

(2) *Integrated Maintenance*.—Evaluate factors of equipment maintainability in-orbit including tools, crew restraints, illumination levels, and the timelines and procedures for performing specific maintenance tasks.

(3) *Suit Donning and Sleep Station Evaluation*.—Evaluate the time required and techniques for pressure-suit donning starting from the restrained sleeping position.

(4) *Alternate Restraints Evaluation*.—Evaluate various crew restraint devices for use in both operating and maintaining equipment.

(5) *Expandable Airlock Technology*.—Demonstrate the feasibility of expandable structures in an earth orbital environment and evaluate the functional characteristics of an airlock design based on this technology.

(6) *Expandable Reentry Structures*.—Demonstrate the ability of an astronaut to deploy and lock or rigidize an expandable reentry capsule structure.

Typical Experiments

SCIENTIFIC

The X-ray Astronomy experiment is a typical scientific experiment. The purpose of the X-ray Astronomy experiment will be to continue the study of X-ray sources outside our solar system. These sources cannot be studied from the earth's surface because of the influence of the atmosphere on absorbing the X-rays. Specific objectives will be to determine the positions of the known X-ray sources very accurately to within less than a tenth of a degree; to measure the X-ray spectrum of the stronger sources; and to observe discrete objects of astronomical interest such as strong radio emission centers, the galactic center and nearby galaxies for evidence of X-ray emission.

These scientific data will be gathered by using a high sensitivity, high resolution detection system. The system will shed light upon the nature of these sources and provide experimental observations for comparison with theoretical predictions.

TECHNOLOGICAL

The Jet Shoes experiment is a typical technological experiment. The potential importance of extravehicular activity (EVA) in space operations such as repair, rescue, multiple rendezvous, refueling, etc., makes it desirable that the astronaut be provided with a natural, simple, and reliable means of mobility. The Jet Shoes concept shows promise of providing the desired type of mobility in a manner closely related to walking.

The Jet Shoes concept involves placing jets on the soles of the astronaut's shoes. These jets are activated on demand by using the toes to depress a switch, and the more or less instinctive movement of the feet and legs is used to direct the jets and produce locomotion in the desired direction. Because the jets are directed and controlled by the feet, both hands are free for any tasks that are required.

Utilization of the large enclosed volume of the S-IVB Workshop is ideal for a safe yet practical evaluation of the Jet Shoes concept. The experiment involves having an astronaut perform a series of maneuvers within the confines of the Workshop to demonstrate the feasibility of the concept and to gain experience and confidence in the use of the jet shoes. The maneuvers will first be performed without a space suit in a shirt sleeve environment, and later, in a pressurized space suit for a realistic evaluation of the concept under the identical conditions of true "space walking".

MEDICAL

A typical Medical Experiment is the Metabolic Activity experiment. The purpose of the Metabolic Activity experiment is to determine man's metabolic effectiveness in doing mechanical work under exposure to the space environment; and comparing this effectiveness with identical physical activities under the influence of earth's gravity. A great deal is known about the relationships between the rate of doing work utilizing muscular effort. However, this wealth of information pertains to measurements done on the earth's surface and under the influence of the force of gravity.

To obtain this comparison of work in space and on earth, it is planned to measure man's metabolic rate as related to his work output in space. This can