

IBM MOVIE: DISCOVERY COMPUTER

PERSONNEL:

- 1. Mission Commander (Bowman)
- 2. Propulsion systems Officer (Hubble)
- 3. Communications and Electronics Officer (Kimble)
- 4. Navigation and Astronomy Officer (Kaminski)
- 5. Bio-medical Officer (Poole)
- 6. Life Support Systems Officer (Whitehead)

These characters appear in the "blister" in shifts of three for the first ten days of the space flight. All of them are in the blister only for "conferences!"

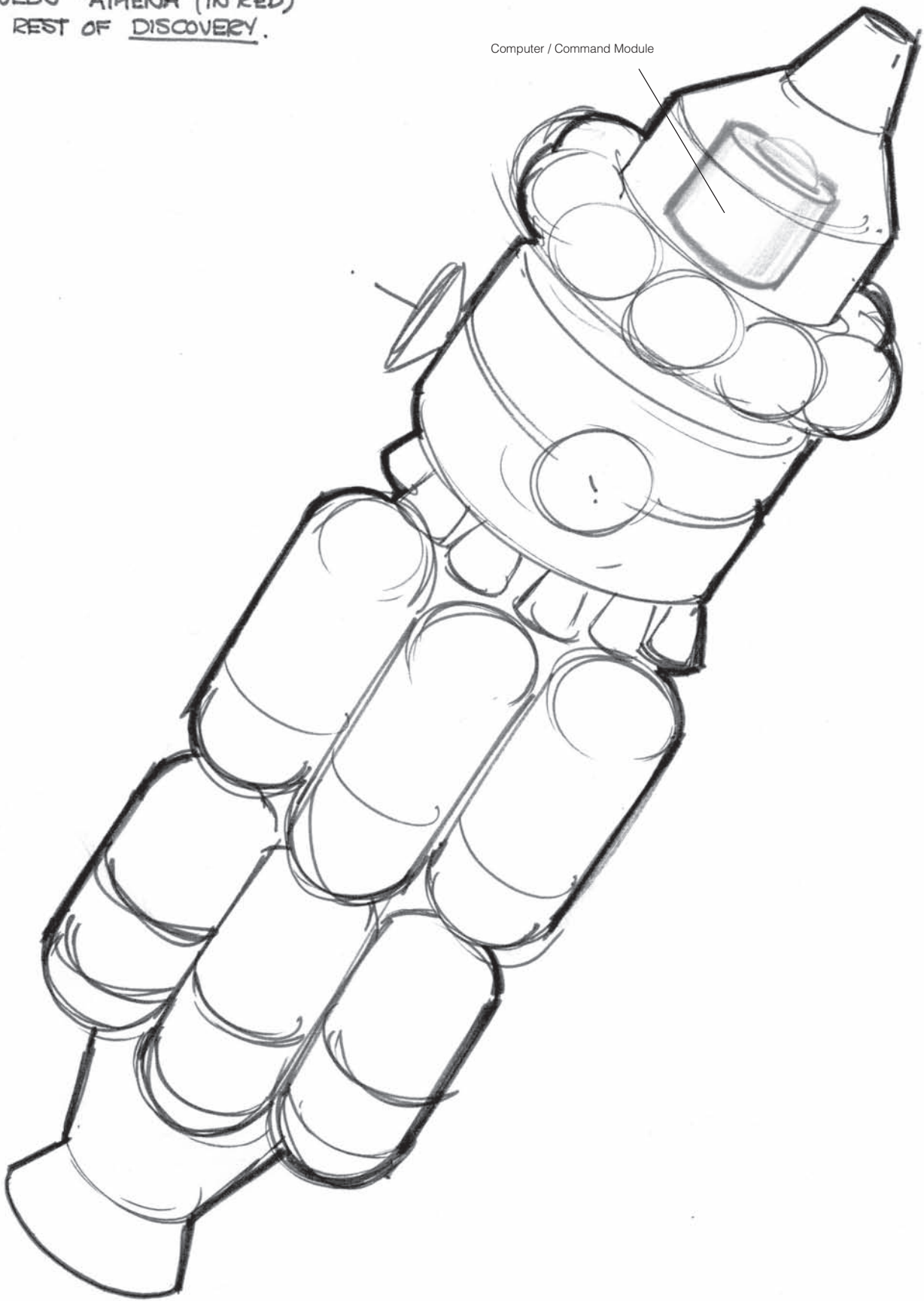
For the remainder of the flight while the rest of the crew is hibernating, Bowman is all alone, dividing his time between the blister and the "carousel".

