95-15

16E.8

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
Washington, D. C. 20546
202-755-8370

FOR RELEASE:
May 1, 1973

PRESS KIT

PROJECT: SKYLAB 1 and 2

contents

GENERAL RELEASE -------------------------- 1-5

OBJECTIVES OF THE FIRST SKYLAB MISSION ---- 6-7

SKYLAB EXPERIMENTS ------------------------ 8-10

MISSION PROFILE: LAUNCHES, DOCKING AND DEORBIT ----------------- 11-13

MISSION PROFILE IV-2: Real-time Flight Planning ------------ 14

MISSION PROFILE IV-3: Crew Work Day ------- 15

MISSION PROFILE IV-4: The Workshop Between Visits -------------- 16

COMMUNICATIONS AND DATA ------------------- 17-27

COUNTDOWN AND LIFTOFF --------------------- 28-36

SATURN WORKSHOP --------------------------- 37

SATURN LAUNCH VEHICLES -------------------- 38

NOTE: Details of Skylab spacecraft elements, systems, crew equipment and experimental hardware are contained in the Skylab News Reference distributed to the news media. The document also defines the scientific and technical objectives of Skylab activities. This press kit confines its scope to the first manned visit to Skylab and briefly describes features of the mission.

NEWS

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
Washington, D. C. 20546
AC 202/755-8370

William Pomeroy
(Phone 202/755-3114)

FOR RELEASE:
Monday, May 1, 1973

RELEASE NO: 73-80

SKYLAB AIMS AT BEING USEFUL

An inward look at man's home planet as well as an outward look toward his life-giving Sun will begin May 14 when the Skylab spacecraft is launched into an Earth-hugging orbit. Man himself and an examination of how well he fares during long periods in space will also be a major objective of this first United States experimental space station.

A three-man astronaut crew in a modified Apollo command/service module (CSM) will be launched into a rendezvous orbit the following day, and will spend almost a month aboard Skylab conducting solar astronomy, Earth resources, medical and other scientific and technical investigations. Two additional three-man crews will spend two months each living and working aboard Skylab later in the year.

-more-

Ranging as far north as the U.S.-Canadian border and as far south as the tip of Argentina, Skylab's instruments will scan a major portion of the inhabited regions of the Earth. The large, 90,600-kilogram (100-ton) space station is expected to be visible at times to people on the ground as it glides overhead.

Skylab is aimed at gaining in space new knowledge for the improvement of life on Earth. Its investigations and experiments will help develop new methods of learning about the Earth's environment and resources and new ways to evaluate programs directed at preserving or enhancing those resources throughout the world.

The astronauts aboard will perform medical experiments aimed at a better knowledge of man's own physiology and they will seek new knowledge about our star, the Sun, and its interaction with our earthly environment.

Among other experiments will be ones directed at developing new industrial processes utilizing the unique advantages of weightlessness.

The Skylab Program is predominantly utilitarian in nature, capitalizing on the vehicles and know-how developed in the Apollo Program to service and advance a wide range of interests while greatly increasing the opportunities for men to function in space. Skylab will be operational the better part of a year, permitting the economy of extended usage and laying the groundwork for future long-duration missions.

America's young people have a stake in Skylab also, for carried aboard the space station are experiments selected from a nationwide competition among secondary school students.

Crewmen for the first manned visit to Skylab are Charles Conrad, Jr., commander; Dr. Joseph P. Kerwin, science pilot; and Paul J. Weitz, pilot. In the all-Navy crew, Conrad holds the naval rank of captain and Kerwin and Weitz are commanders. Conrad flew as pilot on Gemini 5, command pilot on Gemini 11 and was commander of the second manned lunar landing, Apollo 12. Kerwin and Weitz have not been in space before.

Skylab will be boosted from the NASA Kennedy Space Center, Fla., into a 433.4-kilometer (268.7 mile) circular Earth orbit by a Saturn V launch vehicle. Approximately 24 hours after Skylab reaches orbit, the CSM with the crew aboard will be launched atop a Saturn-1B into a 150x222.2-kilometer (93x137.8 mile) elliptical orbit from which they will follow a rendezvous maneuver sequence using the CSM service propulsion system.

The launch of the Saturn V with its unmanned spacecraft is referred to as Skylab 1, SL-1, or sometimes, the workshop launch. The launching of the first astronaut crew on a Saturn 1B is referred to as Skylab 2, SL-2 or the first manned visit. The first Skylab mission begins with the Skylab 1 launch and ends with recovery of the crew.

After docking with Skylab, the crew will remain aboard the command module until the following morning, when they will enter and activate the space station for the 28-day mission. Crew activity days will be on Houston local time, starting at 6 a.m. CDT and ending at 10 p.m. CDT. Mission Control is at the Johnson Space Center, Houston, Texas, home of the astronauts.

While real-time flight planning was usually forced by contingencies in Gemini and Apollo, real-time flight planning will be the standard method for accomplishing the most in Skylab. The operational flight plan will serve mainly as a basic guide into which the performance of experiments will be scheduled on a daily basis by flight planners in the Mission Control Center. For example, Earth resources Experiment package (EREP) experiments depend upon clear skies over ground sites to be scanned and photographed. Scheduling of EREP passes will depend upon weather forecasts and actual conduct of the experiments may be deferred if the cloud cover turns out to be excessive.

Near the end of the 28-day first manned mission, two crew members will don pressure suits and go outside where one will retrieve solar telescope film canisters for return to Earth. These film canisters, data recordings from other Skylab experiments and other forms of information gathered during the month in space will be stowed aboard the command module for the return home.

Ground controllers will keep an electronic eye upon Skylab,its experiments and systems, after the crew completes their stay.

After undocking, the crew will perform two deorbit burns to bring the command module to splashdown in the eastern Pacific about 1,280 km (800 miles) southwest of San Diego, Calif. Extensive medical examinations in Skylab mobile laboratories aboard the prime recovery vessel, the USS Ticonderoga, will be conducted before the crew is flown back to Houston.

The second manned visit to Skylab is planned for early August.

END OF GENERAL RELEASE

II - OBJECTIVES OF THE FIRST SKYLAB MISSION

The Skylab Program was established for four explicit purposes: to determine man's ability to live and work in space for extended periods; to extend the science of solar astronomy beyond the limits of Earth-based observations; to develop improved techniques for surveying Earth resources from space; and to increase man's knowledge in a variety of other scientific and technological regimes.

Skylab, the first space system launched by the United States specifically as a manned orbital research facility, will provide a laboratory with features which cannot be found anywhere on Earth. These include: a constant zero gravity environment, Sun and space observation from above the Earth's atmosphere, and a broad view of the Earth's surface.

Dedicated to the use of space for the increase of knowledge and for the practical human benefits that space operations can bring, Skylab will pursue the following:

Physical Science - Increase man's knowledge of the Sun, its influence on Earth and man's existence, and its role in the universe. Evaluate from outside Earth's atmospheric filter, the radiation and particle environment of near-Earth space and the radiations emnating from the Milky Way and remote regions of the universe.

Life Science - Increase man's knowledge of the physiological and biological functions of living organisms - human, other animal, and tissues - by making observations under conditions not obtainable on Earth.

Earth Applications - Develop techniques for observing Earth phenomena from space in the areas of agriculture, forestry, geology, geography, air and water pollution, land use and meteorology.

Space Applications - Augment the technology base for future space activities in the areas of crew/vehicle interactions, structures and materials, equipment and induced environments.

The First Skylab Mission has three specific objectives as follows:

1. Establish the Skylab orbital assembly in Earth orbit.

   (a) Operate the spacecraft cluster (including CSM) as a habitable space structure for up to 28 days after the SL-2 launch.

(b) Obtain data for evaluating the total spacecraft performance.
(c) Obtain data for evaluating crew mobility and work capability in both intravehicular and extravehicular activity.

2. Obtain medical data on the crew for use in extending the duration of manned space flights.

(a) Obtain medical data for determining the effects on the crew which result from a space flight of up to 28 days duration.
(b) Obtain medical data for determining if a subsequent Skylab mission of up to 56 days duration is feasible and advisable.

