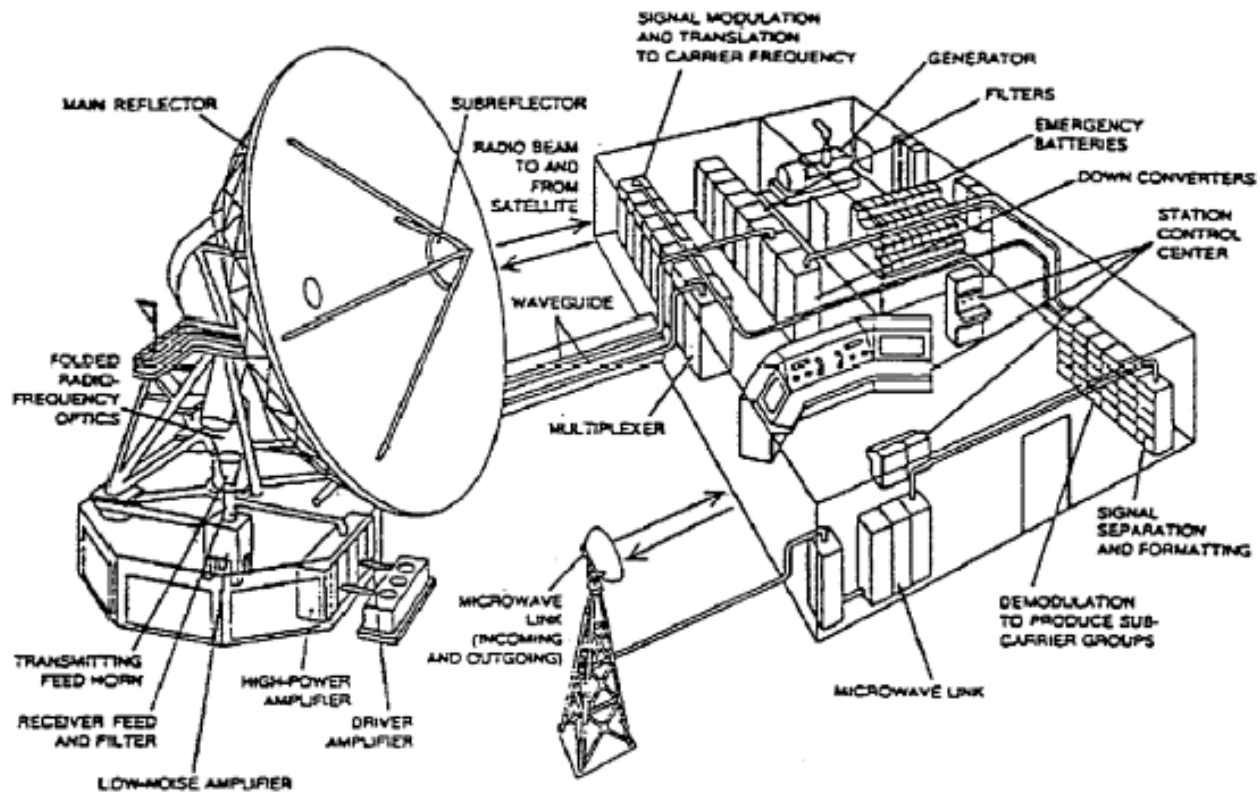
Deployment sequence of ATS-6 10-m antenna. (Courtesy of NASA.)



