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TENTATIVE MARINER B DESIGN CONCEPTS FOR USE IN EXPERIMENT PROPOSAL PREPARATION

The following specifications for this mission are the result of a study conducted at JPL. These specifications are to be used for planning purposes and do not necessarily represent a final design of the spacecraft. Two possibilities have been considered. The first consists of a spacecraft with a planetary entry capsule to be separated near Mars. The design distance of closest approach of the spacecraft is 8,000 kilometers, at which time the velocity will be 5 kilometers per second in Martian coordinates. The capsule will land slightly north of the Mars equator, with descent to be accomplished by ablating materials until approximately Mach one velocity is reached, and subsequently by parachute. The parachute descent time is estimated at 10 to 15 minutes. Planetary experiments can be conducted from the capsule or bus. Data from the capsule will be relayed to the bus for retransmission to earth. During capsule descent, and for approximately 30 minutes after landing, the capsule-bus transmission rate is estimated at 2,000 bits/sec. Following a $2\frac{1}{2}$-hour eclipse, communications will be reestablished at 20-200 bits/sec for 10 hours. Data automation storage in the bus is estimated at 2×10^7 bits with an acceptance rate into the storage unit of 2.4×10^3 bits/sec from all experiments. In the Martian vicinity, communication to earth is estimated at 100-200 bits/sec. This necessitates 10 days of subsequent transmission to empty the data automation system.

Weight allocation for experiments on the bus is estimated at 140-180 pounds, exclusive of power and data handling. Forty to fifty pounds is estimated for the capsule. Power estimate for interplanetary cruising is 15 watts for all experiments. During planetary encounter, the power estimate for the bus experiments is 25 watts. Capsule instrumentation power is estimated at 10 watts for 12 hours subsequent to parachute opening.

The above figures represent the most crucial design parameters. Abandonment of the capsule concept, if necessitated by design considerations, would modify the experimental arrangements. An increase of bus experiment instrumentation from 140-180 pounds to 240-280 pounds may occur if the capsule is not feasible. The trajectory would be approximately the same as in the capsule-bus configuration.

The above information has been included to give the experiment proposer some idea of the need on his part to seriously consider minimal weight, power, and communication so that these factors do not unduly influence the final selection of experiments.