COMPUTER'S FEATURES

- 1. On a "Bio-sensor" display, it monitors the life support system, indicating oxygen pressure, temperature, hull leaks, radiation, and the metabolism of the crew. (page 96, 138) It also participates in the revival of the hibernating crew (page 141).
- 2. The computer, "Athena", makes navigational computations, controls flight maneuvers, and probably keeps time.
- 3. It also contains a variety of communication gear, including transmitters, receivers, radars, and tape recording equipment.
- 4. It provides movies, electronically printed books and newspapers and manuals and engineering drawings; it displays "faces" of people on earth, plays chess and word games and provides music for listening entertainment.
- 5. The computer maintains a "log" of the journey, making its own entries plus those of Bowman, which he records verbally. The computer takes verbal instructions and replies through a "speech synthesizer" (female voice).
- 6. An infrared scanner provides information to the computer which, in turn, displays a heat map. The computer also stores photographic information supplied to it, and recreates photographs.
- 7. The computer and controls include "glorified typewriter keyboard inputs" and pushbuttons as well as the verbal input.
- 8. A teaching machine is associated with the computer, and so is a "high speed printer", which probably is electronic.
- 9. The computer may also operate the "ship's beacon transmitter" which is turned on by Bowman when he gets up each "morning".

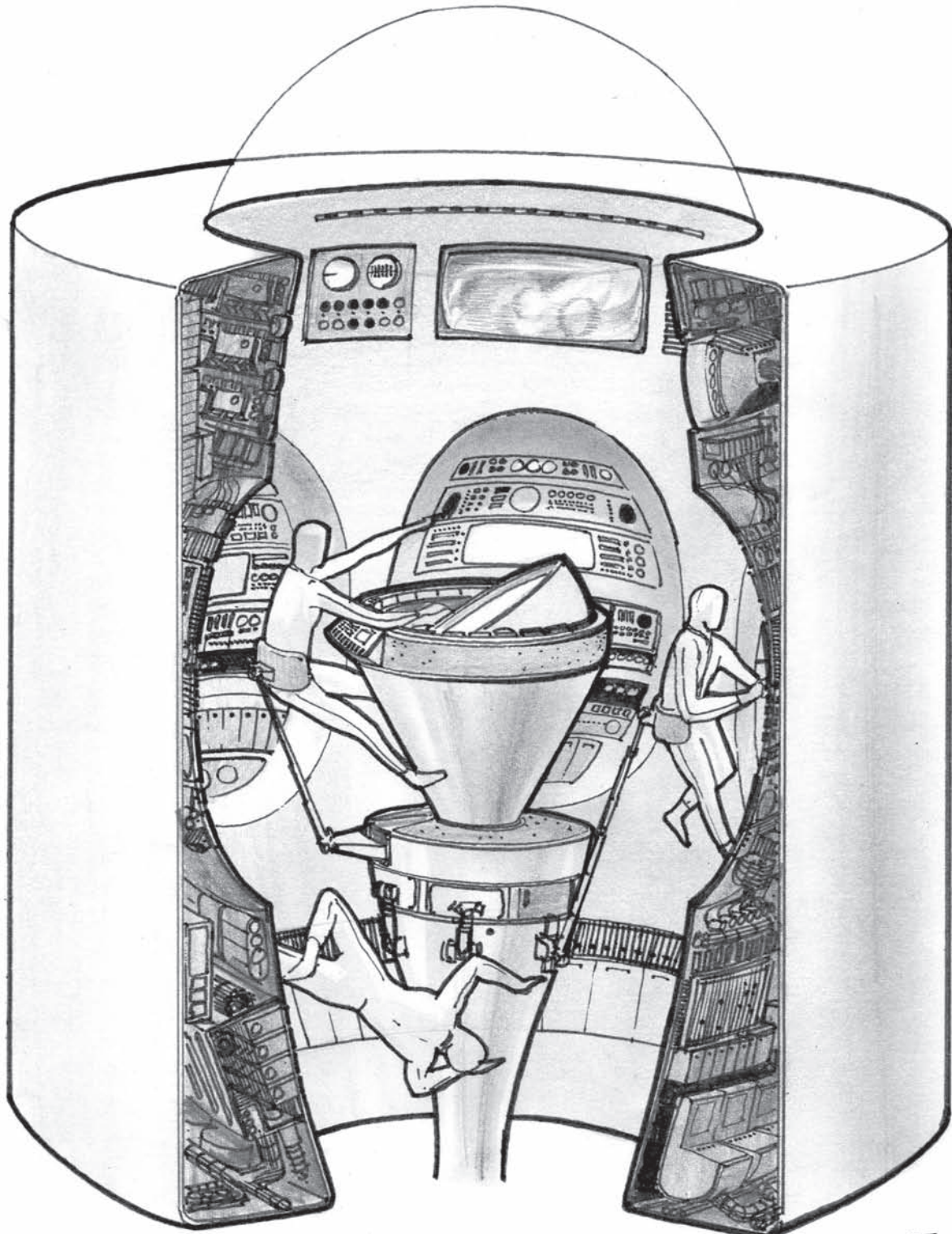
POSSIBLE RELATIONSHIP
BETWEEN "ATHENA" (IN RED)
AND REST OF DISCOVERY.

