

(2) *Frog Otolith Function*.—To determine the adaptability of the otolith or balance system to weightlessness and acceleration due to rotation.

(3) *Meteoroid Impact and Erosion*.—Obtain data on the flux of micro-meteoroids and their effect on optical surfaces.

(4) *Jet Shoes*.—Determine the feasibility of using reaction-jets mounted on shoes for astronaut maneuvering in space.

(5) *Meteoroid Velocity*.—Measure the impact velocity and penetration depth of meteoroids in soft aluminum.

(6) *Heat Pipe*.—Study the feasibility of transferring heat from one place to another during weightless flight by means of a fluid circulating through pipes.

MEDICAL EXPERIMENTS

In addition to biomedical and physiological studies, the medical experiments will provide information and knowledge necessary to improve living conditions for man in space and enable him to live and work comfortably in space for long periods of time.

Medical experiments and their objectives are as follows:

(1) *Vectorcardiogram*.—Measure the electrical activity of the astronauts' hearts to determine any effects due to weightless flight.

(2) *Metabolic Activity*.—Measure changes in man's metabolic effectiveness during space flight.

(3) *Cardiovascular Function Assessment*.—Determine weakening of man's blood circulation system due to weightless flight.

(4) *Bone and Muscle Changes*.—Assess alteration in man's bone and muscle systems during orbital flight.

(5) *Human Vestibular System*.—Investigate the effects of weightlessness on man's balance system.

(6) *Time and Motion Studies*.—Make time and motion studies of astronauts performing tasks in orbit.

(7) *Habitability/Crew Quarters*.—To evaluate the habitability of large crew quarters as compared to the more restricted quarters of previous spacecraft.

ENGINEERING EXPERIMENTS

Engineering experiments and their objectives are as follows:

(1) *Mapping and Survey System*.—Conduct comprehensive photographic study of the lunar surface from lunar orbit.

(2) *Space Suit Evaluation*.—Evaluate several different types of space suits in terms of mobility, comfort, etc.

(3) *ST-124 Stable Platform Removal*.—Remove components of the Guidance and Navigation system from the Instrument Unit during orbital flight to obtain experience in space maintenance.

(4) *Zero Gravity Flammability*.—To determine the propagation of flames along the surface of combustible materials and the relative effectiveness of several extinguishing agents.

(5) *Astronaut EVA Equipment*.—To evaluate the effectiveness of various tethers, restraints, and hand hold devices.

(6) *High Pressure Gas Expulsion*.—To determine the liquification characteristics of high pressure gas during prolonged blow-down in zero gravity.

(7) *Heat Exchanger Service*.—Formulate acceptable heat exchanger servicing procedures for use in extended missions of the future.

(8) *Tube Joining Assemblies*.—Develop and demonstrate tube joining maintenance operations during space flight.

(9) *Electron Beam Welding*.—Develop and demonstrate plate welding maintenance operations in space flight.

DEPARTMENT OF DEFENSE EXPERIMENTS

Experiments conducted for the Department of Defense and their objectives are as follows:

(1) *Carbon Dioxide Reduction*.—Determine the operational capabilities of a solid electrolyte carbon dioxide reduction system in a zero gravity space environment.