Earth Station Technology

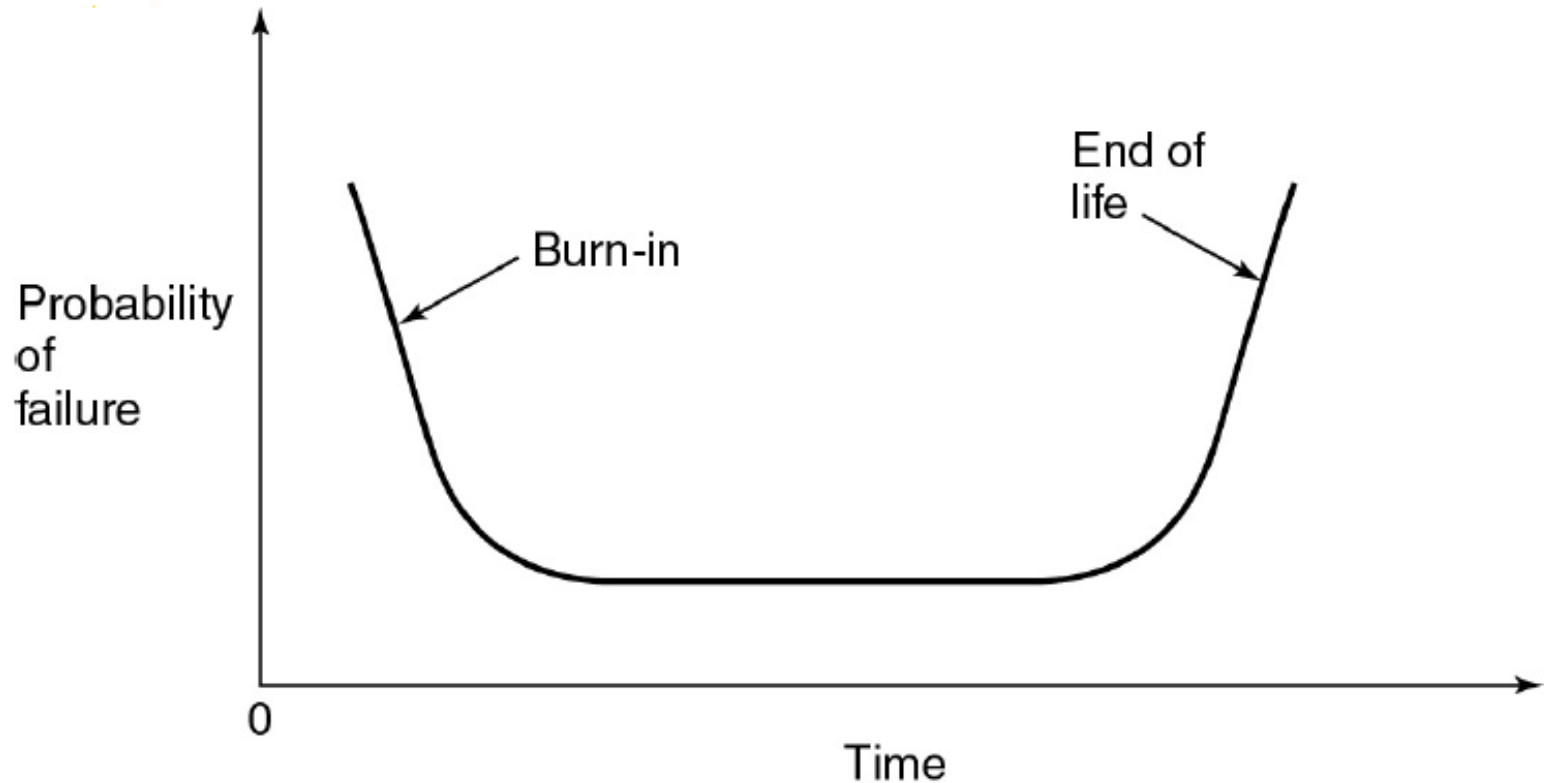


Earth Station Architecture



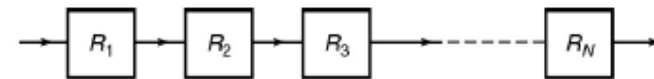
Reliability

Figure 3.20 (p. 89)
Bathtub curve for
probability of failure.

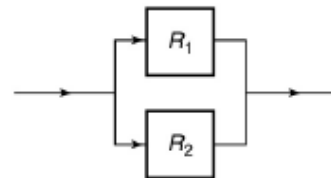


Redundancy

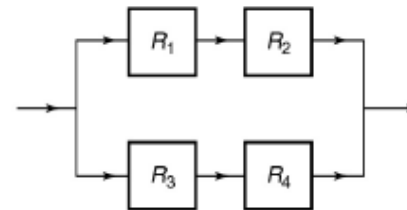
Figure 3.21 (p. 91)
Redundancy connections. (a) Series connection. (b) Parallel connection. (c) Series/parallel connection. (d) Switched connection.



(a)



(b)



(c)

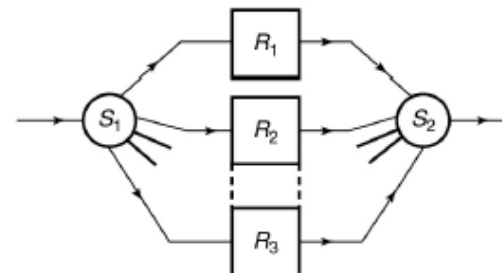


Figure 3.22 (p. 92)

Redundant W/TA configuration in HPA of a 6/4 GHz bent pipe transponder.