Computer / Command Module



AL HAWTHORNE

ELIOT NOYES & ASSOC. - IBM - MOVIE 7-20-65



AL HAWTHORNE

OBSERVATION BLISTER
(BY OTHERS)

CREW
WORK STATION (5)

INSTRUMENT MONITORS
MASTER MONITORING SCREEN

MISSION
COMMANDER

COMBINATION
NAVIGATION
VISUALIZER
MANEUVERING
PLOTTER
LIGHT WRITING
SURFACE
COMMAND
MONITOR

SCREEN
DISPLAY
AREA
MONITORS
STATUS OF
SHIP AND
CREW

KEYBOARD
INPUT
VOICE INPUT
RADIO
COMMUNICATIONS
VOICE AND
VISUAL
RECORDING
(REMOTE)

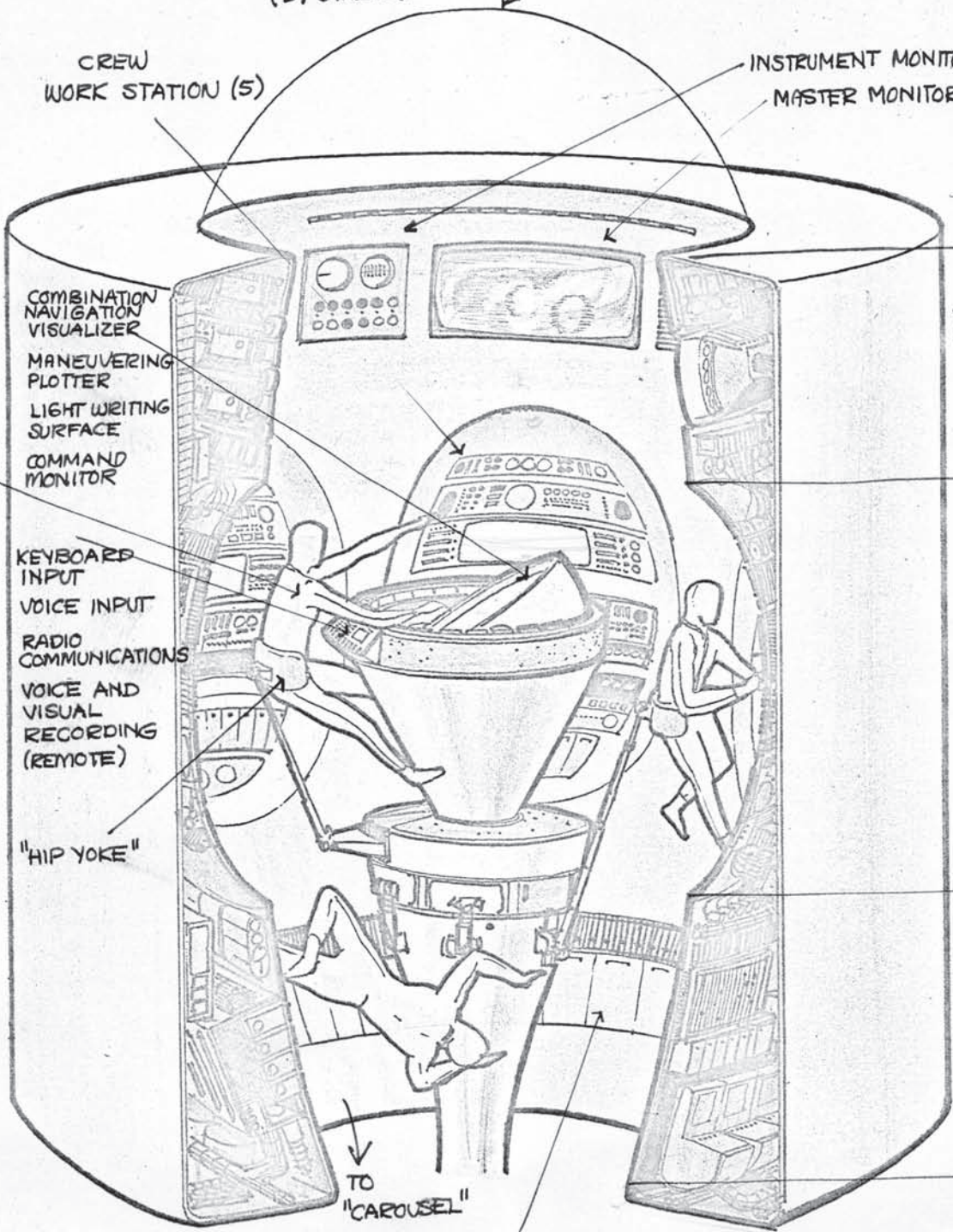
WORK STATION
AREA
DETAIL
CONTROLS AND
INSTRUMENTS
FOR
LIFE SUPPORT,
NAVIGATION &
ASTRONOMY,
COMMUNICATION,
ELECTRONICS,
BIO-MEDICAL,
PROPULSION

