

# CREW

Crew equipment includes all that provided for the protection, comfort, and assistance of the crew, as well as that for routine functions such as eating, sleeping, and cleansing. This section includes seven subsections: clothing, food and water, couches and restraints, hygiene equipment, operational aids, medical supplies, and survival equipment.

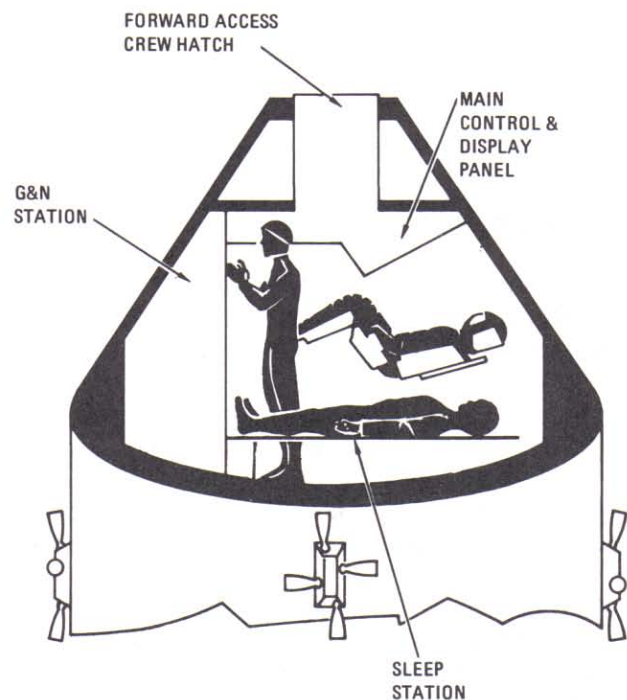
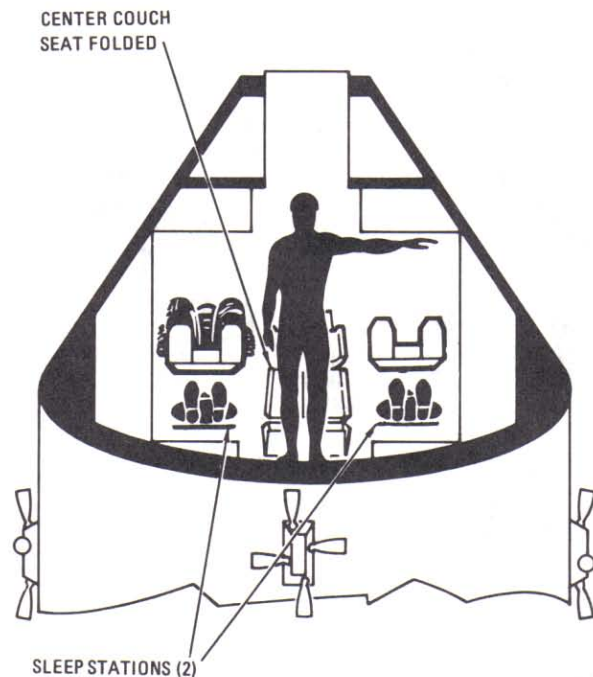
## CLOTHING

The number of items a crewman wears varies during a mission. There are three basic conditions: unsuited, suited, and extravehicular. Unsuited, the crewman breathes the cabin oxygen and wears a bioinstrumentation harness, a communication soft hat, a constant wear garment, flight coveralls, and booties.

Under the space suit, the astronaut wears the bioinstrumentation harness, communications soft hat, and constant-wear garment. The extravehicular outfit, designed primarily for wear during lunar exploration, includes the bioinstrumentation harness, a fecal containment system, a liquid-cooled garment, the communication soft hat, the space suit, a portable life support system (backpack), an oxygen purge system, a thermal meteoroid garment, and an extravehicular visor. The space suit and the extravehicular equipment are described in the Space Suit section.

The bioinstrumentation harness has sensors, signal conditioners, a belt, and wire signal carriers. These monitor the crewman's physical condition and relay the information to the spacecraft's communications subsystem. This information is telemetered to the ground throughout the lunar mission. The sensors are attached to the crewman's skin and routed to signal conditioners in the biomedical belt. The belt is cloth, with four pockets, and snaps onto the constant wear garment. The sensors, which monitor heart beat and respiration, are silver chloride electrodes applied with paste and tape; at least four are worn by each astronaut.

The constant-wear garment is an undergarment for the suit and flight coveralls. Made of porous cloth, it is a one-piece short-sleeved garment with feet similar to long underwear. It is zippered from waist to neck and has openings front and rear.

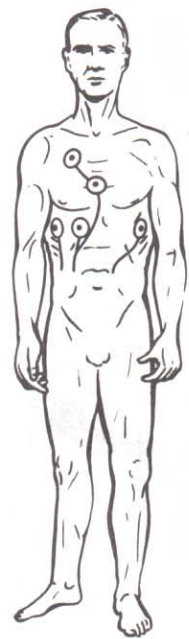


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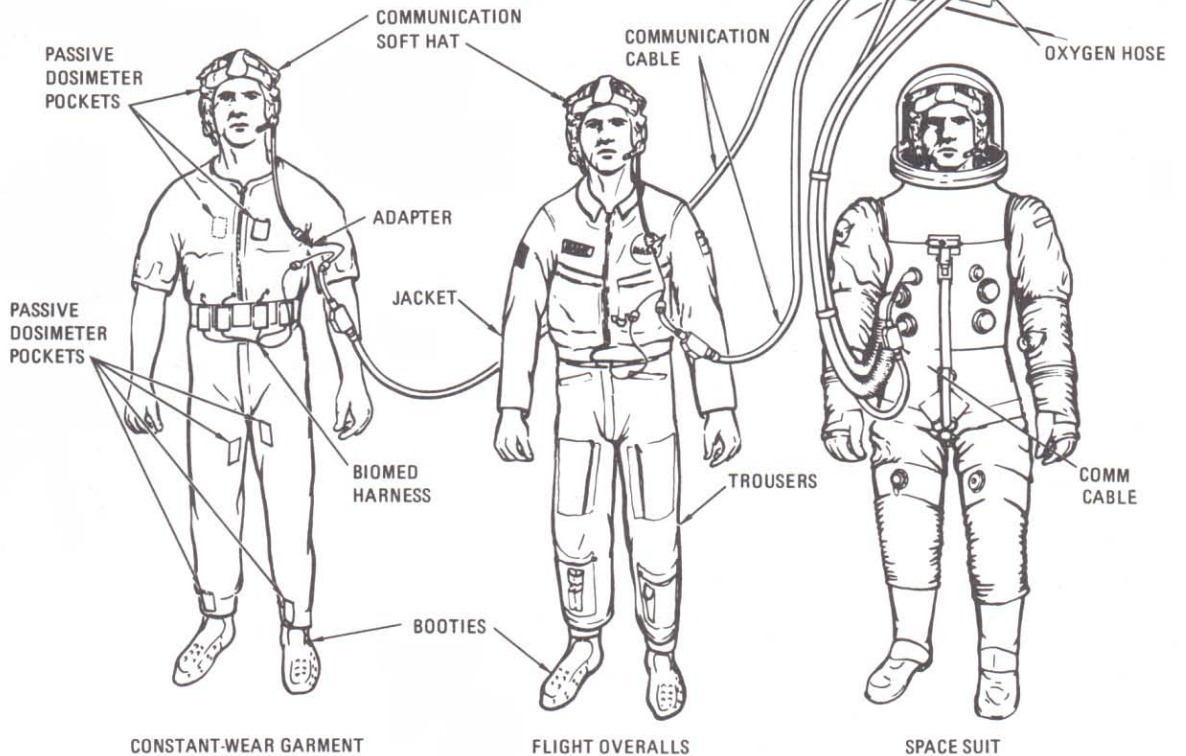
*Crew stations*

for personal hygiene. Pockets at the ankles, thighs, and chest hold passive radiation dosimeters. Spare garments are stowed on the aft bulkhead.

The flight coverall is the basic outer garment for



BIOMEDICAL SENSORS



CONSTANT-WEAR GARMENT

FLIGHT OVERALLS

SPACE SUIT

*Basic articles of clothing*

unsuited operations. It is a two-piece Beta cloth garment with pockets on the shins and thighs for personal equipment.

The communication soft hat is worn when suited. It has two earphones and two microphones, with voice tubes on two mounts that fit over the ears. Three straps adjust the hat for a snug fit and a chin strap is used to hold it on. A small pocket near the right temple holds a passive radiation dosimeter. An electrical cable runs from the hat to the communications cable. The lightweight headset is worn when crewmen are not in their suits.

