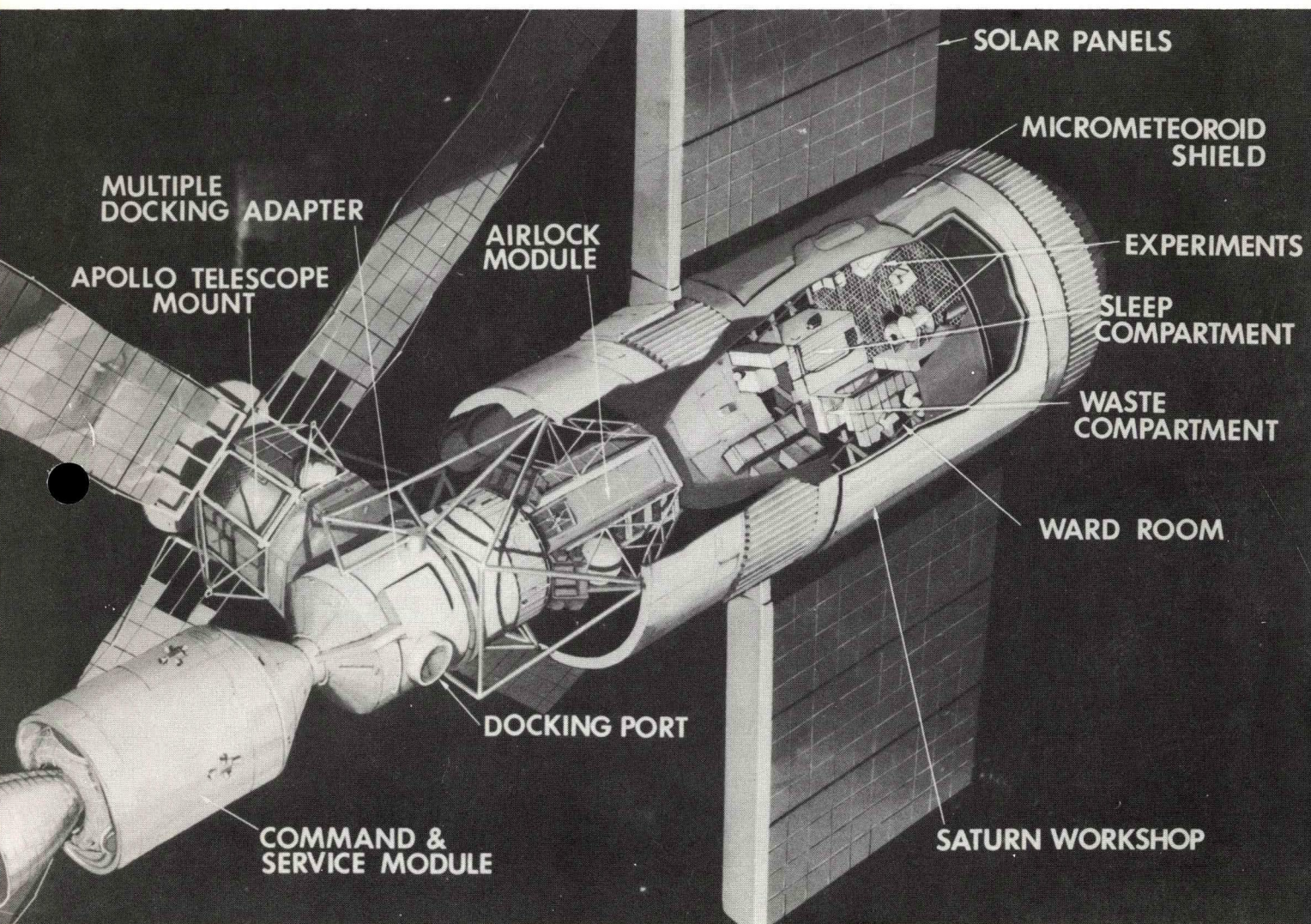




SKYLAB



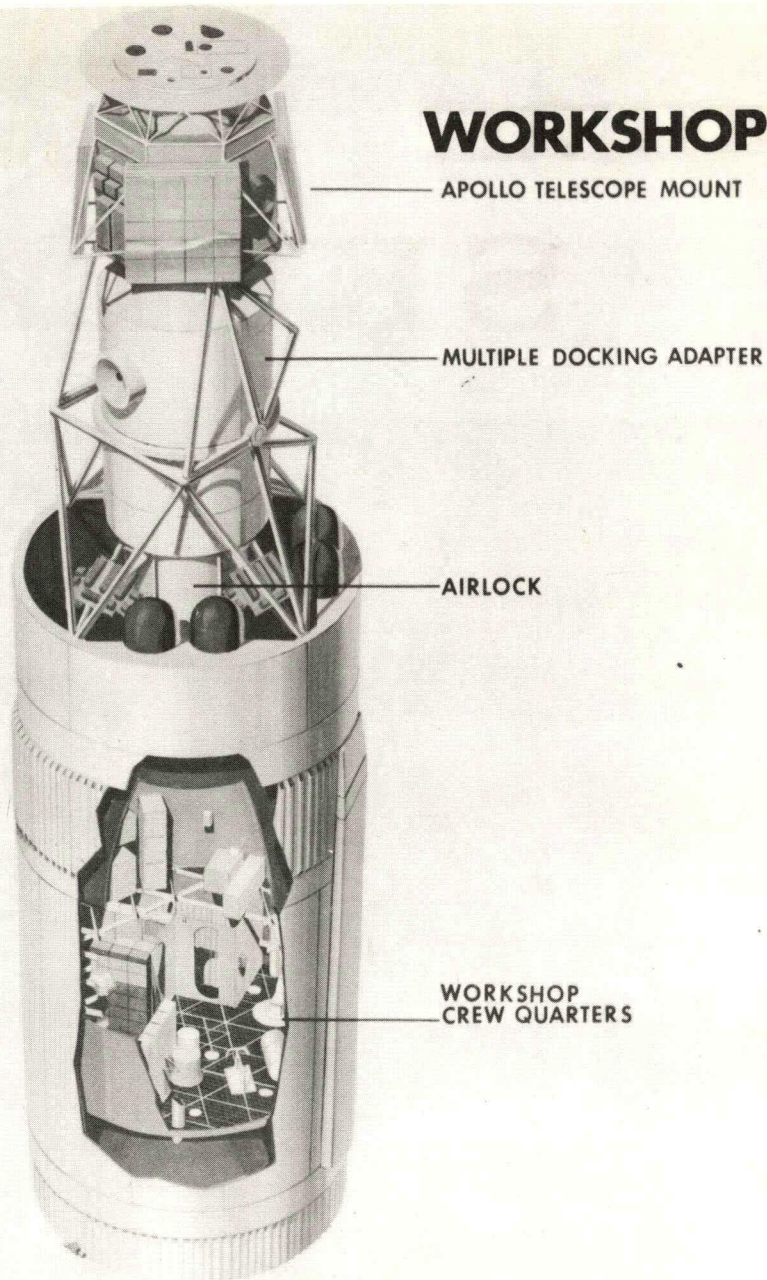
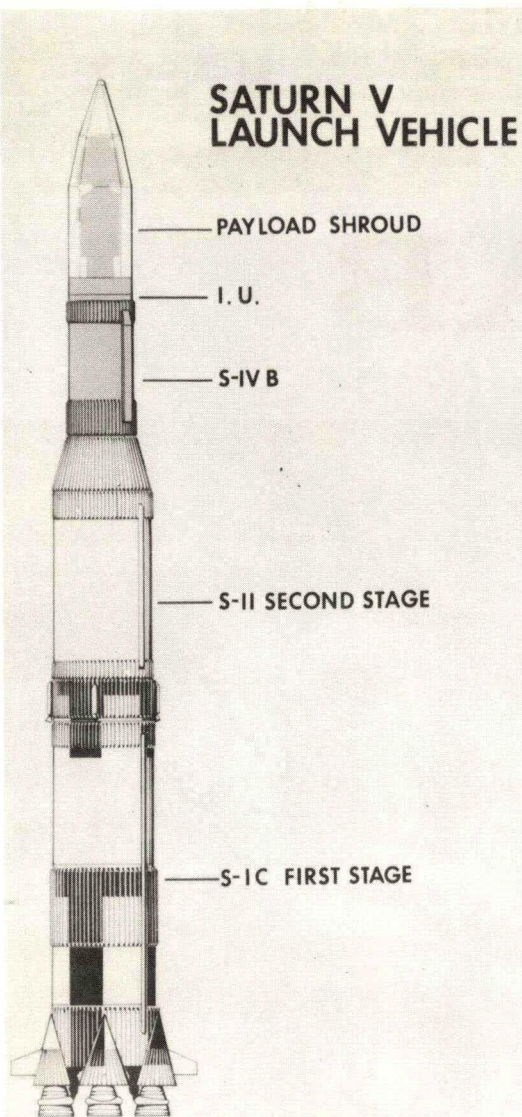
Scheduled to begin a series of flights late in 1972, the Skylab Program is expected to provide many of the answers needed in the development of large, permanent space stations.

How will the human body react to weightlessness in flights of almost two months' duration?