"HIP YOKE"

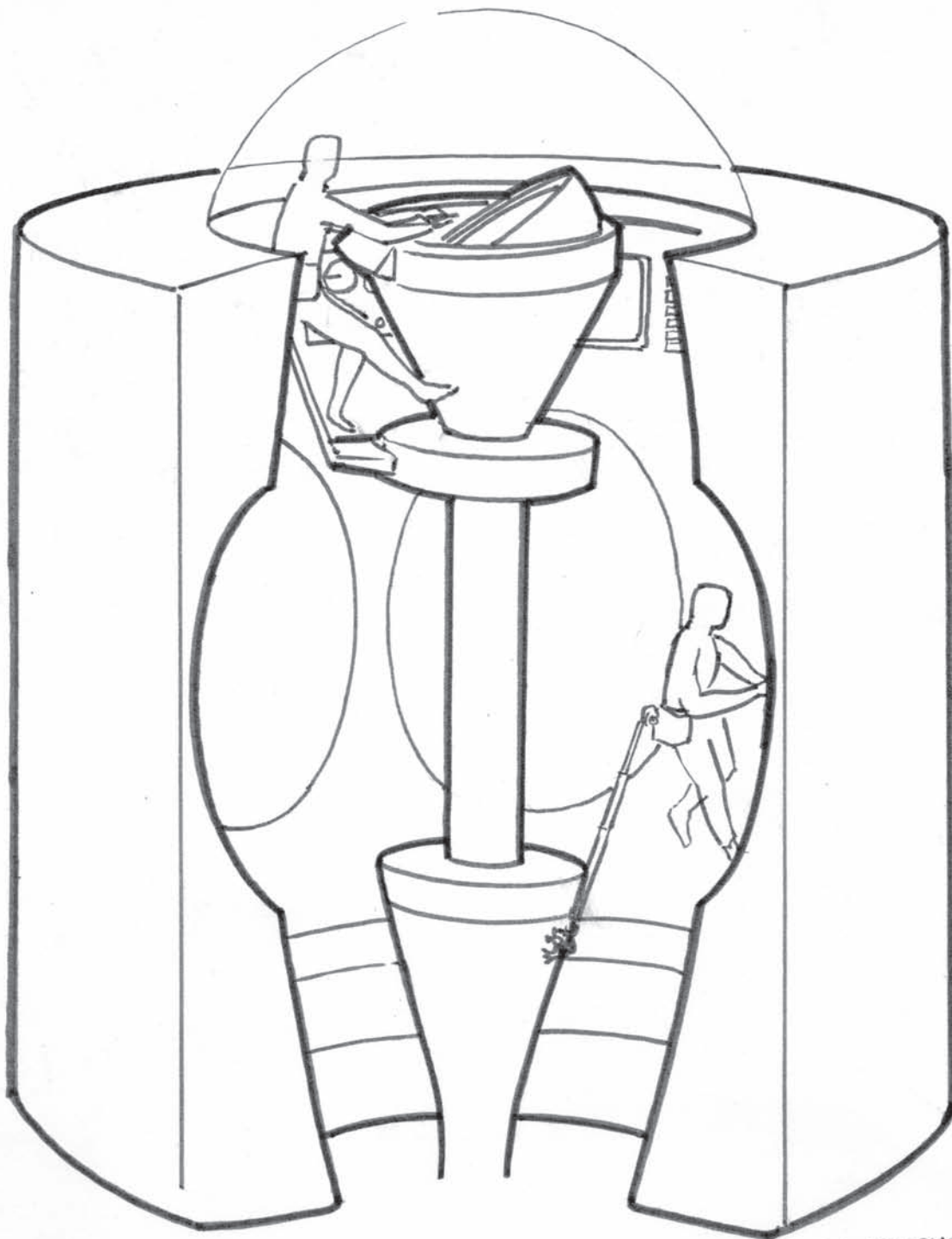
COMPUTER
MEMORY AND
LOGIC
CIRCUITS
POWER
DISTRIBUTION
AND CONTROL

TO
"CAROUSEL"