Booties worn with the flight coveralls are made of Beta cloth with Velcro hook material bonded to the soles. During weightlessness, the Velcro hook engages Velcro pile patches attached to the floor to hold the crewmen in place.

## FOOD AND WATER

Food supplies, furnished by NASA, are designed to supply each astronaut with a balanced diet of approximately 2800 calories a day. The food is

either freeze-dried or concentrated and is carried in vacuum-packaged plastic bags. Each bag of freeze-dried food has a one-way valve through which water is inserted and a second valve through which the food passes. Concentrated food is packaged in bite-size units and needs no reconstitution. Several bags are packaged together to make one meal bag. The meal bags have red, white, and blue dots to identify them for each crewman, as well as labels to identify them by day and meal.

The food is reconstituted by adding hot or cold water through the one-way valve. The astronaut kneads the bag for about 3 minutes. He then cuts the neck of the bag and squeezes the food into his mouth. After use, a germicide tablet attached to the bag is dropped through the mouthpiece; this prevents fermentation and gas. Empty bags are rolled as small as possible, banded, and returned to the food stowage drawer.

The two food stowage compartments (in the left-hand and lower equipment bays) have 5072 cubic inches of space, enough to store food for about 14 days. The food is prepared by the

Pillsbury Co. and packaged by the Whirlpool Corp.

Drinking water comes from the water chiller to two outlets: the water meter dispenser and the food preparation unit. The dispenser has an aluminum mounting bracket, a 72-inch coiled hose, and a dispensing valve unit in the form of a button-actuated pistol. The pistol barrel is placed in the mouth and the button pushed for each half-ounce of water. The meter records the amount of water drunk. A valve is provided to shut off the system in case the dispenser develops a leak or malfunction.

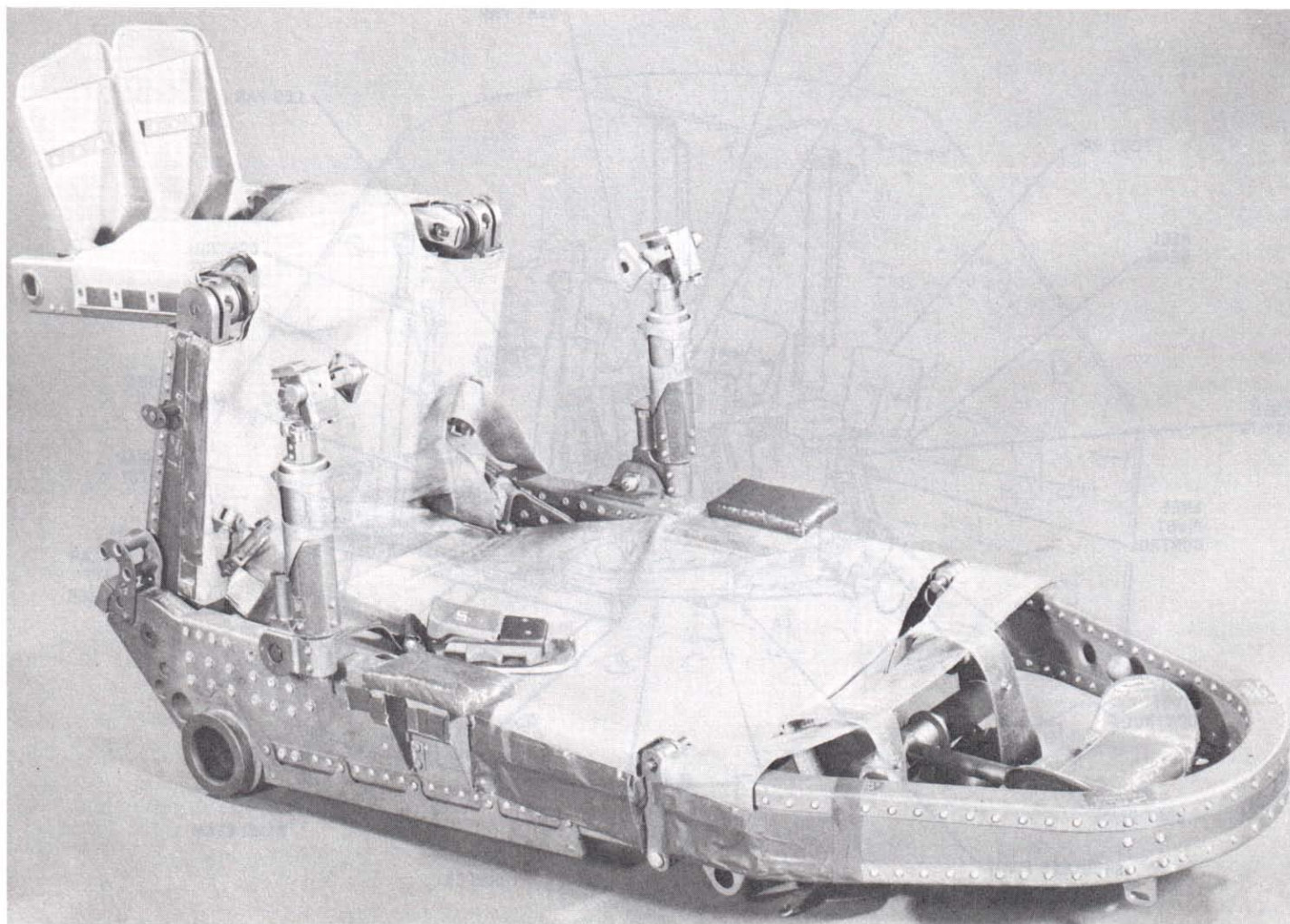
Food preparation water is dispensed from a unit which has hot (150°F) and cold (50°F) water. The water is dispensed in 1-ounce amounts by two syringe-like valves and a nozzle. The nozzle cover is removed and the food bag valve pushed

over the nozzle. The syringe valve (either hot or cold) then is pulled as many times as needed.

Cold water comes directly to the unit from the water chiller. Hot water is accumulated in a 38-ounce tank which contains three heaters that keep the water at 150°.

## COUCHES AND RESTRAINTS

The astronauts spend much of their time in their couches. These are individually adjustable units made of hollow steel tubing and covered with a heavy, fireproof fiberglass cloth (Armalon). The couches (produced by Weber Aircraft Division of Walter Kidde and Co., Burbank, Calif.) rest on a head beam and two side stabilizer beams supported by eight attenuator struts (two each for the Y and Z axes and four for the X axis) which absorb the impact of landing.



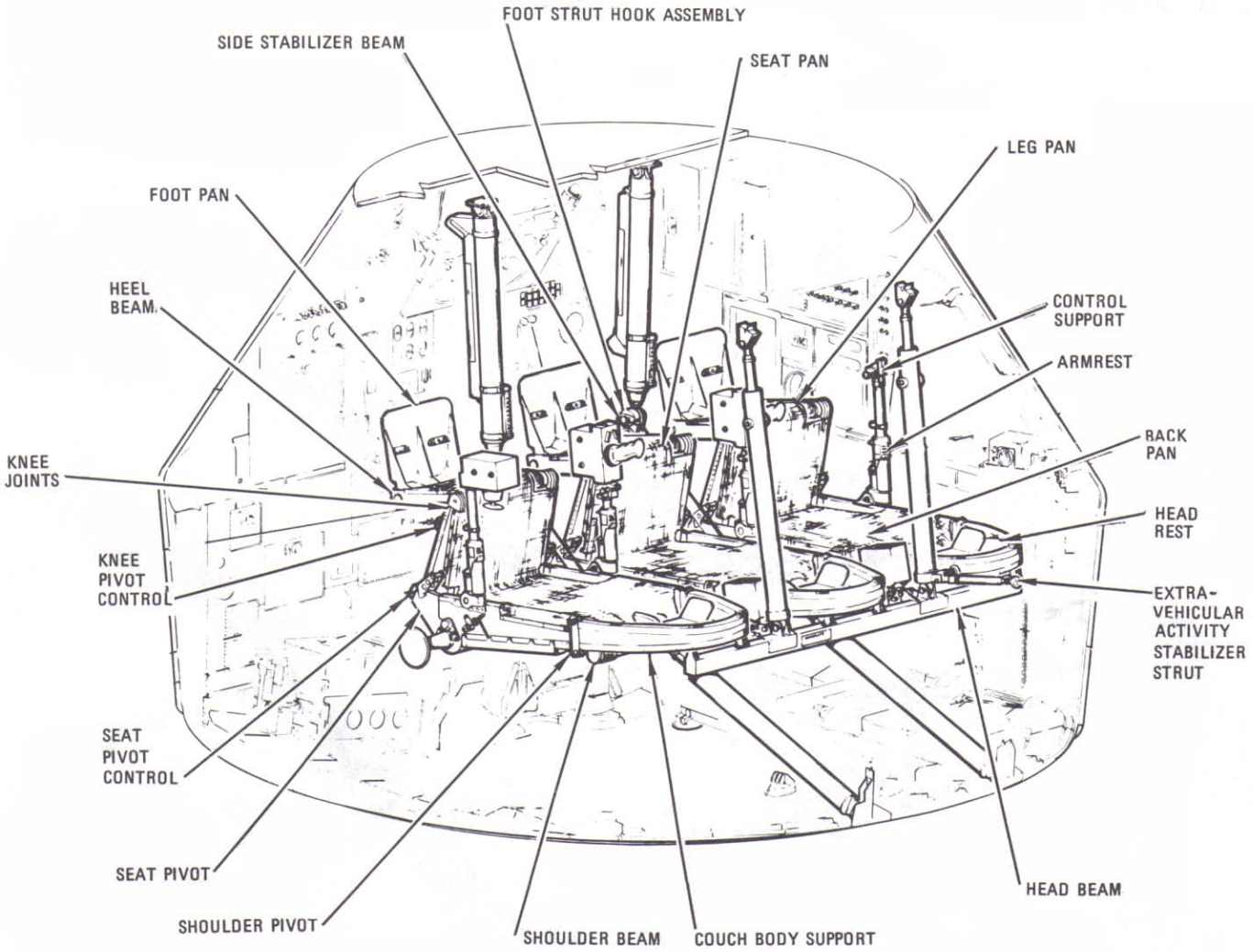
The couches — called foldable — support the crewmen during acceleration and deceleration, position the crewmen at their duty stations, and provide support for translation and rotation hand controls, lights, and other equipment. A lap belt and sholder straps are attached to the couches.

