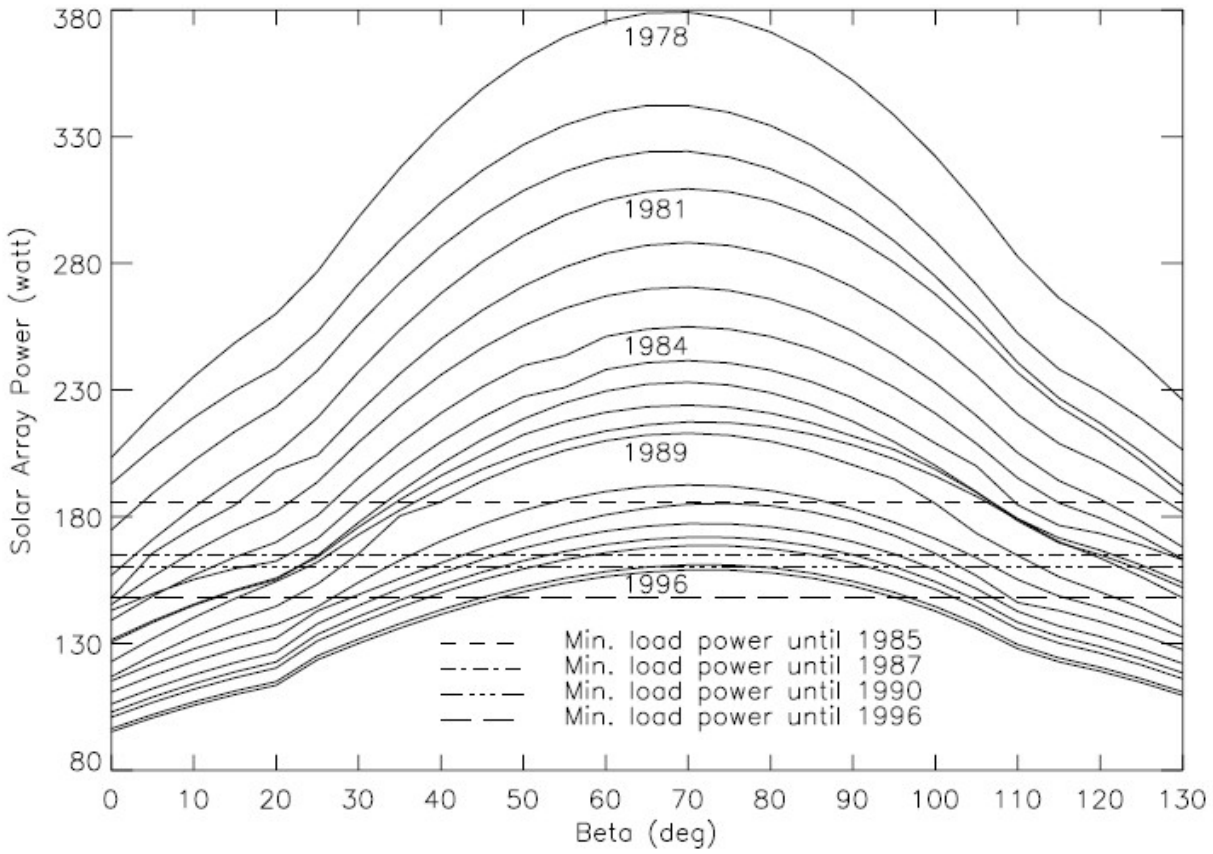
Satellite Power Loss - IUE



The IUE satellite was located in a geosynchronous Earth orbit within the outer magnetiosphere. The above power curves were published in "IUE Spacecraft Operations:Final Report (ESA, 1997, SP-1215) and show the amount of power produced by the solar panels in terms of the orientation angle with respect to the sun (Beta).

Problem 1 - By how much did the maximum solar array power change between 1978 and 1996?

Problem 2 - What is the average slope of this power decline in watts/year?

Problem 3 - What is the percent change in the solar power in percent/year?

Problem 4 - Had the mission continued 5 more years beyond 1996 what would the wattage of the solar panels have been by the end of that time?

Problem 1 - By how much did the maximum solar array power change between 1978 and 1996? Answer: Over the 18 year span of time, the maximum wattage declined from 380 watts to about 160 watts.

Problem 2 - What is the average slope of this power decline in watts/year?

Answer: Slope = (y2 - y1) / (x2 - x1). Then the slope is just m = (160-380)/(18)
so, **m = -12.2 watts/year**.

Problem 3 - What is the percent change in the solar power in percent/year?
Answer: The average amperage during this time is just (380+160)/2 = 270 watts, so the average rate of change of the power is just P = 100% x (-12.2/270)
so **P = -4.5%/year**.

Problem 3 - Had the mission continued 5 more years beyond 1996 what would the wattage of the solar panels have been by the end of that time?

Answer: The number of years since 1978 is just 23, so the power loss from the aging panels was just A = 380 - 12.2 x 23 so **A = 99.4 watts.**