3. Perform in-flight experiments.

(a) Obtain ATM solar astronomy data for continuing and extending solar studies beyond the limits of Earth from low Earth orbit.
(b) Obtain Earth resources data for continuing and extending multisensor observation of the Earth from low Earth orbit.
(c) Perform the assigned scientific, engineering and technology experiments.

The Gemini 7 mission demonstrated that man can readily adapt to space flight for up to two weeks without ill effects. Six Apollo lunar landings proved that man can go into space a quarter million miles away from his mother planet, adapt to a lower gravity field and do useful work in the hostile environment of a hard vacuum.

Skylab will push forward the threshold of human adaptability to spaceflight first by doubling Gemini 7's time in space with the first Skylab crew, then doubling that experience in the next two manned visits.

In the total of 140 manned days of operation, the nine Skylab astronauts will amass medical, scientific and engineering data that will influence the design and operation of future generations of space vehicle systems.

III - SKYLAB EXPERIMENTS

The Skylab space station carries the largest array of experimental scientific and technical instruments ever flown in space. They total 58 and fall into four broad categories: medical, Earth Resources Experiments Package (EREP), Apollo Telescope Mount (ATM), and corollary. This experimental equipment will permit more than 200 ground-based principal investigators to supervise 271 scientific and technical investigations.

Skylab medical experiments are aimed toward measuring man's ability to live and work in space for extended periods of time, his responses and aptitudes in zero gravity, and his ability to readapt to Earth gravity once he returns to a one-g field.

EREP experiments will use six devices to advance the technology of Earth remote sensing and at the same time gather data that may be applied to research in agriculture, forestry, ecology, geology, geography, meteorology, hydrology, hydrography, oceanography and such representative tasks as: mapping snow cover and assessing water-runoff potentials; mapping water pollution; assessing crop conditions determining sea state; classifying land use; and determining land surface composition and structure.

ATM experiments utilize an array of telescopes and sensors to improve knowledge of the Sun and its influence on the Earth.

A wide range of experiments fall into the corollary category, ranging from stellar astronomy and materials processing in zero-g to the evaluation of astronaut maneuvering devices for future extravehicular operations.

Seven experiments selected through a national secondary school competition in the Skylab Student Project also are assigned to the first manned mission.

Experiments assigned to the First Skylab Missions are listed below.

In-flight medical experiments (on all missions):

M071 Mineral Balance
M073 Bioassay of Body Fluids
M074 Specimen Mass Measurement
M092 Lower Body Negative Pressure
M093 Vectorcardiogram
M110, M113, M114, M115 Series, Hematology and Immunology
M131 Human Vestibular Function
M133 Sleep Monitoring

M151 Time and Motion Study
M171 Metabolic Activity
M172 Body Mass Measurement
(These are three ground-based medical experiments - M078, M11 and M112 involving pre- and post-flight data.)

Earth Resources Experiments Package (EREP) experiments (on all missions):

S190 Multispectral Photographic Facility comprised of:
S190A Multispectral Photographic Cameras
S190B Earth Terrain Camera
S191 Infrared Spectrometer
S192 Multispectral Scanner
S193 Microwave Radiometer/Scatterometer and Altimeter
S194 L-Band Radiometer

The ATM experiments (on all missions):

S052 White Light Coronagraph
S054 X-Ray Spectrographic Telescope
S055A Ultraviolet Scanning Polychromator-Spectroheliometer
S056 Extreme Ultraviolet and X-Ray Telescope
S082A Coronal Extreme Ultraviolet Spectroheliograph
S082B Chromospheric Extreme Ultraviolet
(Two hydrogen-alpha telescopes are used to point the ATM instruments and to provide TV and photographs of the solar disk.)

The corollary experiments:

D008 Radiation in Spacecraft
D024 Thermal Control Coatings
M415 Thermal Control Coatings
M487 Habitability/Crew Quarters
M509 Astronaut Maneuvering Equipment
M516 Crew Activities/Maintenance Study
M551 Metals Melting
M552 Exothermic Brazing
M553 Sphere Forming
M555 Gallium Arsenide Crystal Growth
M556 Single Crystals Growth
M566 Copper Aluminum Eutectic
S009 Nuclear Emulsion
S015 Zero Gravity Single Human Cells
S019 Ultraviolet Stellar Astronomy
S020 X-Ray/Ultraviolet Solar Photography
S149 Particle Collection
S183 Ultraviolet Panorama
S228 Trans-Uranic Cosmic Rays

T002 Manual Navigation Sightings
T003 In-flight Aerosol Analysis
T025 Coronagraph Contamination Measurements
T027 Contamination Measurement (Sample Array System)
T027, Contamination Measurement
S073 Gegenschein Zodiacal Light

The student investigations:

ED11 Atmospheric Absorption of Heat
ED12 Volcanic Study
ED22 Objects within Mercury's Orbit
ED23 UV from Quasars
ED26 UV from Pulsars
ED31 Bacteria and Spores
ED76 Neutron Analysis

(Details of the above experiments may be found in Skylab Experiments Overview, available from the Government Printing Office, at $1.75 a copy. Stock number is 3300-0461.)

IV - MISSION PROFILE: LAUNCHES, DOCKING AND DEORBIT

Two launches approximately 24 hours apart will place into Earth orbits the Skylab Saturn Workshop and the Command/Service Module with the first crew who will work and live in the space station for up to 28 days. The crew's docking will take place in the fifth CSM orbit.

The Saturn Workshop (the unmanned spacecraft cluster) will be launched atop a Saturn V launch vehicle from Pad A of the NASA Kennedy Space Center Launch Complex 39 at 1:30 pm EDT, May 14, 1973. At orbital insertion, Skylab will be in a 433.4-km (268.7-mile) circular orbit with an inclination of 50 degrees.

The Skylab 2 CSM will be launched into an initial 150 x 222.2-km (93 x 137.8-mile) orbit by a Saturn 1B launch vehicle from Pad B of Complex 39 with liftoff at 1 pm EDT, May 15, 1973. Both launches will go northerly from the Florida site.

A five-step rendezvous maneuver sequence will be followed to bring the CSM into Skylab's orbit --- two phasing maneuvers, a corrective combination maneuver, a coelliptic maneuver, terminal phase initiation and braking. The CSM will dock with Skylab's multiple docking adapter at about seven hours, 40 minutes GET.

Timekeeping will be on a ground-elapsed-time (GET) basis until Skylab 2 GET of eight hours, after which timing will switch over to day of year (DOY), or mission day (MD), and Greenwich Mean Time (GMT) within each day. Mission Day 1 will be the day the crew is lauched.

After docking, the Skylab crew will verify that all docking latches are secured, then relax with a meal period and eight hours of sleep. The crew will enter and begin activating Skylab following morning.

At the completion of the 28-day manned operation period, the crew will board the CSM undock and perform two deorbit burns -- the first of which will lower CSM perigee to 166 km (103 miles) and the second burn will again lower perigee to an atmospheric entry flight path. Splashdown will be in the eastern Pacific about 1280 km (800 miles) southwest of San Diego, Calif. Splashdown coordinates are 25° 20' N, 127° 04' W.

Following is the preliminary timeline of certain Skylab 1 and 2 key events:

	Date	Time
Launch	May 14	1:30 p.m. EDT
	(launch window closes at 5:00 p.m.)	
S-IC/S-II Separation		1:32:40
S-II Ignition		1:32:42
Payload separation		1:40
Orbit insertion		1:40
Jettison payload shroud		1:45
Rotate ATM 90°		1:46
Deploy ATM solar array system		1:55
Deploy OWS solar array system		2:11
Deploy meteoroid shield		3:06

SKYLAB 2 (First manned launch)

	Date	Time
Launch	May 15	1:00 p.m. EDT*
S-IB/S-IVB Separation		1:02:22
S-IVB Ignition		1:02:23
S-IVB Engine Cutoff		1:10
Orbit Insertion		1:10
CSM/S-IVB Separation		1:16
Phasing burns		3:20 to 6:59
Station keeping		7:49 to 8:22
Docking		8:40
Pressurize tunnel	May 16	8:30 a.m.
MDA hatch open		9:00 a.m.
EVA Egress (EVA 2 hours 25 minutes)	June 10	1:00 p.m.
Undock	June 12	8:46 a.m.
Separation		9:35 a.m.
Deorbit		1:03 p.m.
Entry interface		1:27 p.m.
Splashdown		1:44 p.m.