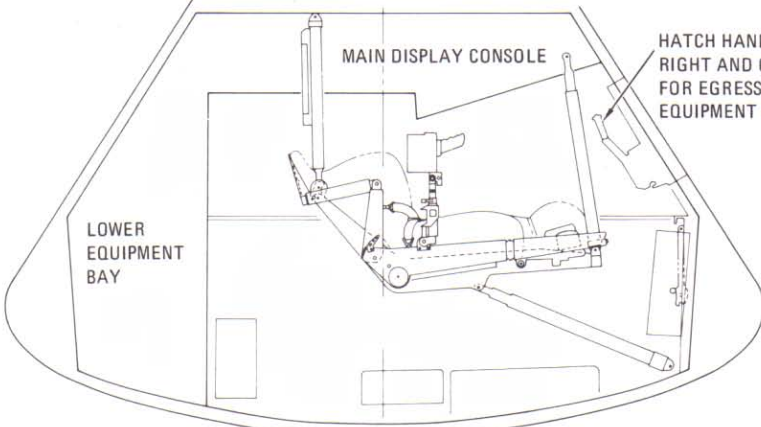
The couches can be folded or adjusted into a number of seat positions. The one used most is the 85-degree position assumed for launch, orbit entry, and landing. The 170-degree (flat-out) position is used primarily for the center couch, so that crewmen can move into the lower equipment bay. The armrests on either side of the center couch can be folded footward so the astronauts from the two outside couches can slide over easily. The hip pan of the center couch can be disconnected and the couch pivoted around the head beam and laid on the aft bulkhead (floor) of

the CM. This provides room for the astronauts to stand and easier access to the side hatch for extra-vehicular activity.

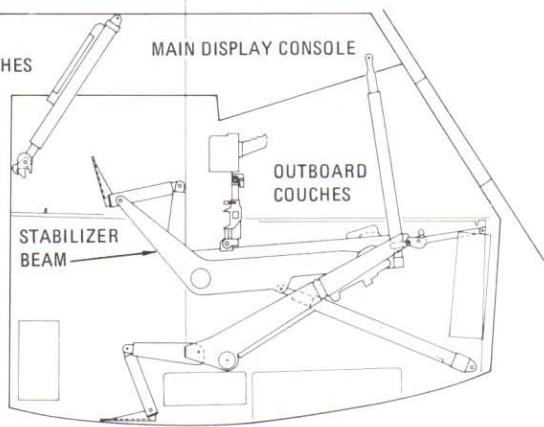
The three couches are basically the same. The head rest can be moved 6-1/2 inches up and down to adjust for crewman height. Two armrests are attached to the back pan of the left couch and two armrests to the right couch. The center couch has no armrests. The translation and rotation controls can be mounted to any of the four armrests. A support at the end of each armrest rotates 100 degrees to provide proper tilt for the controls. The couch seat pan and leg pan are formed of framing and cloth, and the foot pan is all steel. The foot pan contains a boot restraint device which engages the boot heel and holds it in place.

The couch restraint harness consists of a lap belt

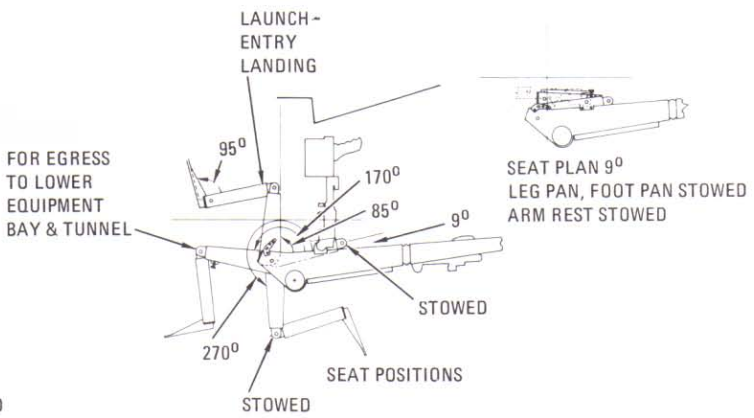
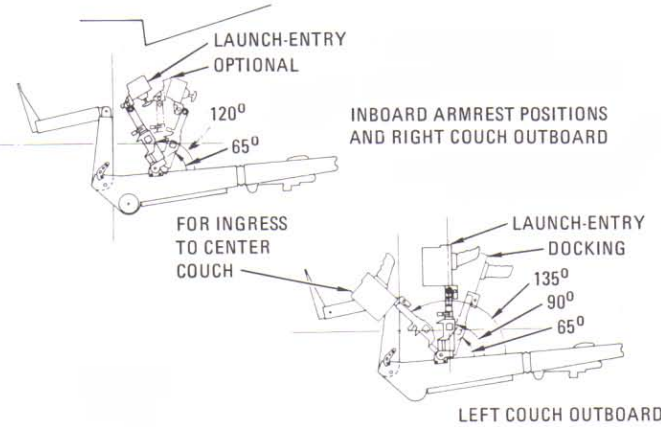




ALL COUCHES FOR LAUNCH, BOOST, ENTRY, LANDING



CENTER COUCH FOR ENTERING AND LEAVING



Couch positions

and two shoulder straps which connect to the lap belt at the buckle. The shoulder straps connect to the shoulder beam of the couch. The lap belt buckle is a lever-operated, three-point release mechanism. By pulling a lever, the shoulder straps and right-lap belt strap will be released. The strap ends and buckle have button snaps which are fastened to mating snaps on the controllers and struts to prevent them from floating during zero gravity.

Other restraints in the CM include handholds, a hand bar, hand straps and patches of Velcro which hold crewmen when they wear sandals.

Two aluminum handholds are by the side windows close to the main display console. The hand bar on the main display console near the side hatch helps crewmen move through the hatch and move couches to the locking position. The hand bar can be stowed or extended.

