PROPOSED CITATION NO.____

NASA EXCEPTIONAL SCIENTIFIC ACHIEVEMENT AWARD - 1971

Dr. Michael A. Minovitch

JET PROPULSION LABORATORY

For inventing and developing the concept of Gravity Thrust Space Travel. This revolutionary concept, formulated in 1961 by Dr. Minovitch at the California Institute of Technology's Jet Propulsion Laboratory, permits space vehicles, launched on relatively low energy initial transfer trajectories, to travel throughout the entire Solar System by substituting conventional rocket thrust with gravitational forces of passing planets. These gravity thrust trajectories can be expressed by sequences of the form $P_o - P_1 - P_2 - \ldots - P_n$, where P_o denotes the initial point or launch planet and P_n denotes the terminal point or arrival planet. He viewed each intermediate planet P_i, as a moving gravitational field which interacts with the vehicle's mass to provide the necessary inertial thrust to reach P_{i+1}. Once the vehicle is launched onto its first leg, all subsequent interplanetary trajectory changes are accomplished essentially free-of-charge by a series of controlled gravitational interactions; control is accomplished by selecting various planetary approach trajectories. Since these gravitational thrust forces increase automatically with vehicle mass, as prescribed by the Newtonian equivalence principle, it does not matter how massive the vehicle is once it is launched. Hence, in this concept of trajectory design, there is no upper limit on the amount of free energy available to carry out interplanetary trajectory changes.

Following his theoretical analysis, Dr. Minovitch initiated a large scale numerical investigation of the concept in 1962. These computations proved that the concept could be employed to significantly reduce launch energies and/or flight times for almost all interplanetary missions, both manned and unmanned, which were designed along conventional direct flight techniques previously thought to be optimal. All currently planned interplanetary missions involving free-fall multiple planetary encounters such as Earth-Venus-Mercury and the Grand Tour missions planned for the latter part of this decade are vivid demonstrations of his concept and its impact on the field of interplanetary trajectory design. Dr. Minovitch thus discovered a method for interplanetary space travel which derives its energy from the essentially inexhaustable and infinite orbital energies of the various planets.

Contact: Dr. C. R. Gates
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For the invention and development of the concept of gravity thrust space flight which form the basis for the multiplanet missions planned for the seventies. He did the first theoretical and numerical work that demonstrated the many significant advantages of multiplanet travel.

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