*Launch window can vary from 7 to 15 minutes depending on the orbital parameters of the space space station.

IV-2 MISSION PROFILE: Real-time Flight Planning

In pre-Skylab United States manned space flight programs, the pre-mission flight plans were followed "by the numbers". Such will not be the case in Skylab flight planning, for the pre-mission printed flight plan will serve mainly as a guideline for planners in the Mission Control Center who each day will be developing the upcoming day's activity to yield the highest return of experiment data.

The daily flight plan, radioed to the crew for on-board teleprinter readout before the astronauts waken, will be designed to take advantage of unique opportunities such as cloud-free forecasts for desired EREP observations and solar event viewing tasks that will accomplish the greatest gain for world-wide ATM joint observing programs (JOPS).

Flight planners will have their hands full. The Skylab flight planning cycle begins at midnight Houston time, or CDT, with a team of flight planners in Mission Control Center developing a "summary flight plan" for the following crew work day. This first team will be relieved by the so-called "execution" team of flight controllers who will carry out the existing detailed flight plan for that day and leave the planning for the next work shift. Flight planners on the next, or "swing", shift will take the summary plan and develop a "detailed flight plan" for the following day, locking up the operational details first developed in the early morning hours ----- and so on, in leapfrog fashion.

Considerations that go into planning each day's flight plan include the different requirements of various experiments which have to be resolved, the optimum use of crew time, and objectives still to be met. A process of review of summary flight plans proposed by the planners takes into account the viewpoints of Skylab systems engineers, experiment principal investigators, flight surgeons, mission management, the flight crew and the weather outlook for potential EREP survey sites.

In planning the crew's work day, precedence is given ATM, EREP and medical experiments, with other experiments scheduled in the remaining time.

Daily flight plans sent up to the Skylab teleprinter will be reproduced and distributed to newsmen at the JSC News Room.

IV-3 MISSION PROFILE: Crew Work Day

Space days for the Skylab crew will not be a whole lot different from Earth days, for the normal activity day will start at 6 a.m. and run until 10 p.m. CDT. Days off, however, will be fewer and farther between.

All three crewmen will eat breakfast at 7 a.m., lunch at noon and dinner at 6 p.m. CDT---except for the man on duty at the ATM console during lunch, who will shift his meal time so that he can be relieved at the console. A standard eight hours sleep will be scheduled each day.

Crew days off will fall about every seventh day, depending upon experiment scheduling conflicts. For example, if an opportunity for a fruitful EREP pass over an unclouded portion of the Earth arises, the day off will be delayed to allow the EREP pass to be made.

Two 15-minute personal hygiene periods will be scheduled each day for each crewman and 30 minutes each day for physical exercise. Additionally, an hour a day will be set aside for "R&R"---rest and relaxation.

Another regularly-scheduled activity is two and a half hours each day for systems housekeeping.

The remaining eight hours in the crew day will be filled with experiment operation planned in real-time by flight planning teams in the Mission Control Center.

IV-4 MISSION PROFILE: The Workshop Between Visits

Ground controllers will become absentee landlords of Skylab during the periods between manned visits. Housekeeping and experiment status monitoring will be handled remotely by information telemetered to Earth, and required commands can be sent up to activate or deactivate many systems.

As the Skylab crew prepares to undock and return to Earth, it will leave the cluster in a "solar inertial attitude" with the ATM instruments pointed at the Sun. The Attitude and pointing control system will keep the vehicle in this solar attitude throughout the two-month unmanned period. Fresh film loaded by Skylab crewmen before undocking will allow ATM S052 White Light Coronagraph and S054 X-ray Spectrographic Telescope experiments to record solar activity in their respective spectra during the unmanned interval.

Immediately after the crew has undocked, the ground will command Skylab to vent down to a pressure of about two pounds per square inch. The pressure will then be allowed to gradually decay to a minimum of one-half pound.

Skylab's attitude pointing and control system and both major electrical systems will remain fully "up" during unmanned operations periods. The telemetry and command systems also will stay "live" to relay systems information to ground controllers and to accept commands for housekeeping functions and data retrieval. The environmental control system will be inactive, except for the refrigeration system and some thermal control components.

V COMMUNICATIONS AND DATA

The magnitude of the support requirements for Skylab in tracking and data acquisition has been summed up as follows: "One day's coverage is equal to an entire Apollo mission."

What this means to the people manning the far flung global network of tracking stations is that many innovations in data acquisition, communications and command functions have occurred since Apollo. Skylab transmits so much data that only 10 percent of the data collected by each station can be sent to Houston while the spacecraft passes over the station. The other 90 percent will be stored by computers and sent later. The supplying of all the vital information being generated by Skylab to ground controllers at Houston instantaneously will be done by tracking network facilities which were configured to handle about half the amount of data during the Apollo missions.

Flight control personnel will maintain contact with the Skylab spacecraft through the Spaceflight Tracking and Data Network (STDN). This network is a complex of fixed ground stations, portable ground stations, specially equipped aircraft and an instrumented ship used for transmitting signals to and receiving and processing data from the spacecraft during the Skylab mission from launch to Earth return. Each station includes tracking telemetry, television and command systems; the communications systems and switching systems.

Under the overall supervision of NASA Headquarters Office of Tracking and Data Acquisition (OTDA), the Goddard Space Flight Center, Greenbelt, Maryland is responsible for the operation and maintenance of the world-wide network.

Thirteen of the 22 STDN stations will be supporting the Skylab mission. They are:

Merritt Island, Fla.	Carnarvon, Australia
Grand Canary Island, Spain	Corpus Christi, Texas
Hawaii	Madrid, Spain
Honeysuckle Creek, Australia	Ascension Island
USNS Vanguard (tracking ship)	Guam
Bermuda	Goldstone, Calif.
Newfoundland	

To obtain the required coverage for Skylab it was necessary that a station be established in the Southern Hemisphere between 35 and 40 degrees South Latitude and 55 and 60 degrees West Longitude. Economics and time being the prime considerations, it was not feasible to install a permanent facility for short term programs such as Skylab, therefore, the Vanguard Tracking Ship will be positioned at Mar Del Plata, Argentina for this purpose.

Since the close of the Apollo program, the network has been engaged in augmenting station equipment and personnel to support Skylab.

The Skylab will be in an Earth orbit with at least one station pass approximately every 90 minutes; therefore requiring a total effort on a 24-hour basis. To insure adequate support of the long duration missions (28/56 days) all stations have been equipped with dual channel receivers, additional decommutation equipment and special gear to handle Skylab voice communications. In addition to increased equipment, the staffing at each site was augmented to provide the capability for 24-hour operations.

The entire network is linked by the facilities of the NASA Communications Network (NASCOM), a global communications network established by NASA to provide operational ground communications for support of all spaceflight operations.

Communications

The NASA Communications Network, one of the most extensive and sophisticated communications networks in existence, links all the STDN stations and NASA installations together. Over two million circuit miles covered by the network includes data and voice channels, medium and high speed message circuits. The majority of these circuits connecting and servicing these centers are leased from common carriers such as AT&T, Western Union, ITT, and various local telephone companies throughout the world. The circuits are specially engineered and maintained for NASA.

Control Center for the NASCOM Network is the NASA Goddard Space Flight Center, Greenbelt, Md. Special computers are used in the system to act as traffic policemen. The computers are programmed to recognize specific types of information and automatically direct or switch it to the proper destination. Switching centers located in London, Madrid, Honolulu, and Australia are used to augment the network, receive data from the tracking stations and route it to Goddard.