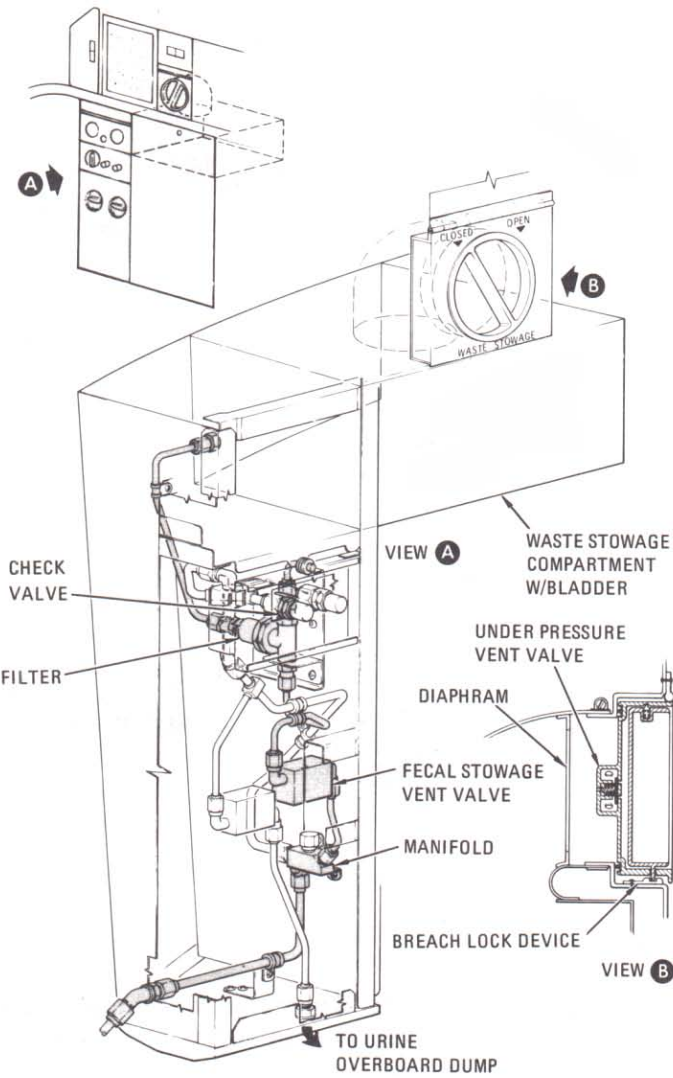
The hand straps, made of Fluorel attached by brackets at each end, serve as a maneuvering aid

during weightlessness. There are five hand straps behind the main display console and one on the left-hand equipment bay.

The astronauts sleep in bags under the left and right couches with the head toward the hatch. The two sleeping bags are lightweight Beta fabric 64 inches long, with zipper openings for the torso and 7-inch-diameter neck openings. They are supported by two longitudinal straps that attach to storage boxes in the lower equipment bay and to the CM inner structure. The astronauts sleep in the bags when unsuited and on top of the bags when they have the space suit on.

**HYGIENE EQUIPMENT**

Hygiene equipment includes wet and dry cloths for cleaning, towels, a toothbrush, and the waste management system. The cloths are 4 inches square and come in sealed plastic bags packaged with the food. The wet cloths are saturated with a germicide and water. Twelve-inch square towels similar to a washcloth are stowed under the left couch.



Waste storage vent system

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The waste management system controls and disposes of waste solids, liquids, and gases. The major portion of the system is in the right-hand equipment bay. The system stores feces, removes odors, dumps urine overboard, and removes urine from the space suit.

Urine, oxygen, and fecal odors, as well as emergency relief of fluids from the CM batteries and excess water from the water system, are routed overboard through the water/urine dump line. A small (0.055-inch) nozzle restricts gas flow to 0.4 cubic feet per minute and liquid flow to 1 pound per minute. The limited gas flow prevents excessive loss of cabin atmosphere during fecal canister use. The liquid flow is restricted to prevent the formation of ice in the nozzle. Redundant heaters at the nozzle also help prevent ice.

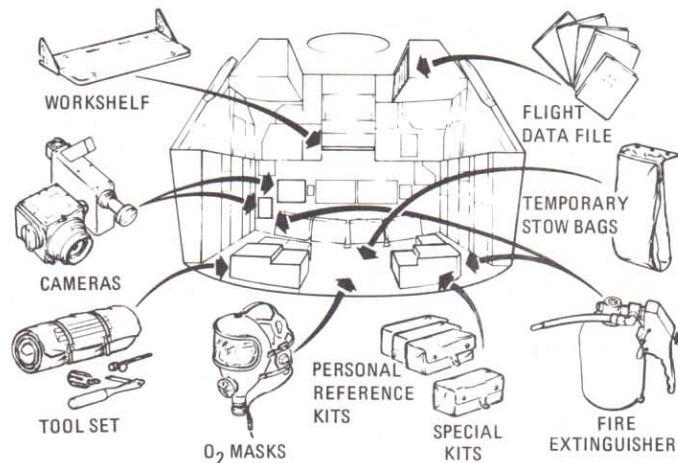
The urine subsystem contains urine collection bags, a 100-inch flexible hose (capable of reaching the crewman in a couch) with a 3/8-inch suit urine valve quick-disconnect, and controls. The urine collection bag connects to the flexible hose at one end and to a hold-on cuff at the other. The rubber cuff is rolled onto the penis. The flexible hose can withstand a 5-psia differential pressure.

The fecal subsystem has 30 bag assemblies and tissue dispensers. The bag assemblies have inner and outer fecal-emesis bags with pouches containing a germicide and a skin-cleaning towel. The rim of the inner bag is covered with a cement-like material covered with a thin plastic. For use, the plastic is peeled off and the bag "pasted" to the buttocks. After use, the germicide is inserted in the inner bag and the latter is sealed in the outer bag and kneaded. The sealed bags are stowed in the waste disposal compartment; a split membrane trap prevents the bags from floating through the door into the cabin when the door is open. Tissue dispensers contain tissue (Kleenex) for wiping and are stored in a container under the center couch.

## OPERATIONAL AIDS

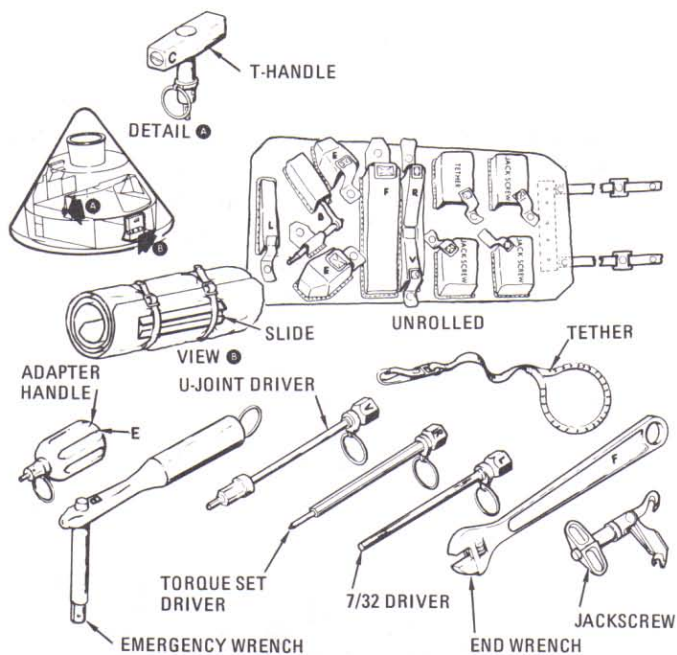
These include data files, tools, workshelf, cameras, fire extinguishers, oxygen masks, and waste bags.

The crew has a data file containing checklists, manuals, and charts needed for operation of the spacecraft. At launch the data file is stored in a compartment in the right-hand forward equipment bay. Data books used by the LM pilot are stored in



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Operational aids



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*Tool kit*

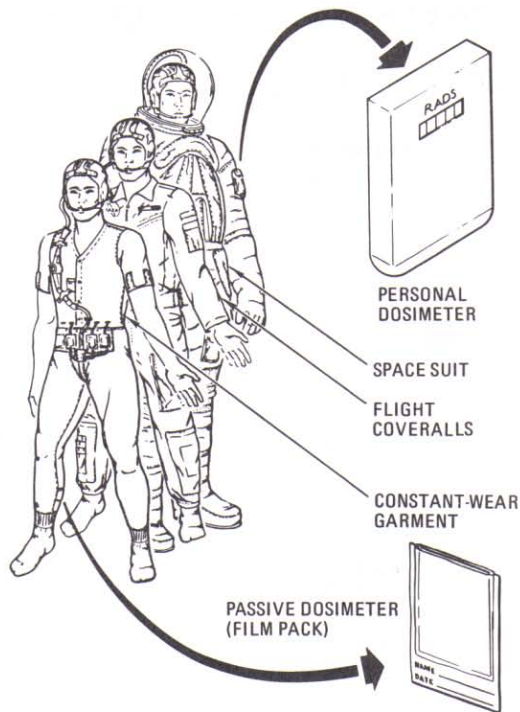
a container at his right side during flight. The files contain such things as the flight plan, mission log, landmark maps, star charts, and subsystem data.

The tool set holder is a synthetic cloth pouch which contains pockets for a number of tools. It rolls for stowage (on the aft bulkhead) and has snaps on the back so it can be attached to the CM structure. Among the tools in the set are an adjustable wrench, an adapter handle, hatch securing tools, two drivers, and a 20-inch tether. Placards throughout the CM indicate which tools are to be used and the direction of rotation.