CIRCUIT AND ELECTRICAL
POWER ACCESS

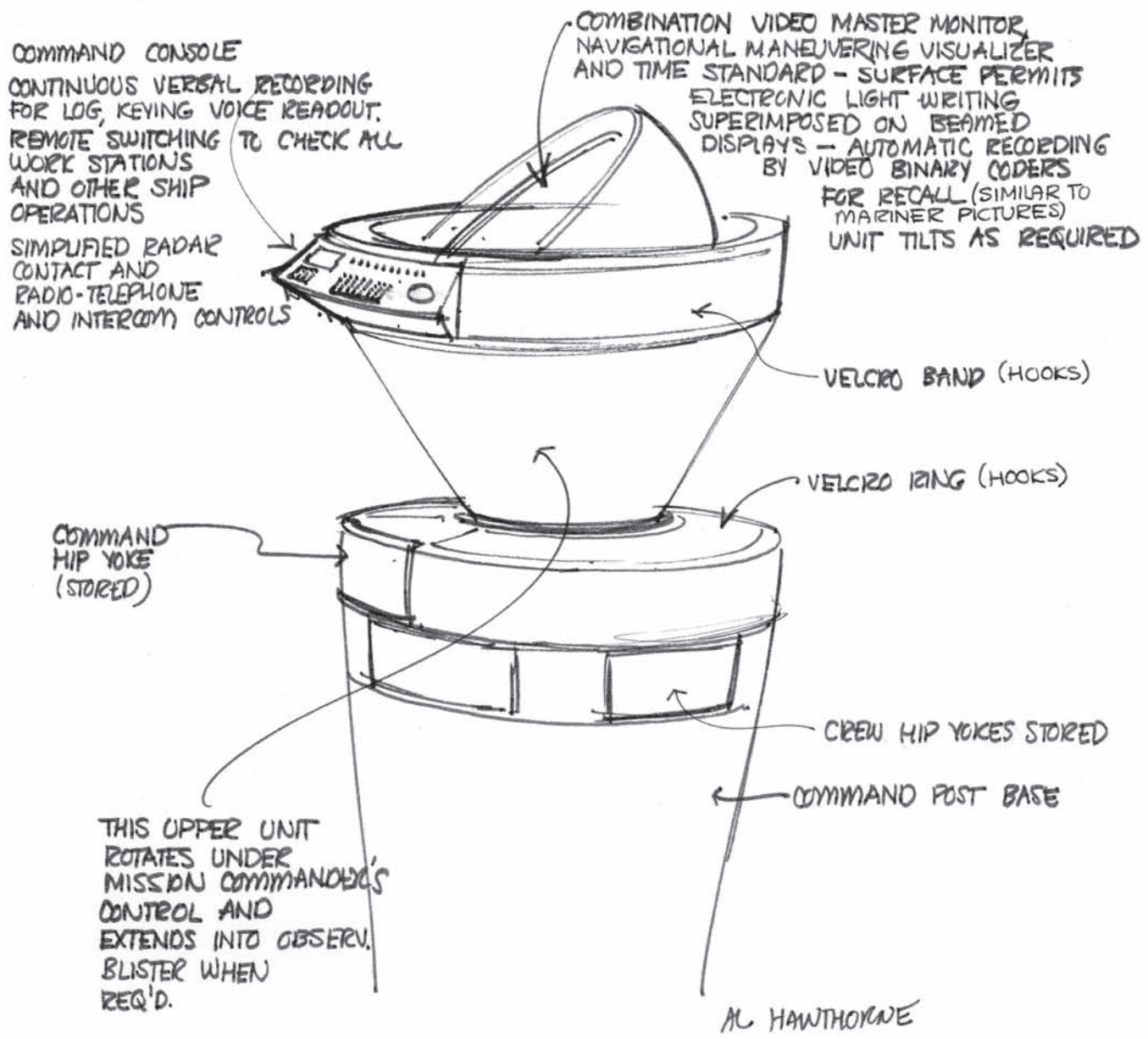


COMMAND POST EXTENDED TO