The complexity of programs such as Skylab has required the network to continuously revise and sophisticate its total system in order to handle the voluminous amount of information the network handles on a daily basis. As an example: during Project Mercury, the amount of information handled per second was the equivalent of a single 8 1/2 x 11 printed page per minute -- with the Gemini flights, this increased to the equivalent of 10 pages -- the Apollo series saw this increased by a factor of 50 to 1 over Gemini and estimates for the Skylab indicate growth of 10 to 1 over Apollo, or 5000 times from Mercury.

Network Operations

Network stations supporting the Skylab will use the "S" Band systems developed and employed during the Apollo flights. The "S" Band system is not only more powerful for longer reach and better coverage during near Earth activities, but also simplifies the ground task by combining all tracking and communications functions into a single unit.

During the mission, stations will view the spacecraft for periods of 6 to 10 minutes. Not unlike the Gemini missions, one of the major differences people will be quick to recognize is the changed quality of voice and TV transmissions when compared to Apollo.

The orderly flow of mission information, command and data between the station actively tracking the spacecraft and Mission Control Center in Houston is the prime considerations during manned missions. Prior to each pass over a particular station, ground controllers at MCC transmit information to the station to update the flight plan. At the station, high-speed computers compare the information to preprogrammed parameters for validity before transmitting it to the spacecraft.

The 13 STDN stations supporting the Skylab mission are equipped with unified "S" band systems (USB).

The "unified" concept of the unified "S"-band system permits the multiple functions -- command, telemetry, tracking and two-way voice communications -- to be accomplished simultaneously using only two carrier frequencies: an uplink frequency between 2090 and 2120 MHz and a downlink frequency between 2200 and 2300 MHz. The system will also receive television from Skylab.

As used in the Apollo program, the USB uplink, voice and updata (command information) frequency modulates subcarriers; these subcarriers are combined with ranging data and the composite signal comprises the uplink carrier frequency. A subcarrier is also used for uplinking voice information. Subcarrier use is required only when multiple uplink functions are required; for example, uplink command data is phase modulated onto the main carrier frequency for transmissions to the workshop. All USB systems can transmit two uplink frequencies simultaneously.

The USB downlink system includes four main receivers and is capable of receiving four downlink frequencies simultaneously in the 2200-2300 MHz frequency range. Normally the downlink carrier will be modulated with a composite signal consisting of ranging data and modulated subcarriers, but as with the uplink, other data can be modulated directly onto the main carrier. Two Signal Data Demodulate or Systems (SDDS) are in each USB system to demodulate the various downlink signals. Television signals are taken directly from the carrier and filtered to remove subcarrier information, and then remoted directly to JSC, over wideband lines. Astronaut voice is normally sent over regular communications lines of the NASA Communications Network (NASCOM).

During the Skylab mission the CSM will act as an interface between the workshop and the ground for all voice and television communications. Command and voice will be uplinked to the CSM on USB frequency 2106.4 MHz while "real-time" telemetry and voice will be downlinked to the stations on a frequency of 2287.5 MHz. Recorded telemetry, voice and real-time television will be downlinked on a frequency of 2272.5 MHz. A VHF system with frequencies of 296.8-259.7 will be used to provide backup two-way voice communications with the CSM.

The ATM and Orbital Workshop equipment will use different systems and frequencies for transmitting and receiving data and voice communications. A UHF uplink will be employed for transmitting data to the spacecraft with VHF used to downlink data from the spacecraft. The ATM and Workshop have two VHF transmitters for downlinking real-time and recorded data. One transmitter will be used for real-time and recorded data. One transmitter will be used for real-time "dump" of data during each station pass and one transmitter will be used to "dump" recorded data.

Two recorders are aboard the Workshop to record data obtained between station passage. Data is recorded at a speed of 4 ips and is "dumped" over each station at a speed of 72 ips. Real-time and recorded telemetry is transmitted at 72.0 kb/sec. There will normally be no "dump" data from the CSM as the nominal CSM configuration calls for up to 80 percent of the systems to be powered down except during launch and reentry.

Data Management

Due to the immense proportion of usable data being recovered during the Skylab mission, a "data-compression" system will be employed in order that 100 percent of the data can be provided to Mission Control.

Data compression is simply a method of reducing the amount of information received during a mission by extracting only that portion of the data which is meaningful prior to sending it on to Mission Control Center. In this system, each parameter in the telemetry downlink is represented by a succession of samples. Data compression uses a mathematical standard to judge which of those samples contain redundant information and deletes those samples. Thus only the meaningful information is transmitted by the data compression computer. As an example, the computer compares the current value of a particular sample to the value of the last sent sample and if it is the same, that sample of information will not be transmitted. If the sample is less than the last sample, or more than the value selected, the information will be transmitted.

All data received will be recorded at each station during a pass and either sent to JSC real-time or post pass. As an example of the requirements for data handling at each station the following is a typical schedule for transmitting data during and after a station pass:

SUPPORT PHASE	FUNCTIONS TELEMETRY PROGRAM	COMMAND PROGRAM
PASS	COMPRESS & TRANSMIT PCM DATA OVER THREE 7.2 KBPS LINES LOG PCM DATA ON DIGITAL TAPES (ADDT)	COMMANDING TRANSMIT FIXED FORMATTED BIO-MED DATA ON 7.2 KBPS LINE

POST PASS PHASE I	COMPRESS AND TRANSMIT REAL-TIME ADDT DATA OVER THREE 7.2 KBPS LINES	LOG DUMP PCM DATA ON DIGITAL TAPE (ADDT)
POST PASS PHASE II	COMPRESS AND TRANSMIT DUMP ADDT DATA OVER THREE 72. KBPS LINES	TRANSMIT CMD HISTORY DATA OVER TTY CIRCUITS

Range Instrumented Aircraft

Four instrumented aircraft will be used to support the Skylab mission, operating from Spanish, Australian and Indian Ocean airfields. The instrumented aircraft are used primarily to fill the voids between land and ship stations during the launch and early orbital phases of the flight.

One aircraft will operate out of Madrid, Spain and support the mission at a location 100 miles off the coast of Greece, in the Mediterranean Ocean for the purpose of monitoring the ATM deployment phase of the mission. Upon completion of the ATM deployment maneuver, the aircraft will reposition to a new area in the North Atlantic at 48 degrees North - 38 degrees West to monitor the CSM/ SIVB separation.

One aircraft will stage out of Mahe, Seychelles Islands and support at a location 100 miles East of Mahe during the solar array beam deployment. Upon completion of the deployment maneuver, the aircraft will move to Capetown, South Africa to monitor the SIVB deorbit maneuver during SL-2.

Two aircraft will stage at Perth, Australia and be positioned 1500 miles South of Perth in the Indian Ocean to provide voice communications with the CSM and to monitor the SIVB deorbit maneuver during SL-2.

On-board Television Distribution

Television coverage during the mission will be both real-time and recorded. All stations in the STDN network are capable of receiving and recording video; however, only Goldstone, Calif. (GDS), Corpus Christi, Texas (TEX), and Merritt Island, Fla. (MILA) have been designated as "prime" for live television and will transmit video to the Johnson Space Center, Houston, in real-time.

"Live" television will be transmitted to Houston via hardline, color-converted and released to the news media under the direction of the Public Affairs Office, Johnson Space Center.

Recorded television will be stored aboard the Skylab and dumped daily to selected stations in the network. Video recorded at US stations will be transmitted daily to JSC where it will be edited, color-converted and released. Other stations will record video as directed.

The stations at Madrid, Spain and Honeysuckle Creek, Australia will have a "real-time" receive, record and transmit capability; however, they will record only, unless otherwise directed. The Guam STDN site will record video of the CSM/OA rendezvous and station-keeping maneuver and transmit this video via satellite to JSC within 30 or 40 minutes after completion of the event.

Still photographs of the video signal will be obtained and released to the news media at the MILA STDN station, Merritt Island, Fla. and JSC.

