

## NUCLEAR STAGE MODULE - CLUSTER

### BASIC PROPULSION MODULE

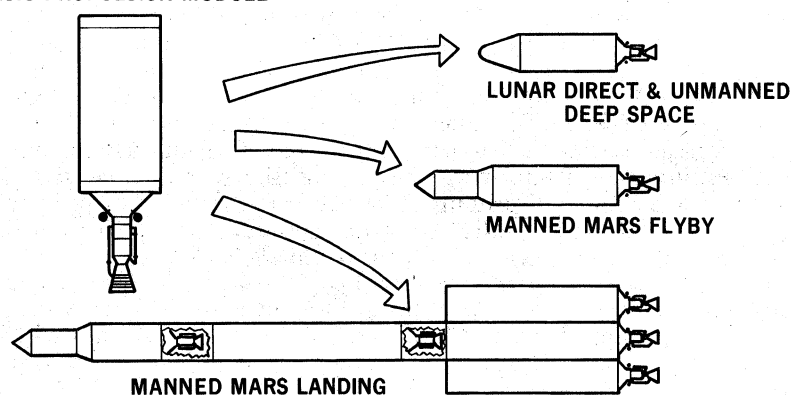


FIGURE 59

if lunar activities became profitable, and it was worthwhile to transport larger and larger payloads, a modular system of nuclear stages could be employed. That utilization would reduce the cost of the transportation system by a factor of about 3. The same modules could accomplish the Mars flyby mission in a more economical fashion. A five module cluster would accomplish the manned Mars landing mission; however about 15 years in leadtime would be required to achieve this mission capability (see fig. 55). Beyond the 3 to 4 years still required for technology improvements, are about 10 more years of development and integration before a basic module can be produced. Then 2 to 3 more years would pass before a cluster capability could be achieved.

These leadtime requirements reinforce the need to begin to advance the basic technologies now. It is still not necessary to make decisions about what kind of hardware to build. And not all of the advance technology requirements have to be resolved at the same time. The urgency, then, is in the need to pursue the technologies for which the most leadtime is required.

Underlying all of the technological requirements for spacecraft and booster systems is the requirement for secondary power. The usefulness of any of the proposed space systems is limited by the availability of secondary power and by the reliability of that subsystem. Spacecraft life depends on secondary power for environmental control, for operating experiments, and for all of the electrical functions associated with spacecraft electronics subsystems. The various sources of secondary power are shown in figure 60.

They are displayed against scales which relate power level (in kilowatts of electricity) to the length of time that each source may be expected to operate.