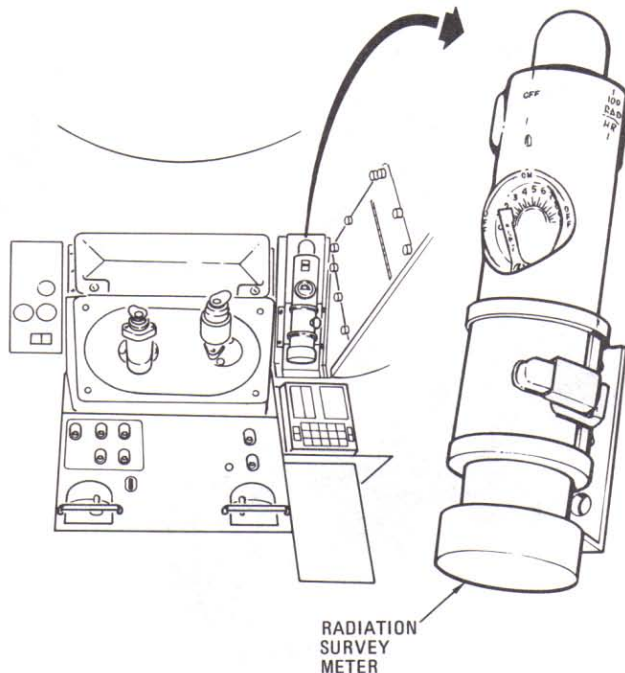
The astronauts will have still and movie cameras in the CM. The movie camera is a 16mm Maurer sequence camera that operates at 6 frames per second, 1 frame per second, single frame, and time exposure. Accessories include 18 and 5mm lenses and a right-angle mirror. The camera is powered by the spacecraft's dc system and can be mounted to the CM structure. The still camera is a 70mm Hasselblad. It is hand-held and manually operated, and has a ring sight and an 80mm lens. An exposure meter and a spotmeter also are provided.

The CM has one fire extinguisher, located adjacent to the left-hand and lower equipment bays. The extinguisher weighs about 8 pounds, is about 10 inches high, and has a 7-inch nozzle and handle. The tank body is a stainless steel cylinder with a dome. The extinguishing agent is an aqueous gel expelled in 2 cubic feet of foam for approxi-

mately 30 seconds at high pressure. The expelling agent is Freon. Safety features prevent sparking and over-heating. Fire ports are located at various panels so that the extinguisher's nozzle can be inserted to put out a fire behind the panel. The fire extinguishers are produced by Southwest Research Co., San Antonio, Tex.



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*Radiation measuring and monitoring units*

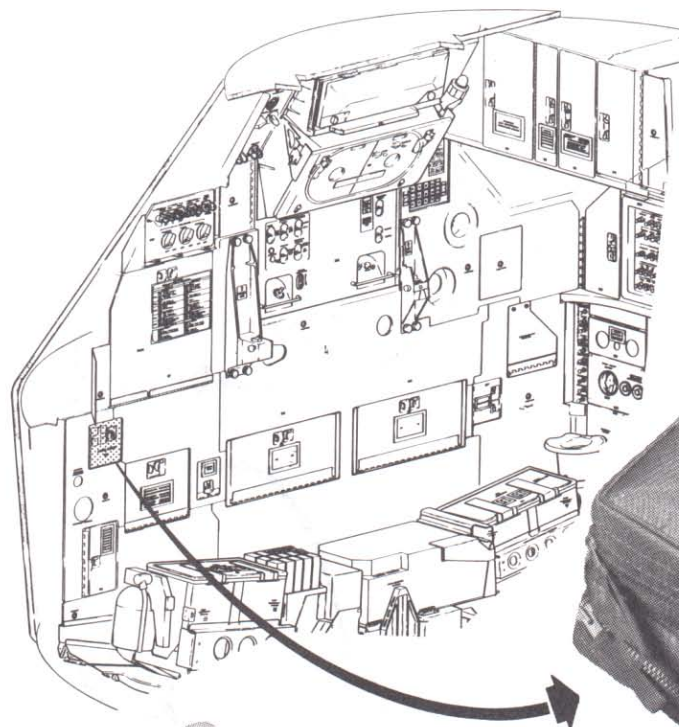
Oxygen masks are provided for each astronaut in case of smoke, toxic gas, or other hostile atmosphere in the cabin while the astronauts are out of their suits. The masks are a modified commercial type with headstraps. Oxygen is supplied through a flexible hose from the emergency oxygen/repressurization unit in the upper equipment bay. The masks are stowed in a cloth bag in the aft equipment bay below the emergency oxygen unit.

## MEDICAL SUPPLIES

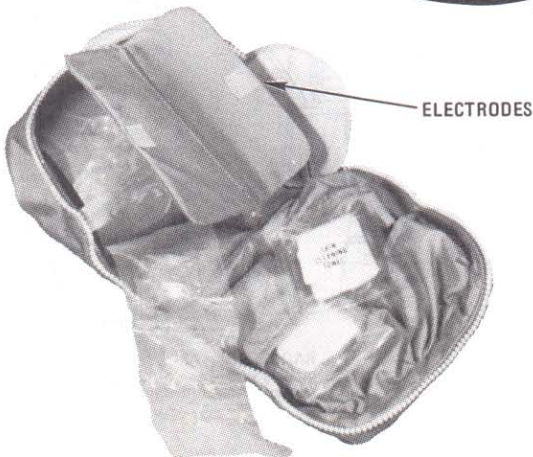
Medical equipment aboard the command module includes monitoring devices and emergency supplies.

The sensors attached to each crewman are the principal monitoring devices. These sensors are connected to signal conditioners which fit into pockets on the bioinstrumentation belt. The signal conditioners (somewhat smaller than a cigarette package and weighing about 2 ounces) amplify the low-level signals from the sensors, and transmit them to an electrocardiograph and an impedance pneumograph (which measures respiration rate).

A number of devices are used to monitor radiation level. These include passive dosimeters, personal radiation dosimeters, a radiation survey meter, a Van Allen Belt dosimeter, and a nuclear particle detection system.



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  - TEST PAPER
  - ROLL-ON CUFFS





Each crewman wears four passive dosimeters (film packs) in pockets at the temple, chest, thigh, and ankle. These register total radiation dosage and are processed on the ground after the mission. Each crewman also wears a personal radiation dosimeter which is battery-powered and about the size of a cigarette package; it has a readout which indicates the total dosage received during the mission.

The radiation survey meter determines the magnitude of the immediate radiation field; it is flashlight-like about 10 inches long and 2 inches in diameter. It is battery-operated and is clamped to a bracket near the guidance and navigation station in the lower equipment bay.

The Van Allen Belt dosimeter measures dose rates to the skin and blood-forming organs (depth dose measurement). It consists of two individual dosimeters (skin and depth) which have ionization chambers as sensors; the measurements of the sensors are telemetered to the ground. This is mounted in the structure of the CM near the hatch.

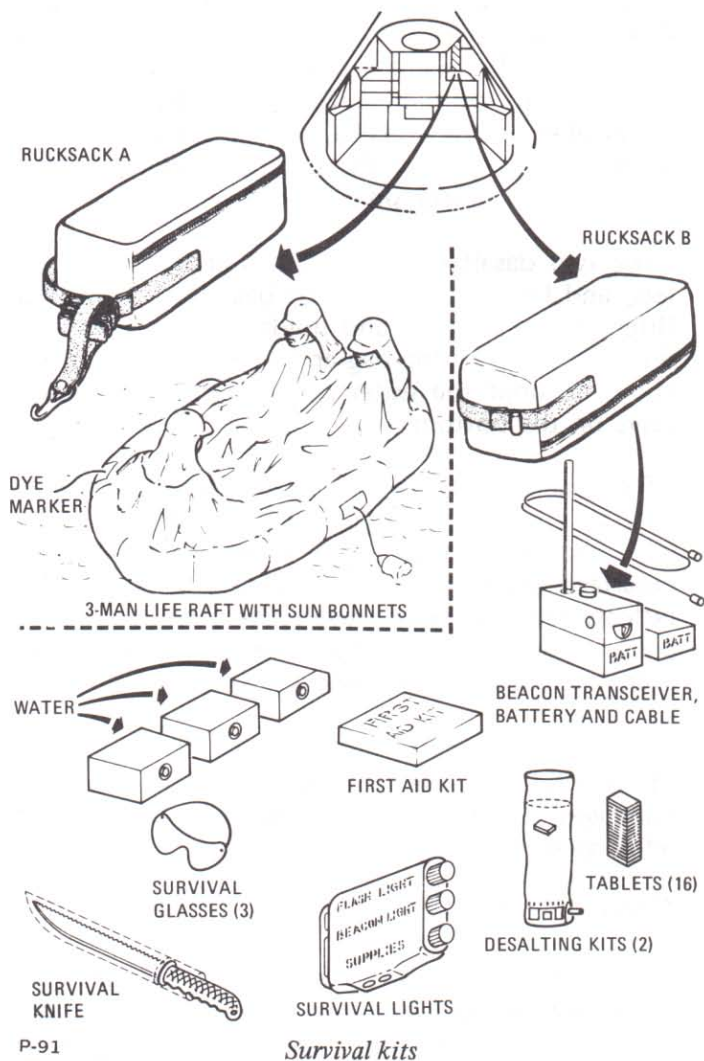
The nuclear particle detection system (produced by Philco Corp's Western Development Laboratory, Palo Alto, Calif.) measures proton and alpha particle rates and telemeters the information to the ground. It is normally located in the area between the command and service modules that is enclosed by the SM-CM fairing.