Color television from Skylab will be fed to ground stations by a portable TV camera. The camera, attached to a 9.1-meter (30-foot) cable, can be connected to six TV locations throughout the cluster: Multiple Docking Adapter, Airlock Module, Workshop forward dome, forward compartment, experiment compartment and the CSM. A 3.7-meter (12-foot) cable is supplied for use in the CSM. Additionally, black and white TV from the ATM solar telescopes can be relayed to Earth. Both color and black and white TV signals are relayed by the CSM FM transmitter.

An on-board videotape recorder permits delayed relay of up to 30 minutes of TV from either the color camera or the ATM equipment.

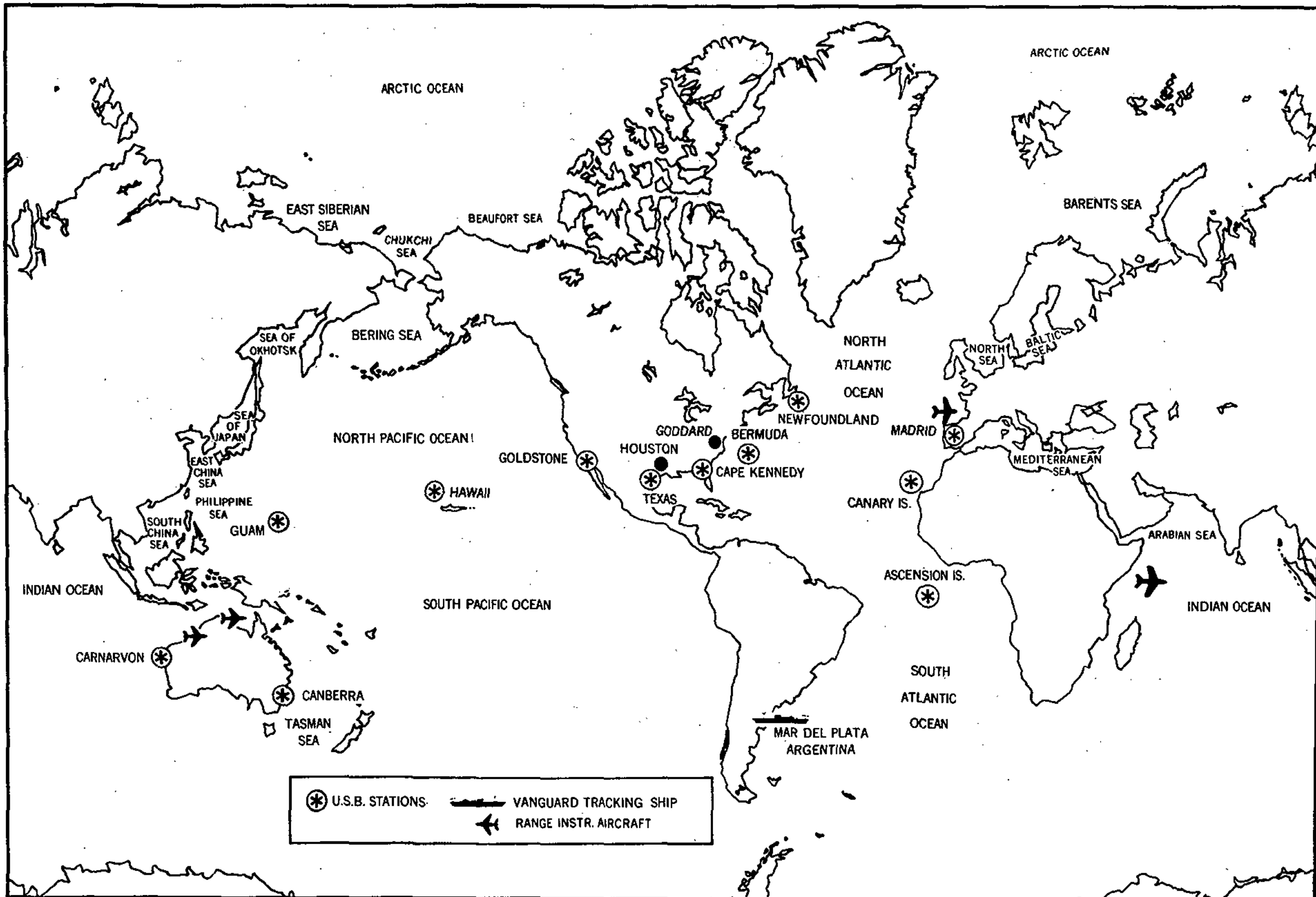
Mission events planned for TV relay include rendezvous and station keeping, experiment operations, a tour of the Workshop and other spacecraft elements, systems housekeeping, ATM console operations, EVAs for ATM film canister loading and retrieval, and undocking at the end of the mission.

Data collected and relayed in real-time to STDN stations from the Skylab cluster by the instrumentation system includes vehicle systems conditions such as pressures, voltages and temperatures; crew medical status such as respiration and heart rates; scientific information from experiments, and confirmation of mission events triggered by on-board sequencers or by ground command. Additionally, the instrumentation system furnishes data to on-board crew displays and to an array of data recorders for delayed transmission to the ground.

The Skylab intercom system has speaker boxes in 13 locations: two in the MDA forward compartment and one in the aft compartment; one in the Workshop dome; two in the Workshop forward compartment; two in the experiment compartment; one in the wardroom; one in the waste management compartment; and three in the sleep compartments.