What types of work can man perform during these extended periods of weightlessness?

What services can best be provided by space stations?

Because of its unique design, which incorporates the huge third stage of the Saturn V launch vehicle, providing an orbiting facility equal in size to a medium sized home on earth, Skylab is expected to put the United States firmly on the road toward development of permanent space stations truly beneficial to mankind.



The third stage of the Saturn V will be completely outfitted on the ground to serve as a spacecraft rather than a stage. The first two stages of the Saturn V will place the structure in earth orbit along with an attached solar observatory called the Apollo Telescope Mount.

With 10,000 cubic feet of interior space, the liquid hydrogen tank of the third stage will have sufficient roominess for kitchen, bath, bedroom, and workroom facilities. Because it is a rocket stage, the structure is naturally qualified to withstand the stresses of launch. It is also strong enough to withstand much higher pressure loadings than are necessary to maintain a shirt-sleeved environment in the vacuum of outer space.

Quarters for the crew will be constructed inside the huge tank. Partitions will divide the various rooms. In the waste management and food management compartments, steps will be taken to control odors and particles.

A thermal control and ventilation system will give the astronauts freedom to select comfortable temperature ranges.

The environmental system will consist of an oxygen-nitrogen combination and will extend throughout the Skylab cluster. Internal pressure will be maintained at a comfortable level. Fans will circulate the internal atmosphere to keep the temperature constant.

Electrical power sources are located in large solar array and battery systems.

Saturn IB launch vehicles no longer needed in the Apollo program will be used. Apollo spacecraft and Saturn V launch vehicle will be borrowed from Project Apollo.

Since Skylab makes maximum use of Saturn hardware that is already designed, tested, flown in space, and on the production line, a substantial savings is realized without sacrificing quality or safety.

COMPONENTS OF THE WORKSHOP

Only two major pieces of new equipment are required to convert an S-IVB stage into the workshop: an airlock and a multiple docking adapter for astronaut access.

The airlock is a five and one-half foot diameter circular tunnel that is attached to the top of what was the liquid hydrogen tank. It forms a passageway for the astronauts to enter the main area. It can also be depressurized and sealed off for exit into space outside the vehicle.

The multiple docking adapter is attached to the outside end of the airlock and provides docking ports where the astronauts' spacecraft, flown up from earth, can be attached. The multiple docking adapter is 10 feet in diameter and 17 feet long.

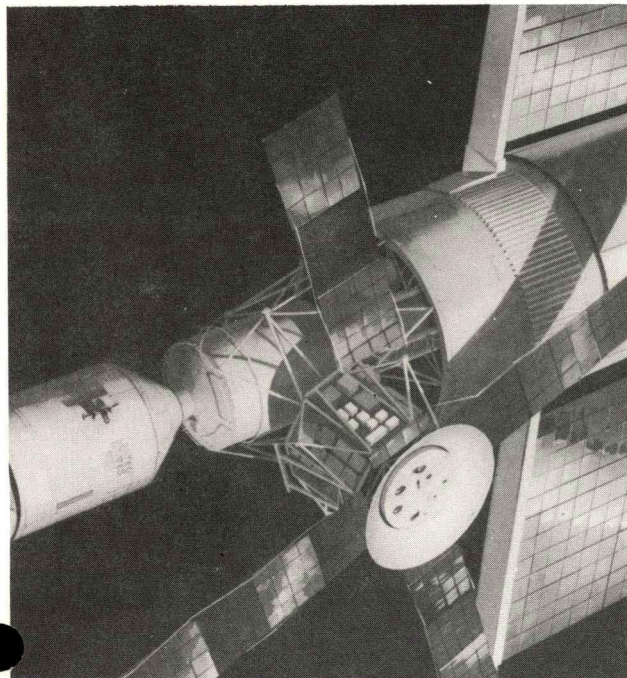
APOLLO TELESCOPE MOUNT

The Apollo Telescope Mount will be attached to the multiple docking adapter during ground assembly. Essentially, the ATM is a manned solar observatory which can be aimed with pinpoint accuracy and provides several large instruments for making studies and observations of the Sun from above the earth's protective but distortive atmospheric blanket.