Medical supplies are contained in an emergency medical kit, about 7 by 5 by 5 inches, which is stored in the lower equipment bay. It contains oral drugs and pills (pain capsules, stimulant, antibiotic, motion sickness, diarrhea, decongestant, and aspirin), injectable drugs (for pain and motion sickness), bandages, topical agents (first aid cream, sun cream, and an antibiotic ointment), and eye drops.

## SURVIVAL EQUIPMENT

Survival equipment, intended for use in an emergency after earth landing, is stowed in two rucksacks in the right-hand forward equipment bay. The rucksacks are 18 inches long, 6 inches wide, and 6 inches deep and weigh about 54 pounds.

One of the rucksacks contains a three-man rubber life raft with an inflation assembly,



carbon-dioxide cylinder, a sea anchor, dye marker, and a sunbonnet for each crewman.

The other rucksack contains a beacon transceiver, survival lights, desalter kits, machete, sun-glasses, water cans, and a medical kit.

The UHF beacon transceiver (manufactured by Sperry Phoenix Co.) is a hand-held battery-powered radio tuned permanently to a VHF frequency of 243 megacycles. The receiver-transmitter and battery pack form a watertight assembly about 8 by 4-1/2 by 3 inches; a tapered, flexible steel tape antenna can be extended to 11-1/2 inches. The transceiver unit can be used for voice communications through a speaker and microphone or as a beacon, in which case it will transmit an intermittent signal for up to 24 hours. A spare battery and a spacecraft connector cable are provided.

The survival lights are contained in a waterproof, three-in-one device. The unit has a flashlight, a strobe light for night signaling, and a waterproof compartment containing fish hook, line, a sparky kit (striker and pith balls), needle and thread, and a whistle. The top of the unit is a compass with a folding signal mirror on one side.

The two desalter kits contain a process bag, tablets, and bag repair tape. The bag is plastic with a filter at the bottom and holds about a pint. Sea water is put into the bag and a tablet added; after about an hour the water can be drunk through a valve on the bottom.

The machete (protected with a cloth sheath) is very thin with a razor edge on one side and a saw edge on the other. The three sunglasses are polarized plastic sheet with a gold coating that reflects heat and radio waves. The three water cans are aluminum, hold a little more than a half-gallon each, and have a drinking valve.

The survival medical kit contains the same type of supplies as the emergency medical kit: 6 bandages, 6 injectors, 30 tablets, and one tube of all-purpose ointment.

## EQUIPMENT

Bioinstrumentation Harness — Sensors are attached to bodies of each crewman with paste and tape to monitor heartbeat (electrocardiogram) and respiration (impedance pneumograph). The assembly includes three signal conditioners (cigarette package size) and accessories located in the medical accessories kit.

Cameras — There are a 16-mm Maurer sequence camera and a 70-mm Hasselblad camera. Accessories for the Maurer are an 18-mm lens, a right angle mirror, power cable and film magazines. The camera weighs about 1.9 pounds and each magazine, 1/2 pound. Ten to 15 magazines are carried. It is electrically operated on 28 volts dc. Normally, it is mounted on the right rendezvous window frame. There are two electrical outlets in the cabin from which it can be used as a hand-held camera to take sequential pictures of crew activity. It is also used to show docking and rendezvous movies and any other sequential operation. It can be operated at speeds of six or one frame per second, or for test, single frame or time exposure. The 70-mm Hasselblad is hand-held and has an



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*Communications soft hat*

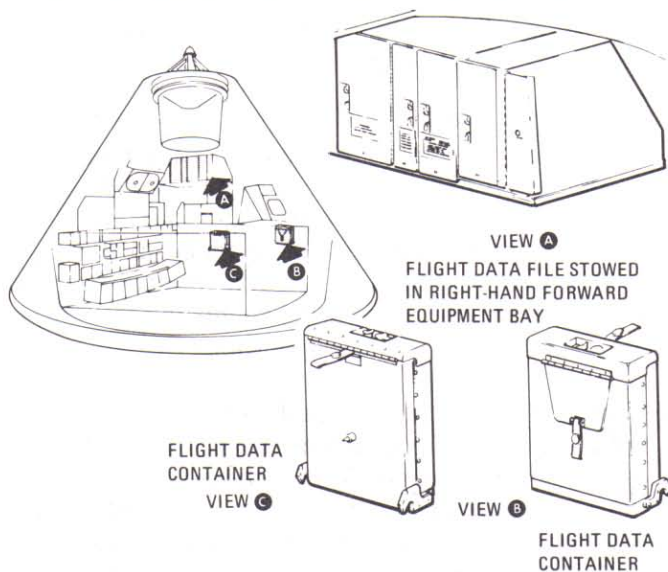
80-mm Zeiss planar lens and a ring sight. The camera weighs 1.9 pounds and each of five cassettes weighs 1.59 pounds. Each cassette has 150 exposures. This camera will be used for high-resolution photography. It will verify landmark tracking; record third-stage Saturn separation; photograph disturbed weather regions (hurricanes, typhoons etc.) debris collection on spacecraft windows, other equipment in space, the lunar module during rendezvous and docking, the terrain of the moon, and act as a back up to the 16-mm camera. The cameras are stowed in the lower equipment bay.

Communications Soft Hat — It has two earphones and two microphones, with voice tubes, on two mounts that fit over the ears. It is made of cloth and plastic. There are three straps attached to the mounts with laces for individual fitting. A chin strap secures it to the head. A small pocket on the inside near the right temple holds a passive dosimeter film packet. An electrical cable with a 21-socket connector will connect to the constant-wear garment adapter or the space suit. The hat is worn at all times for the purpose of

communications.

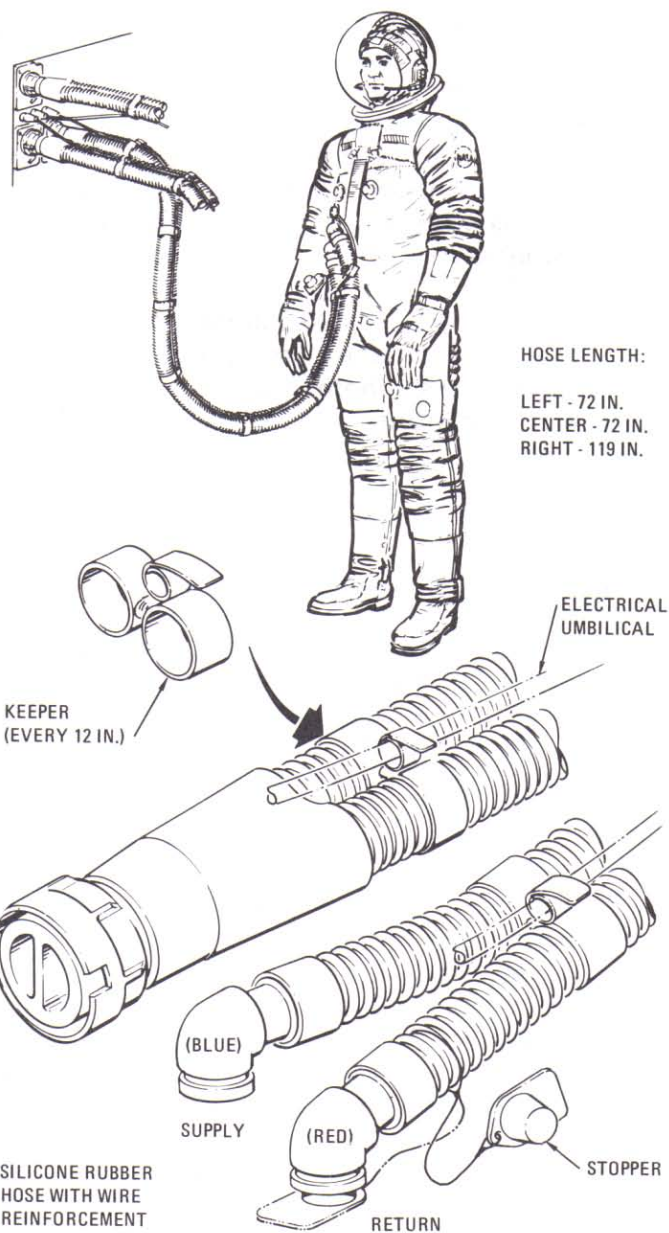
**Constant Wear Garment** (David Clark Co.) – This is a 13-ounce undergarment for the space suit. It is a porous cotton cloth, one-piece garment similar to long underwear. It has a zipper from the waist to the neck and openings for urination and defecation. There are snaps at the midsection to attach the biomedical belt with signal conditioners, and pockets for film packet passive dosimeters at the ankles, thighs, and chest. The garment also has integral socks. Each crewman will wear one garment and will have another garment stowed in a locker on the aft bulkhead bay.

