

EARTH ORBIT LASER SYSTEMS

Ja H. Lee
LaRC

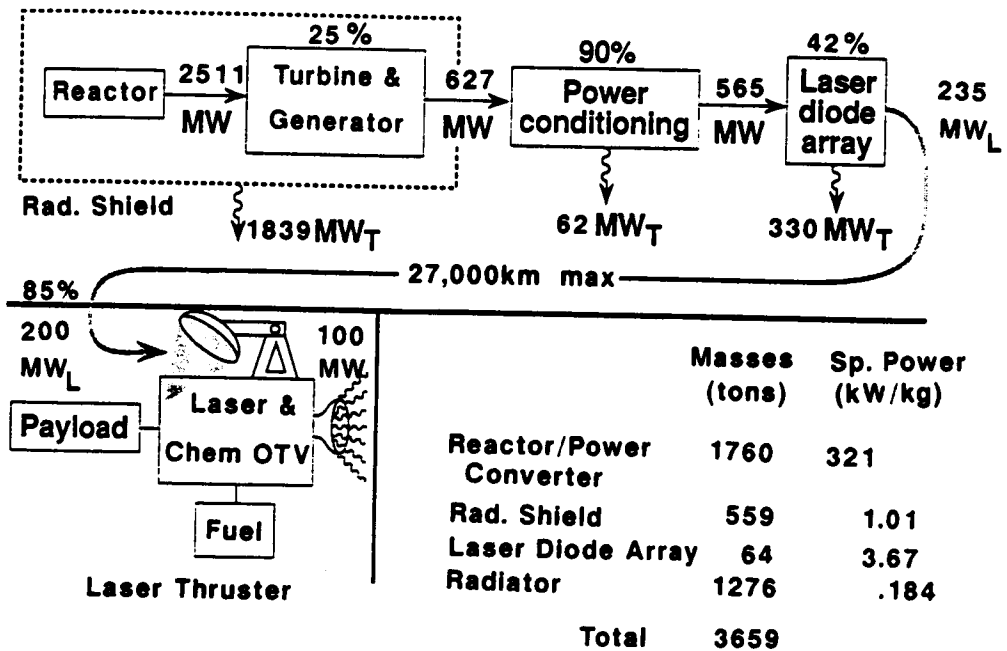
216789
ND210091

35

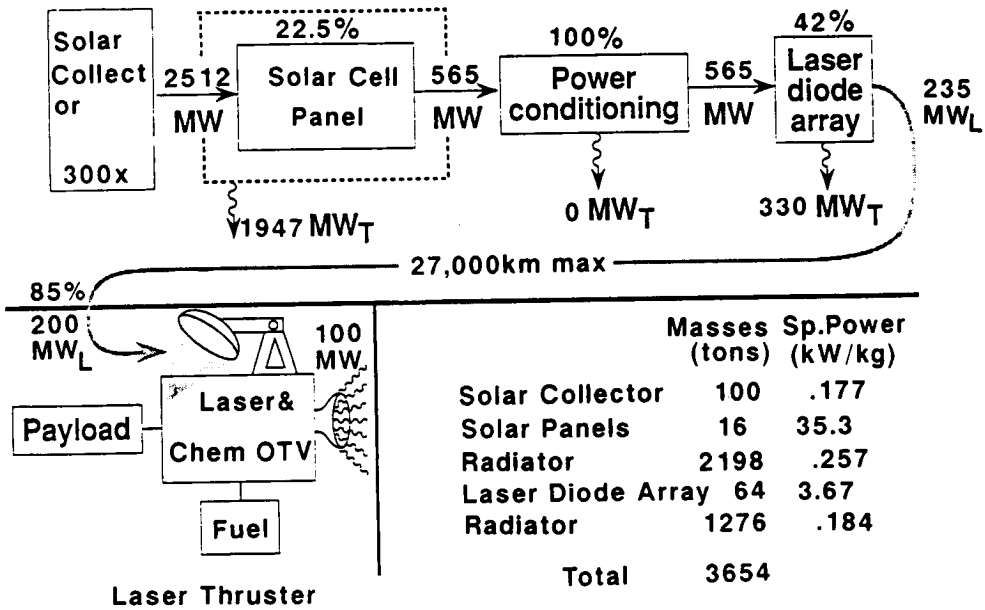
PRECEDING PAGE BLANK NOT FILMED

- Provide 50 ~ 500-MW laser powers for 25 ~ 250-MW thrusters
- Placed on 6,300-km earth orbit for power beaming to laser OTV's
- Laser system options
 - a) Electrically pumped lasers
 - Nuclear reactor driven diode laser amplifier array
 - Solar panel driven diode laser amplifier array
 - Other electric discharge lasers are considered but discarded a priori
 - b) Direct solar-pumped lasers
 - Iodine photodissociation laser
 - Solid-state lasers
 - Liquid lasers