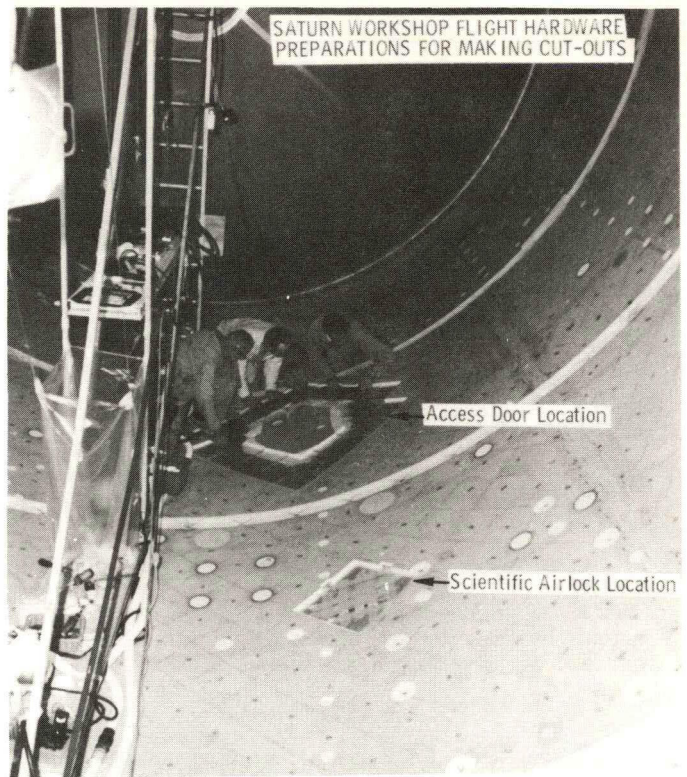
The ultimate source of all energy on the earth is the Sun.

In this century, the rate of increase in use of energy by the world's people has been tenfold and the trend toward increased consumption is continuing. Approximately 32,000 times as much energy as the human race uses reaches the earth's surface each year from the Sun. An efficient means of harnessing a portion of this energy would go far towards solving the world's energy problem.

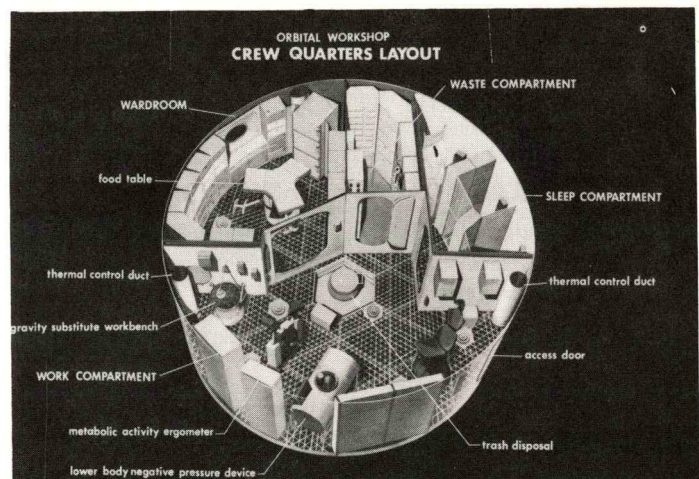
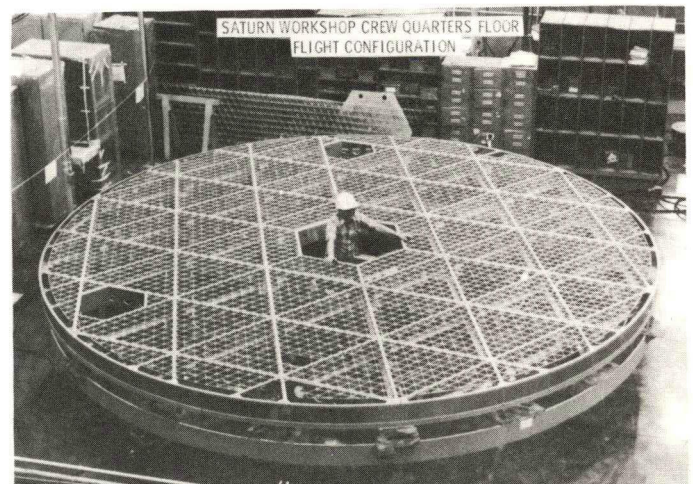
The Skylab's manned solar observatory provides a new and exciting tool for studying the Sun and conducting experiments regarding the solar phenomena, because only a small portion of the full range of the Sun's radiation penetrates the earth's atmosphere.



APOLLO TELESCOPE MOUNT WITH SOLAR PANELS DEPLOYED



TANK INTERIOR, OUTFITTING OF STRUCTURE FOR CREW QUARTERS AND WORK AREA.



SKYLAB EXPERIMENTS

A long list of experiments is being compiled for Skylab flights. Responsibilities for coordinating these experiments are being assigned to principal investigators at various universities, laboratories, and NASA centers across the U. S.