**Couches** (Weber Aircraft, Burbank, Calif.) – The three crew couches (left, center, and right) are made of steel framing and tubing and covered with Armalon, a heavy glass fiber cloth impregnated with Teflon. The couches are clamped together and weigh 280 pounds. They are suspended and supported by eight attenuator struts, and each couch is adjustable. The backpan of each couch is 32 by 22 inches and is concave. Headrests can be moved 6-1/4 inches up and down to adjust for crewman height. The hiprest and upper legrest form the seat of the seatpan. The seatpan also has a footrest, which engages the boot heel and holds it in place. The couch seats are adjustable to a number of positions, but the ones used most are 85 degrees (for launch, orbit, entry, and landing), 170 degrees (when crewmen want to get to lower equipment bay), and 11 degrees (when crewmen want to get to right, left, and lower equipment



*Flight data file*

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*Oxygen hose assembly*

bay stowage areas). It can also be adjusted to 270 degrees for lower equipment accessibility. Positions are indicative of the angle of the seatpan (which is movable) to the backrest.

**Crewman Umbilical Assembly** – Cable and hose assembly is connected to the space suit – the cable for electrical power for communications equipment and the hose for oxygen. There are three oxygen hoses made of Fluorel, or silicon rubber in a fiberglass cloth sock. Two of the hoses are 72 inches long with a diameter of 1-1/4 inches and weigh 5.3 pounds each. The third, used for transfer to the lunar module, is

119 inches long with a diameter of 1-1/4 inches and weighs 8.2 pounds. The communications cables are Fluorel-covered and consist of a cable and control head. Two are 74 inches long with a 3/8-inch diameter and weigh 2.5 pounds each. Two others, one of which is a spare, are 121 inches long with a 3/8-inch diameter and weigh 3.5 pounds each.

**Data Files** – There are 20 volumes, containing all reference data for the mission, including checklists, light plans, photo logs, star charts, lunar and earth landmark maps, orbital map, malfunction procedures, and crew logs. They weigh a total of 20 pounds and are stored in the right-hand forward equipment stowage compartment.

#### Emergency Oxygen Mask and Hose (Darling Co.)

Each crewman has a mask to wear in case of smoke, toxic gas, or other hostile environment when he is in shirtsleeves. Total weight for masks and hoses is 4 pounds. The masks are stowed in a Beta cloth bag on the aft bulkhead below the emergency oxygen/repressurization unit.

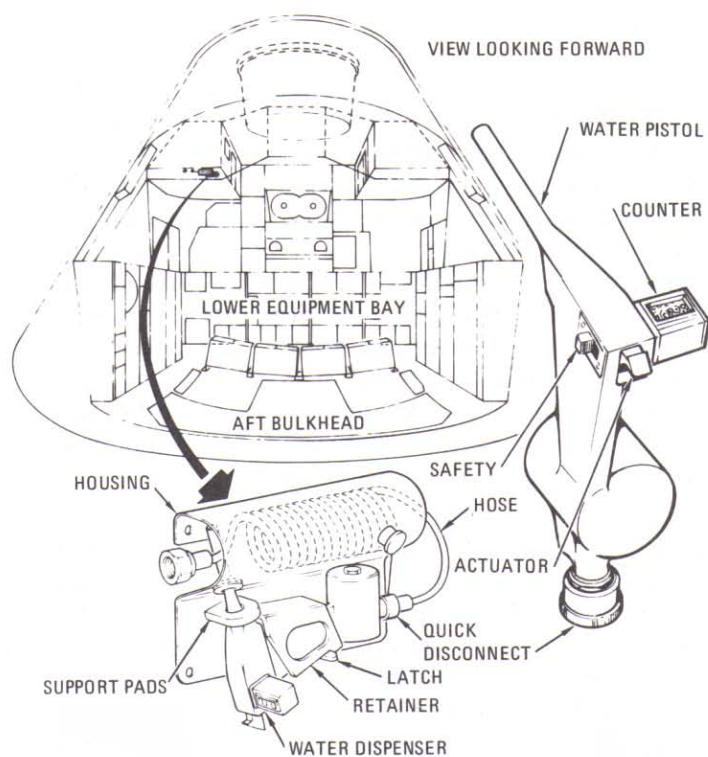
#### Fire Extinguisher (Southwest Research Co.) –

There is one extinguisher stowed in the lower equipment bay beside a CO<sub>2</sub> absorber container. It weighs about 8 pounds, is 10 inches high, and has a 7-inch flexible nozzle and a handle both of which are insulated. It is a stainless steel cylinder with dome containing 2 cubic feet of aqueous gel foam at 6 pounds per square inch. It is activated by pulling a pin and pressing a button.

#### Flight Coveralls – This is a two-piece Beta Cloth garment with a pair of booties. The coveralls and booties weigh 3 pounds. The coveralls are worn over the constant wear garment and provide additional warmth as well as stowage for miscellaneous personal equipment while in a shirtsleeve environment. The booties are cloth fabric boots with snaps at the ankles. They have Velcro patches at the balls of the feet.

**Medical Accessories Kit** – Beta cloth bag, about 7 by 5 by 5 inches, has two zippers for access to oral drugs and pills, injectable drugs, dressings, creams and ointments, and bioinstrumentation accessories. The kit weighs 2.5 pounds and is in the lower equipment bay.

**Nuclear Particle Detection System** – This consists of a detector assembly in the form of a telescope



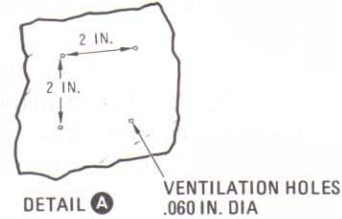
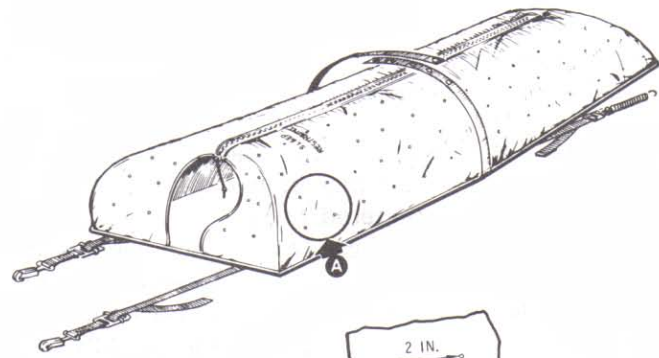
P-95 *Water metering dispenser assembly*

and a signal analyzer assembly. The pulse rates from the detector assembly at which particles enter the various energy intervals are converted to d-c voltage levels by ratemeters in the signal analyzer; the outputs of the ratemeters are then telemetered to ground. The system measures proton and alpha particle rates in four proton and three alpha differential energy bands and one integral proton energy band. The unit is in the adapter section between the command and service modules and is mounted on the forward bulkhead of the service module.

**Passive Dosimeters** – Each crewman wears three of the radiation-measuring devices, which are processed after recovery to determine total dosage received. They are in form film packs and are worn in constant wear garment pockets at the chest to simulate a 5-centimeter depth to measure bone marrow dosage and at the thigh and ankle to measure skin dosage. Each weighs about half an ounce.