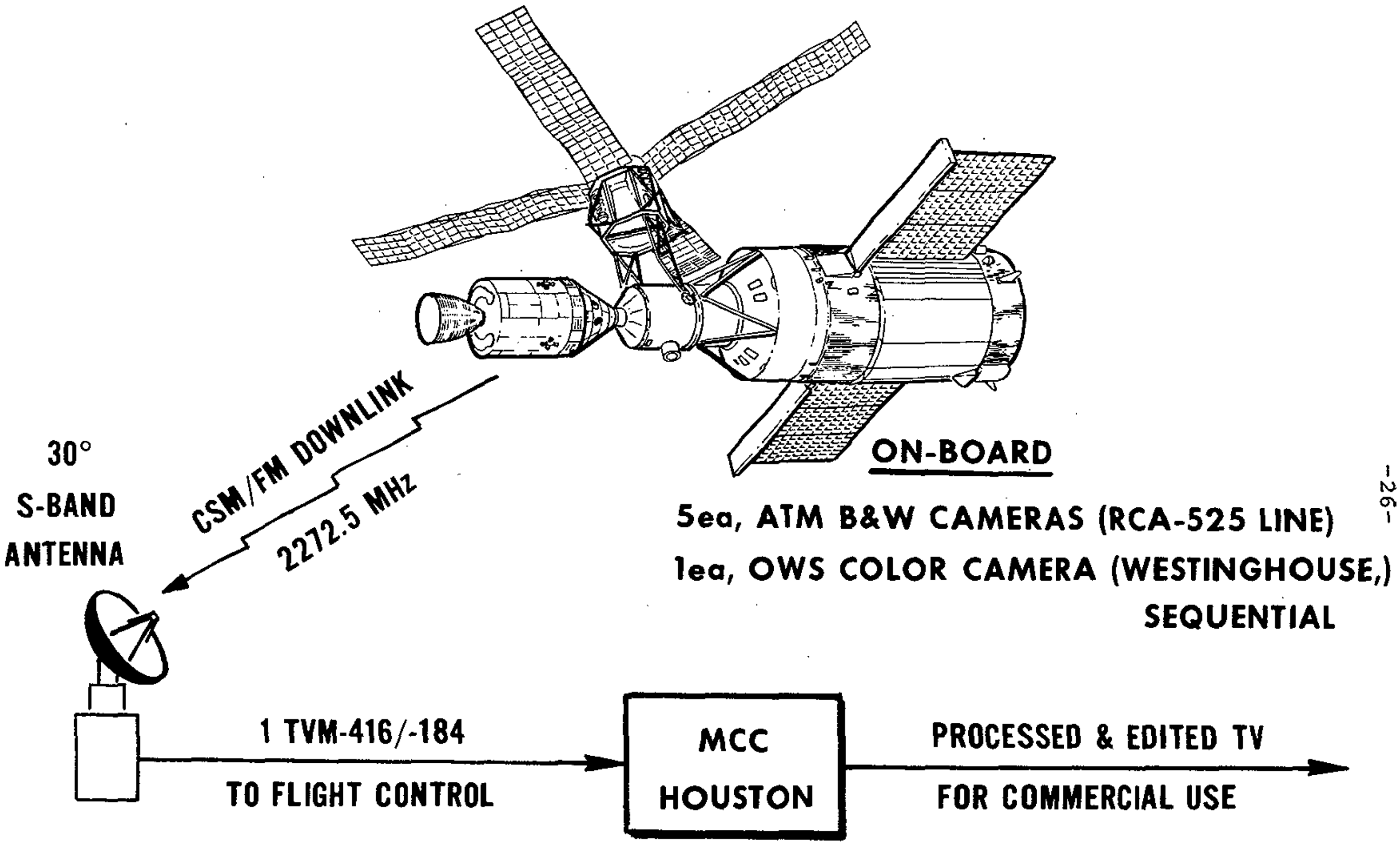
-more-

SKYLAB I & II

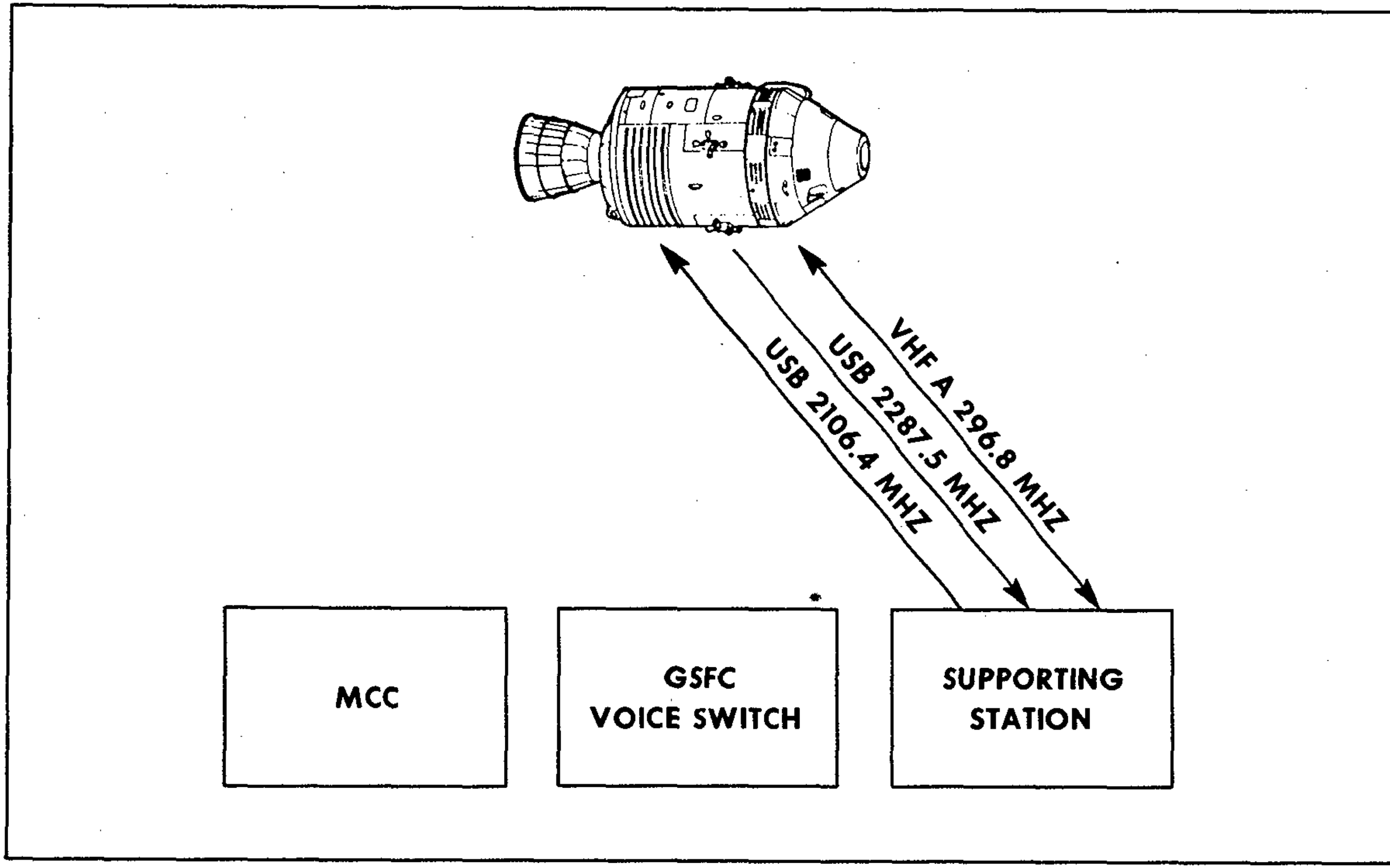


SPACEFLIGHT TRACKING AND DATA NETWORK

TYPICAL PRIME STATION TV CONFIGURATION FOR SKYLAB:



5 ORBITAL PASSES DAILY, 10 MIN DURATION EACH. REAL-TIME INTERFACE TO MCC 1 HOUR DAILY, AT TIME OF FINAL PASS. AFTER FINAL PASS, ALL TV RECORDED WILL BE PLAYED BACK TO HOUSTON.



NORMAL COMMUNICATIONS MODE

VI - COUNTDOWN AND LIFTOFF

A government-industry team of about 1,300 at the Kennedy Space Center, will conduct the dual countdown of Skylab 1 and Skylab 2, the first time a parallel launch operation involving two complex spacecraft and two Saturn-class launch vehicles has been performed at Complex 39.

A team of about 500 will conduct the launch of Skylab 1 (Saturn V/Orbital Workshop) from the Launch Control Center's (LCC) Firing Room 2. Launch is to be from Pad A. Another team of approximately 500 will conduct the launch of Skylab 2 (Saturn 1B/Apollo) from the LCC's Firing Room 3. Skylab 2 will be launched from Pad B.

Approximately 300 team members will control the Orbital Workshop and Apollo spacecraft aspects of the launch from the Manned Spacecraft Operations Building in the KSC Industrial Area five miles south of Complex 39. Of these, about 200 will be involved in the Orbital Workshop launch and 100 in that of the Apollo spacecraft.

Final precount activities for Skylab 1 will begin 4.5 days before launch and those for Skylab 2 will get underway six days prior to launch.

During the early portion of the SL-1 precount, space vehicle pyrotechnics and electrical connections are completed. The Orbital Workshop and its related payload systems will be closed out and final systems checks conducted just prior to launch.

Precount activities for SL-2 includes mechanical buildup of spacecraft components and servicing the spacecraft with various gases and cryogenics (liquid oxygen and liquid hydrogen). Space vehicle pyrotechnics and electrical connections are also completed.

The final countdown for SL-1 will begin at T-minus 7 hours; that for SL-2 will begin at T-minus 9 hours.

The intricate dual precount and countdown will be conducted in parallel, with the SL-2 precount entering a built-in hold at T-22 hours, 15 minutes. This is 15 minutes prior to liftoff of Skylab 1.

It is a distance of 1.3 kilometers (.8 statute miles) from the center of Pad A to the center of Pad B and for safety reasons the latter pad will be cleared of personnel two hours prior to Skylab 1 liftoff.

In the event of a "scrub" in the launch of SL-1, the SL-2 count will be held at the T-minus 19 hour mark.

The RP-1 fuel used in both the Saturn V and Saturn 1B boosters was loaded preceeding the Countdown Demonstration Tests (CDDT). Cryogenic propellant loading liquid oxygen and liquid hydrogen, takes place during the terminal portions of both countdowns Liquid oxygen is the oxidizer in each propulsion stage and liquid hydrogen the fuel for the upper stages of both rockets.