The various categories of experiments are as follows:

WORKSHOP HABITABILITY

The purpose here is simply to obtain and evaluate information about the living quarters and environmental systems in order to improve the design of future spacecraft and space stations.

MEDICAL

Medical experiments are planned to determine the effect of long-duration orbital flight on the crew. Some of the major areas include nutritional and musculoskeletal function, cardiovascular function; hematology and immunology, neurophysiology, pulmonary function, and metabolism.

SOLAR ASTRONOMY

The Apollo Telescope Mount contains the hardware for solar astronomy scientific experiments. These instruments are the largest and most complex ever designed for use in earth orbit. Special emphasis is placed on observations that are impossible on earth because of the atmospheric blanket. The ATM has precision pointing ability for eight major solar experiments from which scientists hope to obtain a better understanding of the Sun, which is the source of all available energy for life on earth.

ASTRONAUT MANEUVERING

These experiments are designed to evaluate the ability of the astronauts to work and move about both inside the Skylab cluster and in extra-vehicular activities. The working and maneuvering equipment will be thoroughly appraised.

BIOSCIENCE

Several experiments are planned to study the influence of zero gravity on human cells, plants, small mammals, and insects.

EARTH RESOURCES

This very important series of experiments will help develop the sensors and photographic equipment necessary to support the expanding earth resources program. Data will be gathered on earth surface composition and condition to determine the extent to which these methods may be used in the future for the benefit of all mankind.

EXTERNAL CONTAMINATION MEASUREMENTS

Changes in the space near Skylab due to waste dumps, thruster firings, and other factors will be measured. Several other measurements will be taken including the distribution of micrometeorites.

STELLAR GALACTIC ASTRONOMY

Spectral photographs of selected star fields will be taken and a survey for low energy galactic X-rays will be made.

MATERIALS TECHNOLOGY

Characteristics of metals and other materials will be studied in zero gravity condition.

MISSION SEQUENCE

In the flight sequence, the fully outfitted, but unmanned workshop, with ATM attached, will be launched into orbit by two stages of the Saturn V.

The Apollo spacecraft, command and service modules, with three astronauts aboard, is launched separately on a Saturn IB.

The astronauts will rendezvous with the workshop and dock to one of the ports in the multiple docking adapter. They move into the docking adapter, through the airlock, and then into their future home in space -- the interior of Skylab. With docking of the Apollo spacecraft, the Skylab cluster will be complete.

The first crew of astronauts is scheduled to remain in Skylab for 28 days. A second mission will be flown to the same Skylab for a duration of 56 days, followed by a third mission of the same length. Other missions have been discussed. Since Skylab is a reusable facility, mission scheduling is flexible.

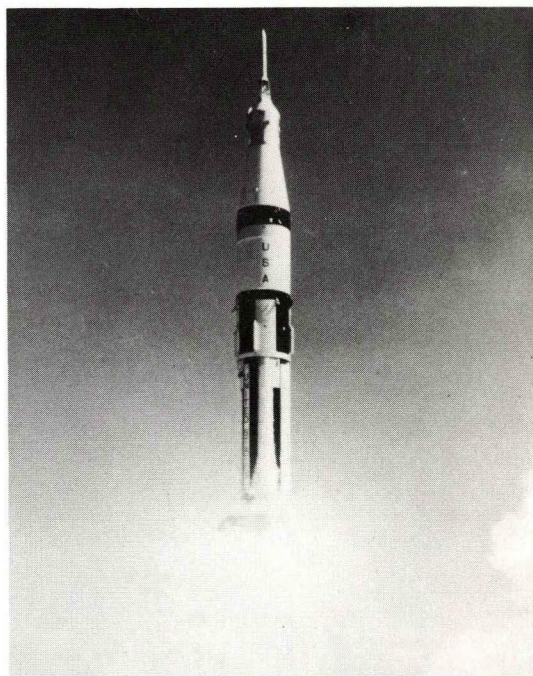
KEY TO THE FUTURE

A long list of experiments is being prepared for Skylab, including ones in scientific, technological, engineering, and medical areas. The Apollo Telescope Mount will be the major experiment.

A definite list of experiments for the first Skylab flights will not be finalized until the last possible moment before flight time. This is done so the latest thinking can be incorporated into the experiments by the astronauts. Priority listings will be established and the experiments will be flown and conducted accordingly.

One of the key requirements in space exploration is the ability to sustain long duration manned space missions to find out what man can do in space to enhance his environment here on earth.

The workshop in space will provide a sound basis for the beginning of these endeavors.



SATURN IB LAUNCH VEHICLE WILL TAKE THE ASTRONAUTS TO A RENDEZVOUS WITH THE ORBITING SKYLAB WORKSHOP