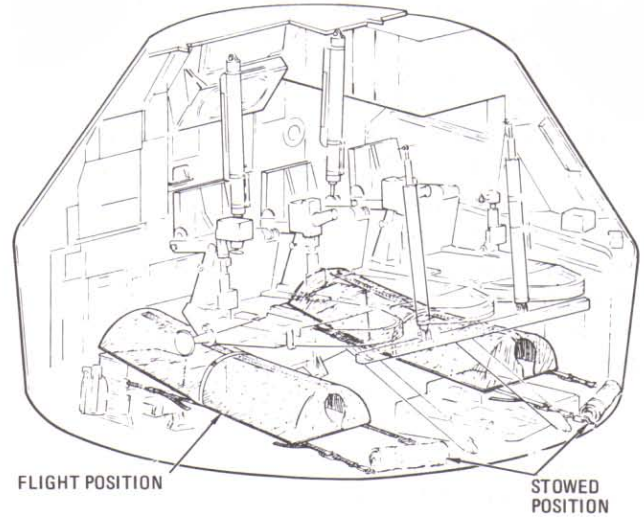
**Personal Dosimeters** – Each crewman wears a battery-powered radiation dosimeter about the size of a cigarette package in the pocket of a sleeve of the space suit or flight coveralls. Its readout dial will indicate in rads accumulated dosage of radiation received by the crewman during the mission. The dosimeter weighs half a pound.

**Personal Hygiene** — Each crewman has a toothbrush, 4-by-4-inch wet and dry cleansing cloths, and a tube of ingestible toothpaste, items that are packaged with the food. The wet cloths are saturated with a germicide and water. Towels, 12 by 12 inches and similar to washcloths, will be packaged in containers and stowed in an aft bulkhead locker.



**Pilots Preference Kits** — Each crewman has an 8 by 4 by 2-inch Beta cloth bag for personal items. The bags are kept in an aft bulkhead stowage locker.

**Radiation Survey Meter** — It is a 1.58-pound cylinder 10 inches long and 2 inches in diameter. It measures the magnitude of the immediate radiation field. It has an on-off switch, a direct readout dial calibrated in radians per hour, and is battery operated. The meter is clamped in a bracket mounted on the guidance and navigation signal conditioning panel. It is transferred to the lunar module during crew transfer.



**Restraints** — Gravity-load restraints are three harnesses (one for each crewman) to hold crewmen in their couches; two handholds, and a hand bar. Each restraint harness has a lap belt and two shoulder straps connected at a lap belt buckle. The lap belt buckle is a lever-operated, three-point release mechanism. The strap ends and buckle have snap fasteners and they can be fastened to mating snaps on the couch and struts when not in use. The handholds are strong aluminum handles, one on each longeron by the side windows. The hand bar is near the side hatch and can be stowed or extended. A crewman can hold it with two hands for ingress or egress from the command module side hatch. Zero-gravity restraints are five hand straps behind the main display console, one on the left-hand equipment bay, and one on each lower x-x axis strut.

P-96

*Sleep station restraints*

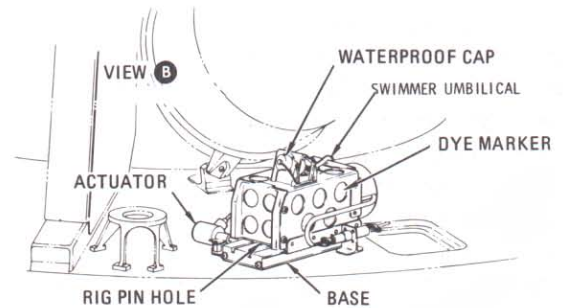
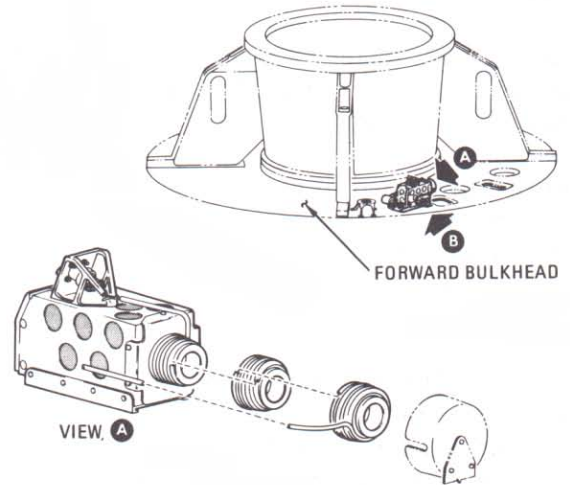
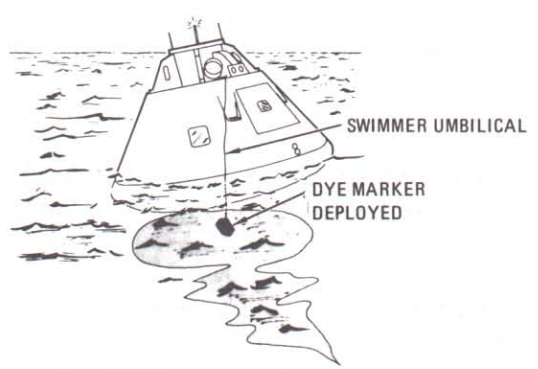
mounted on the side of the lighting and audio control console above the side viewing window; they have folding joints. The center astronaut's mirror is mounted on the right-hand upper x-x axis attenuator strut. External viewing mirrors, which also are metal, consist of an upper mirror assembly mounted on the side wall near the upper rim on the right rendezvous window frame and a lower mirror assembly mounted on the right rendezvous window housing near the lower rim of the window frame. A mirror assembly is a mirror and a bracket.

**Sighting Aids** — Each of the command module's five windows has an aluminum sheet window shade held on by wing latches. They are .20-inch thick with .250-inch frames and are stowed in a stowage bag in the upper equipment bay. There are two mirror subsystems: internal and external. Each couch has a 4-by-6-inch metal internal viewing mirror assembly consisting of a mounting base, a two-segmented arm, and a mirror. The mirrors for the left and right astronauts are

**Sleeping Bags** — There are two Beta-cloth sleeping bags weighing 2.5 pounds each. They are 64 inches long with a 7-inch diameter neck opening when the bag is zippered closed. There is a torso zipper opening. The bags have holes for ventilation every 4 inches. The bags are under the left

and right couches for couches. At launch, they are rolled and strapped against the upper side wall and aft bulkhead.

**Survival Kit** – The kit is stowed in the right-hand forward equipment bay in two rucksacks, which are Beta cloth zippered bags. Both rucksacks are 18 by 6 by 6 inches. One, which weighs 34.8 pounds, contains a VHF beacon-transceiver which is a hand-held, battery-powered radio fixed-tuned to a VHF frequency of 243 megacycles; it is manufactured by Sperry Phoenix Co. The receiver-transmitter and battery pack assemblies mate to form a water-tight 8-by-4-1/2-by-3-inch unit. The antenna is an 11-1/2-inch tapered flexible steel tape ending in a coaxial RF connector and is normally stored in a retaining spool and clipped on top of the radio. The rucksack also contains a spare battery and spacecraft connector cable; a survival light unit containing a flashlight, a strobe light for night signaling, a fish hook and line, a sparky kit (striker and pith balls), needle and thread, whistle, compass, and a folding signal mirror; plastic desalter bag with a filter at the bottom; desalter tablets; desalter bag repair tape; one machete protected with a cloth sheath (the knife has a razor edge and the back edge is a saw); three pair of sunglasses that are a polarized plastic sheet with Sierra Coat III – a gold coating that reflects heat and radio waves – to protect eyes against the sun and glare; three 5-pound capacity aluminum water cans; and medical kit with 6 Band-Aids, 6 injectors, 30 tablets, and one tube of all-purpose ointment. The other rucksack weighs 17.8 pounds and contains a three-man life raft with lanyard with an inflation assembly and CO<sub>2</sub> cylinder, a sea anchor, a dye marker kit, and three sunbonnets.



P-97

*Dye marker and swimmer umbilical*

tools weigh 2.19 pounds. They are stowed in a locker in the aft bulkhead.

**Van Allen Belt Dosimeter** – The meter is 2-1/2 by 8 by 3 inches and weighs 6 pounds. It measures dose rates to the skin and blood-forming organs. It has two dosimeters (skin and depth), which have ionization chambers as sensors. The meter is mounted in the command module between longeron No. 4 and the hatch. It has three telemetry channels and is powered by 28 volts dc.

**Temporary Stowage Bags** – Each crewman has a 3-foot-by-1-foot-by-3-inch bag with inner and outer pocket. It is made of Beta cloth (fiberglass cloth). The inner bag is for temporary stowage of small items; the outer bag is for dry, uncontaminated waste. The bags are stowed in an upper equipment bay locker.

**Tools** – A rolled pouch contains an emergency wrench, two adapter handles, a crescent wrench, a 4-inch torque set driver, three jack screws, and a 20-inch tether. Each tool has a tether ring, and each is designated by a letter of the alphabet, except the three jack screws. The pouch and