Movement of the Mobile Service Structure, normally associated with a Saturn V operation, will not take place during the SL-1 launch. The MSS was used to inspect the second stage insulation of the Saturn V during the CDDT and then moved from Pad A to Pad B to support the SL-2 launch. It is to be returned to Pad A only if a "scrub" is called after cryogenic loading of the Saturn V begins and another inspection of the second stage insulation panels is necessary. The MSS will be moved from Pad B to its park site - in a nominal launch sequence - after the T-20 hour mark in the SL-2 countdown.

Key events late in the respective countdowns include:

<u>SKYLAB - 1</u>

T-7 hours	Clearing of blast danger area for launch vehicle propellant loading begins.
T-5 hours, 30 minutes	Launch vehicle propellant loading begins. Liquid oxygen for first stage. Liquid oxygen and liquid hydrogen for second stage. Continues through T-2 hours, 15 minutes
T-5 hours, 15 minutes	Open Multiple Docking Adapter vent valves
T-2 hours, 30 minutes	Thruster Actuated Control System (TACS) covers removed.
T-2 hours, 15 minutes	Retract primary damper.
T-2 hours	One-hour built-in hold begins.

T-40 minutes	Final launch vehicle range safety checks (to 35 minutes).
T-33 minutes, 30 seconds	Arm destruct system.
T-30 minutes	Launch vehicle power transfer test. Turn on AM transmitter and Digital Command System receiver.
T-6 minutes	Space vehicle final status schecks.
T-3 minutes, 7 seconds	Firing command (automatic sequence).
T-50 seconds	Launch vehicle transfer to internal power.
T-8.9 seconds	Ignition sequence start.
T-2 seconds	All engines running.
T-0	Liftoff.

SKYLAB - 2

T-9 hours	Begin clearing of blast danger area for launch vehicle propellant loading.
T-8 hours, 8 minutes	Initial target update to the Launch Vehicle Digital Computer (LVDC) for rendezvous with OWS.
T-6 hours, 45 minutes	Launch vehicle propellant loading. Liquid oxygen in first stage and liquid oxygen and liquid hydrogen in second stage. Continues through 4 hours, 15 minutes.
T-4 hours, 17 minutes	Flight crew alerted.
T-4 hours, 2 minutes	Crew medical examination.
T-3 hours, 32 minutes	Brunch for crew.
T-3 hours, 30 minutes	One-hour, 13 minute, built-in hold. The lift-off time will be adjusted at the pickup of the count following this hold based on OWS target update information received at T-8 hours, 8 minutes.
T-3 hours, 7 minutes	Crew leaves Manned Spacecraft Operations Building for LC-39 via transfer van.

T-2 hours, 55 minutes	Crew arrives at Pad B.
T-2 hours, 40 minutes	Start flight crew ingress.
T-1 hour, 51 minutes	Space Vehicle Emergency Detection System (EDS) test.
T-58 minutes	Launch vehicle power transfer test.
T-45 minutes	Retract Apollo access arm to stand-by position (12 degrees).
T-44 minutes	Arm launch escape system.
T-42 minutes	Final launch vehicle range safety checks (to 35 minutes).
T-35 minutes to T-15 minutes	Last target update of the LVDC for rendezvous with the OWS.
T-33 minutes	Arm destruct system.
T-15 minutes	Maximum 2 minute hold for adjusting liftoff time.
T-15 minutes	Spacecraft to full internal power.
T-6 minutes	Space vehicle final status checks.
T-3 minutes, 7 seconds	Firing command (automatic sequence).
T-50 seconds	Launch vehicle transfer to internal power.
T-3 seconds	Ignition sequence start.
T-1 second	All engines running
T-0	Liftoff.

NOTE: Some changes in the counts are possible as a result of the experience gained in the countdown demonstration test which is held before launch.

SL-1 (SATURN V) LAUNCH EVENTS

Time Hrs Min Sec	Event	Vehicle Wt Kilograms (Pounds)*	Altitude Meters (Feet)*	Velocity Mtrs/Sec (Ft/Sec)*	Range Kilometers (Naut Mi)*
00 00 00	First Motion	2,818,085 (6,212,815)	59 (194)	0 (0)	0 (0)
00 01 15	Maximum Dynamic Pressure	1,824,200 (4,021,673)	12,298 (40,348)	460 (1,511)	4 (2)
00 02 20	S-IC Center Engine Cutoff	942,067 (2,076,903)	61,533 (201,880)	1,951 (6,400)	53 (29)
00 02 38	S-IC Outboard Engine Cutoff	748,876 (1,650,989)	84,670 (277,788)	2,537 (8,324)	85 (46)
00 02 40	S-IC/S-II Separation	581,417 (1,281,805)	87,301 (286,422)	2,543 (8,342)	89 (48)
00 02 42	S-II Ignition	580,816 (1,280,479)	89,593 (293,940)	2,534 (8,314)	92 (50)
00 03 10	S-II Aft Interstage Jettison	548,758 (1,209,805	127,462 (418,181)	2,631 (8,631)	153 (83)
00 05 14	S-II Center Engine Cutoff	389,184 (858,004)	271,923 (892,137)	3,566 (11,699)	491 (265)
00 09 50	Payload Separation	89,439 (197,180)	442,027 (1,450,221)	7,332 (24,056)	1,818 (982)
00 09 58	Orbit Insertion	89,439 (197,180)	442,128 (1,450,552)	7,333 (24,057)	1,871 (1,010)

*English measurements given in parentheses

SL-2 (SATURN IB) LAUNCH EVENTS

Time Hrs	Min	Sec	Event	Vehicle Wt Kilograms (Pounds)*	Altitude Meters (Feet)*	Velocity Mtrs/Sec (Ft/Sec)*	Range Kilometers (Naut Mi)*
00	00	00	First Motion	586,421 (1,292,836)	0 (0)	0 (0)	0 (0)
00	01	13	Maximum Dynamic Pressure	374,532 (825,702)	12,438 (40,807)	468 (1,536)	4 (2)
00	02	18	Inboard Engine Cutoff	189,435 (417,632)	55,418 (181,817)	1,981 (6,498)	59 (32)
00	02	21	Outboard Engine Cutoff	184,281 (406,270)	58,310 (191,306)	2,037 (6,684)	64 (35)
00	02	22	S-IB/S-IVB Separation	183,517 (404,586)	59,636 (195,655)	2,037 (6,682)	66 (36)
00	02	23	S-IVB Ignition	137,362 (302,830)	60,893 (199,781)	2,031 (6,663)	69 (37)
00	02	51	Launch Escape Tower Jettison	131,377 (289,636)	84,379 (276,834)	2,104 (6,903)	119 (64)
00	08	57	S-IB Stage Impact	45,495 (100,300)	0 (0)	90 (295)	498 (269)
00	09	40	S-IVB Engine Cutoff	30,878 (68,075)	158,368 (519,581)	7,625 (24,690)	1,760 (950)
00	09	50	Orbit Insertion	30,803 (67,910)	158,510 (520,047)	7,532 (24,711)	1,834 (990)

*English measurements given in parentheses

The solar cell arrays are folded against the sides of the OWS for launch and deployed in orbit. The OWS is protected by meteoroid shield which is deployed by swinglinks to stand five inches from the OWS wall is space.

The liquid oxygen tank of the S-IVB was converted to serve as a receptacle for liquid and solid wastes. Trash is placed in the tank through an airlock in the floor of the Crew Quarters. Liquid is fed to the tank via inlet lines and, in some cases, collected in receiving bags and introduced like trash through the airlock.

(See Skylab News Reference book for detailed information on the Orbital Workshop and other elements of the Skylab cluster.)

Apollo Telescope Mount

The Apollo Telescope Mount is the first manned astronomical observatory for performing solar research from Earth orbit. It weighs 11,181 kilograms (24,650 pounds), is 4.4 meters (14.7 feet) long and almost 6 meters (20 feet) in diameter with solar arrays folded, or 31 meters (102 feet) wide with arrays extended.