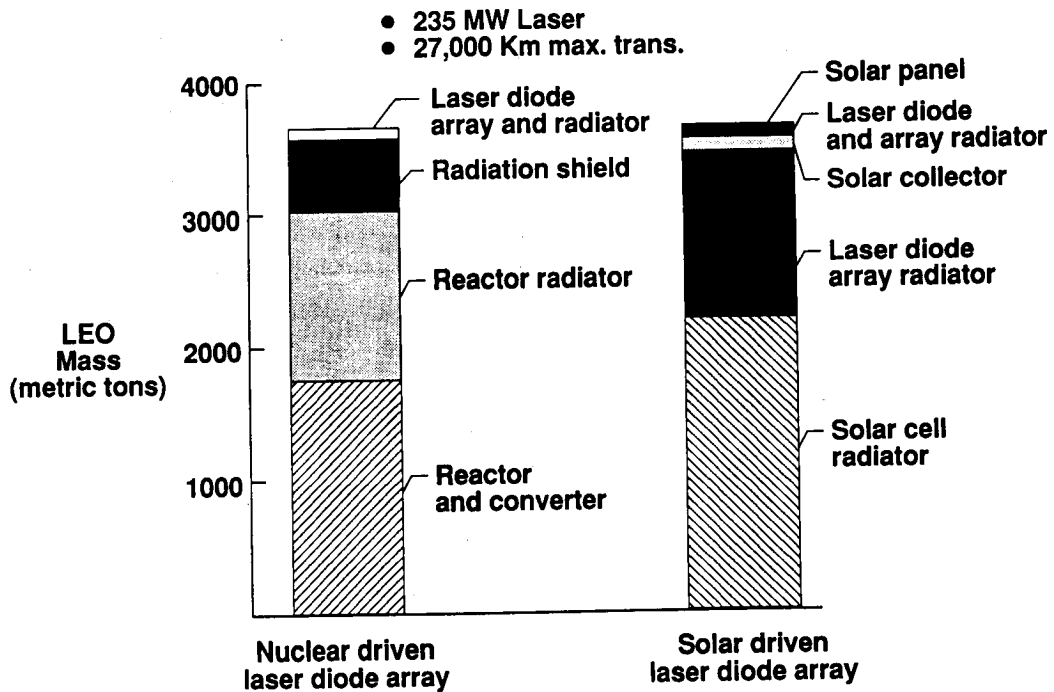
REACTOR DRIVEN LASER POWER TRANSMITTER FOR LEO-TO-LLO OTV



SOLAR DRIVEN LASER POWER TRANSMITTER FOR LEO-TO-LLO OTV

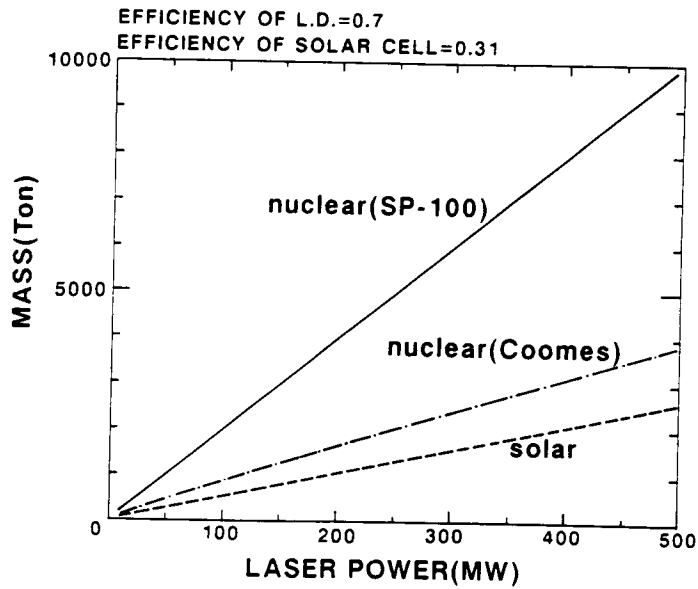
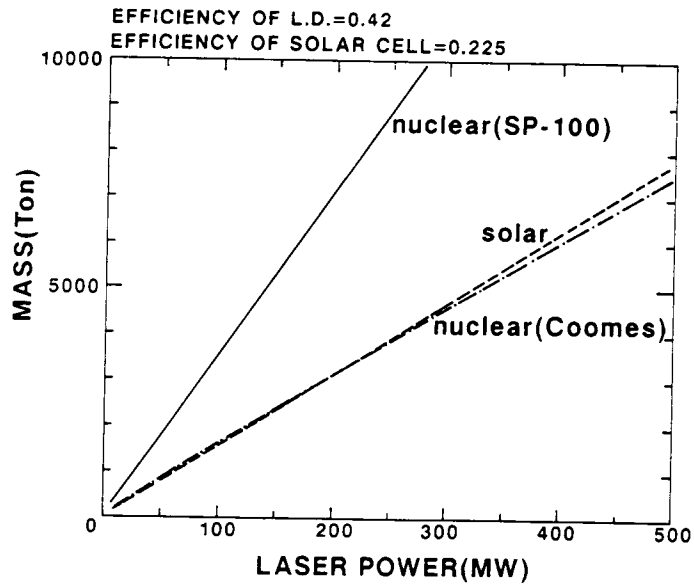


LASER SYSTEMS FOR PROPULSION

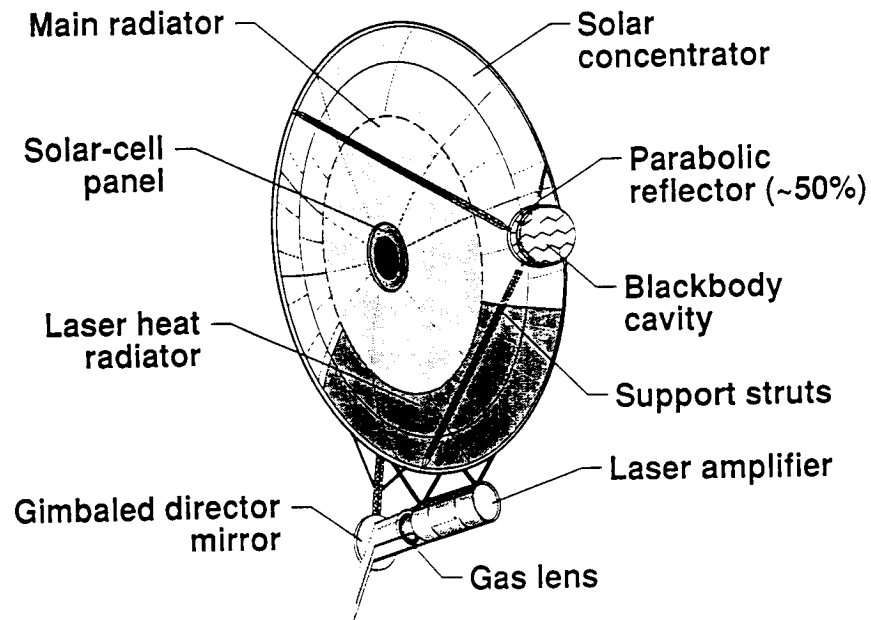


C-5

TRANSMITTER MASS VS LASER POWER



SOLAR DRIVEN LASER POWER TRANSMITTER



SUMMARY

- ✗ At the state-of-the-art efficiencies, both nuclear and solar-driven systems require equal masses for the same laser powers in the 50-500 MW range, typically 3,700 tons for a 100-MW thruster.
- Future efficiency improvement of solar panel and laser diode array will realize significant reduction (by a factor of 3) in system masses.
- Beaming time for laser propulsion is relatively short and other missions should be considered for increasing the system duty cycle.