The ATM consists of five major hardware elements: experiment canister, attitude and pointing control system, solar array wings, control and display console (in the MDA) and the rack assembly.

The experiments canister consists of the spar, the MDA and the Sun end canister halves and the canister girth ring.

The rack is made of two large octagonally-shaped rings separated by eight vertical beams. Equipment-mounting panels are provided in seven of the bays between beams. One bay is left open for an astronaut work station. The Sun end mounts the solar shield assembly and acquisition Sun sensor.

A girth ring around the center of the spar is the structural interface between the experiments canister and the rack-mounted experiment pointing control-roll positioning mechanism.

The MDA end canister includes four film retrieval doors. The Sun end canister half has two film retrieval doors and ten aperture doors on the Sun end bulkhead.

Mounted on the ATM are major elements of Skylab's Attitude and Pointing Contol System that provides three-axis stabilization and maneuvering capability for the orbiting vehicle.

The ATM solar array consists of four wing assemblies which are stowed in a folded position for launch and deployed upon reaching orbit. The wings expose 112 square meters (1,200 square feet) of solar cells to the Sun.

Airlock Module

The Airlock Module is between the MDA and the OWS. It is 5.3 meters (17.5 feet) long, weighs 22,226 kilograms (49,000 pounds) and has 17.4 cubic meters (622 cubic feet) of habitable volume. It consists of a Structural Transition Section (STS), tunnel assembly, four truss assemblies, the lower truss of the Deployment Assembly, a flexible tunnel extension and a Fixed Airlock Shroud (FAS).

The STS connects the tunnel assembly to the MDA. The tunnel has an airlock and hatch to permit astronauts to perform extravehicular activities without depressurizing the entire spacecraft. The FAS provides a shroud around the aft portion of the AM and structural mounting for the AM and MDA, the Deployment Assembly and the Skylab oxygen supply tanks. It supports the Payload Shroud, ATM, AM and MDA during boost.

The four truss assemblies attach the AM to the FAS and provide exterior mounting for battery, electronic, thermal and experiment equipment.

The STS contains the AM data file, control panels, lights, circuit breaker panels, ducts, stowage containers, the molecular (mol) sieve, and cabin heat exchanger, ATM tank, water tank, condensate and carbon dioxide sensor modules.

Although relatively small, the AM tunnel contains dozens of items of equipment, including lights, ATM film tree support, ducts, vent valves, stowage, spare mol sieve fan and replacement liquid/gas separators, tape recorder module, portable timers, spare batteries, light bulbs and teleprinter head and numerous other items.

The FAS protects the AM aft compartment and serves as mounting structure for two discone antennas.

Multiple Docking Adapter

The Multiple Docking Adapter is a cylindrical structure with a forward conical bulkhead. It is 5.2 meters (17.3 feet) long and 3 meters (10 feet) in diameter. It weighs 6,260 kilograms (13,800 pounds and contains about 32 cubic meters (1,140 cubic feet) of space. It has an axial docking port at the forward end, to which the Apollo CSM will normally dock, and a radial port which could be used as a backup if necessary.

The MDA serves as the docking interface for the Command Module and permits the transfer of personnel, equipment, power and electrical signals between the docked CSM and the Airlock and Orbiting Workshop. In orbit the MDA functions as a major experiment control center for solar observations, metals and materials processing and Earth resources experiments. Major experiment items in the MDA are the ATM Control and Dispaly console, Earth Resources Experiment Package, and the M512 and M518 materials processing facilities.

Major items on the outside include the S192 10-band multispectral scanner, S191 infrared spectrometer, S194 L-Band antenna, proton spectrometer, inverter lighting control assembly, orientation lights, docking lights and docking targets.

The MDA also contains special tool kits and spare parts for selected types of orbital maintenance and activation/ deactivation sequences to be performed by the astronauts.

Payload Shroud

The Payload Shroud is a smooth structure which surrounds and protects the ATM, MDA, AM and associated equipment during launch and climb to orbit. Once in orbit, the PS is split into four quarters and jettisoned.

The PS is 6.5 meters (21.7 feet) in diameter at the aft end, 17.1 meters (56 feet) long and weighs 11,794 kilograms (26,000 pounds). It has a nose cap, a forward cone which tapers at a 25-degree angle, and an aft cone which tapers at a 12.5-degree angle. The aft cone connects to a cylindrical section which attaches to the Fixed Airlock Shroud.

VII - SATURN WORKSHOP

The Skylab cluster, without the CSM attached is called the Saturn Workshop. The following describes the major elements.

The Orbital Workshop (OWS) portion of Skylab is S-IVB-212, the second stage of Saturn IB vehicle SA-212, which has been converted into living and working quarters for three astronauts. It is divided into two main sections, the forward compartment and crew quarters. The living area, formerly the liquid hydrogen tank, affords 295 cubic meters (10,414 cubic feet) of space. The OWS weighs 35,380 kilograms (78,800 pounds).

Mounting on opposing sides of the OWS are solar array "wings" which provide electrical power. At the aft end, the engine was replaced by cold gas storage bottles and a refrigeration radiator. Thrusters for attitude control are mounted on the circumference at the aft end.

The crew quarters section, in the aft end of the former hydrogen tank, is divided into a wardroom with about 9.3 square meters (100 square feet) of floor space, a waste management compartment of 2.8 square meters (30 square feet), a sleep compartment of about 6.5 square meters (70 square feet) and an experiment area of about 16.7 square meters (180 square feet).

The forward compartment is separated from the crew quarters by an eight-inch beam structure with a grid on each side, serving as floor and ceiling. In the forward compartment are lockers for storing food, clothing, film and other items and water tanks holding enough for the entire mission.

On the water tank mounting ring are 25 lockers holding supplies such as bundles of urine bags, portable lights, electrical cables, hoses, umbilicals, pressure suits, tape recorder, charcoal filters, fans, lamps and intercom boxes. Major items on the floor and around the wall include the food lockers and freezers, several major items of experiment equipment, astronaut maneuvering equipment, EVA suits and various scientific instruments.

The thermal control and ventilation system will provide the astronauts with a habitable environment with temperatures ranging from 15.6 to 32.2 degrees Centigrade (60 to 90 degrees Fahrenheit) and an oxygen-nitrogen atmosphere with internal pressure of 3.45 Newtons per square centimeter (5 pounds per square inch).

-more-

VIII - SATURN LAUNCH VEHICLES

The launch vehicles for the Skylab program are Saturn multi-stage rockets developed by the NASA-Marshall Space Flight Center for the Apollo Program.

A two-stage Saturn V will send the unmanned Skylab cluster into Earth orbit. This will be the 13th flight of a Saturn V. Ten of the previous 12 vehicles have been manned, the rocket having been proven safe for manned flight after only two launches.

For its Skylab role, the Saturn V does not carry a "live" third stage. In its place will be the Orbital Workshop and mounted atop the Workshop, enclosed in a shroud, will be the Airlock Module, Multiple Docking Adapter and Apollo Telescope Mount. The Saturn V will place this unmanned payload into an Earth orbit at an altitude of 433.4 kilometers (268.7 miles).

The smaller Saturn IB vehicles will carry Skylab crews into orbit to rendezvous and dock with the orbiting space station. Each of these vehicles consists of the S-IB (first) stage and S-IVB (second) stage and the Instrument Unit with the manned Apollo Command-Service Module above.

Twelve Saturn IB vehicles were manufactured. Five have been launched successfully. The sixth (Sa-206) will carry the first crew (Skylab 2) into orbit, the next (SA-207) will transport the Skylab 3 crew, and the eighth (SA-208) will take the Skylab 4 crew to the space station.

In case of emergencies, the next vehicle in line will be used for a rescue mission. SA-209 would be used if rescue of the Skylab 4 crew was required.

NOTE: Robert O. Aller of NASA Headquarters, is Director of Skylab Operations. His name was spelled improperly in the Skylab News Reference.

-end-

GPO 861.000