PERMIT SIMULTANEOUS OBSERVATION

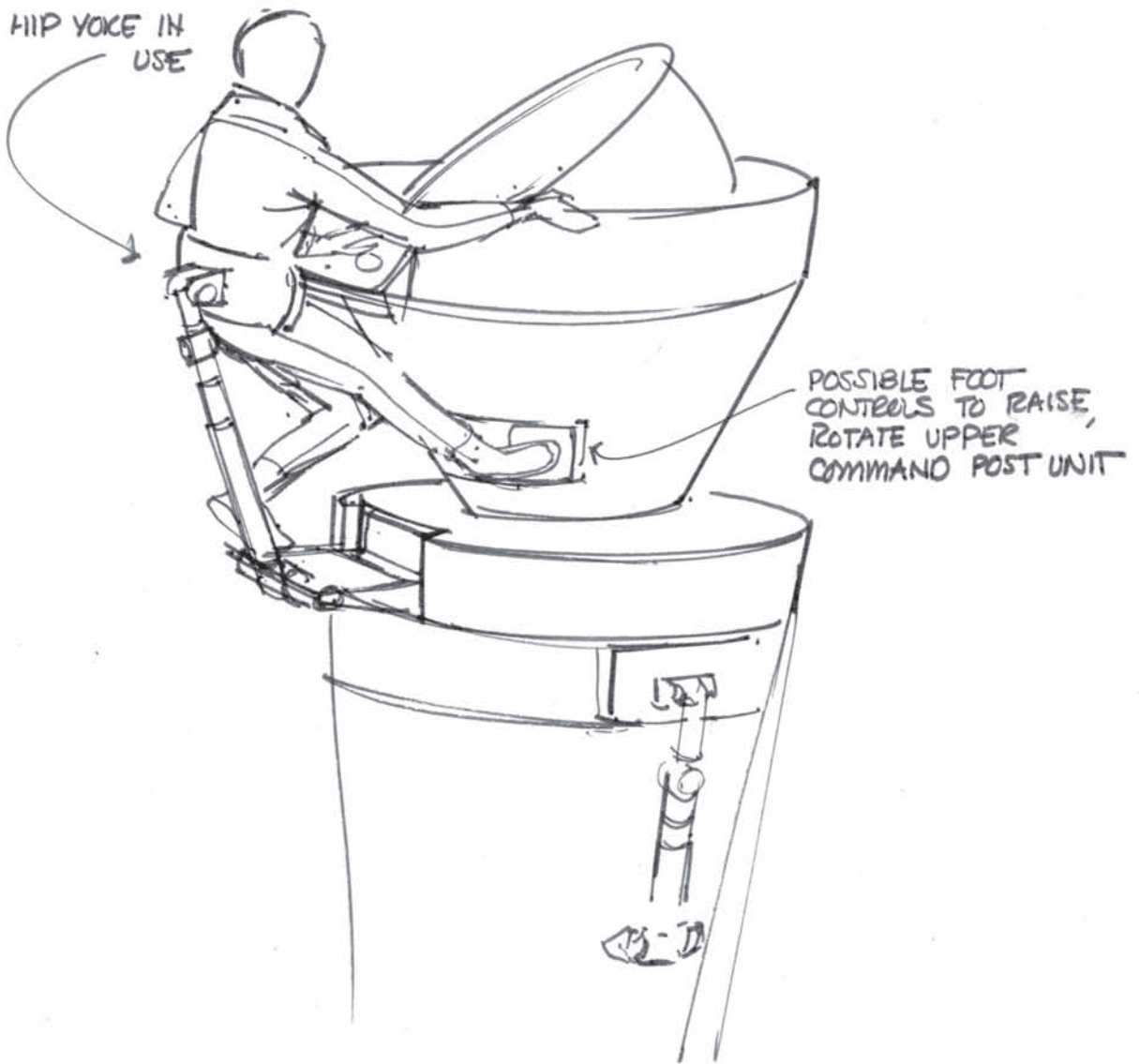


AL HAWTHORNE

COMMAND POST

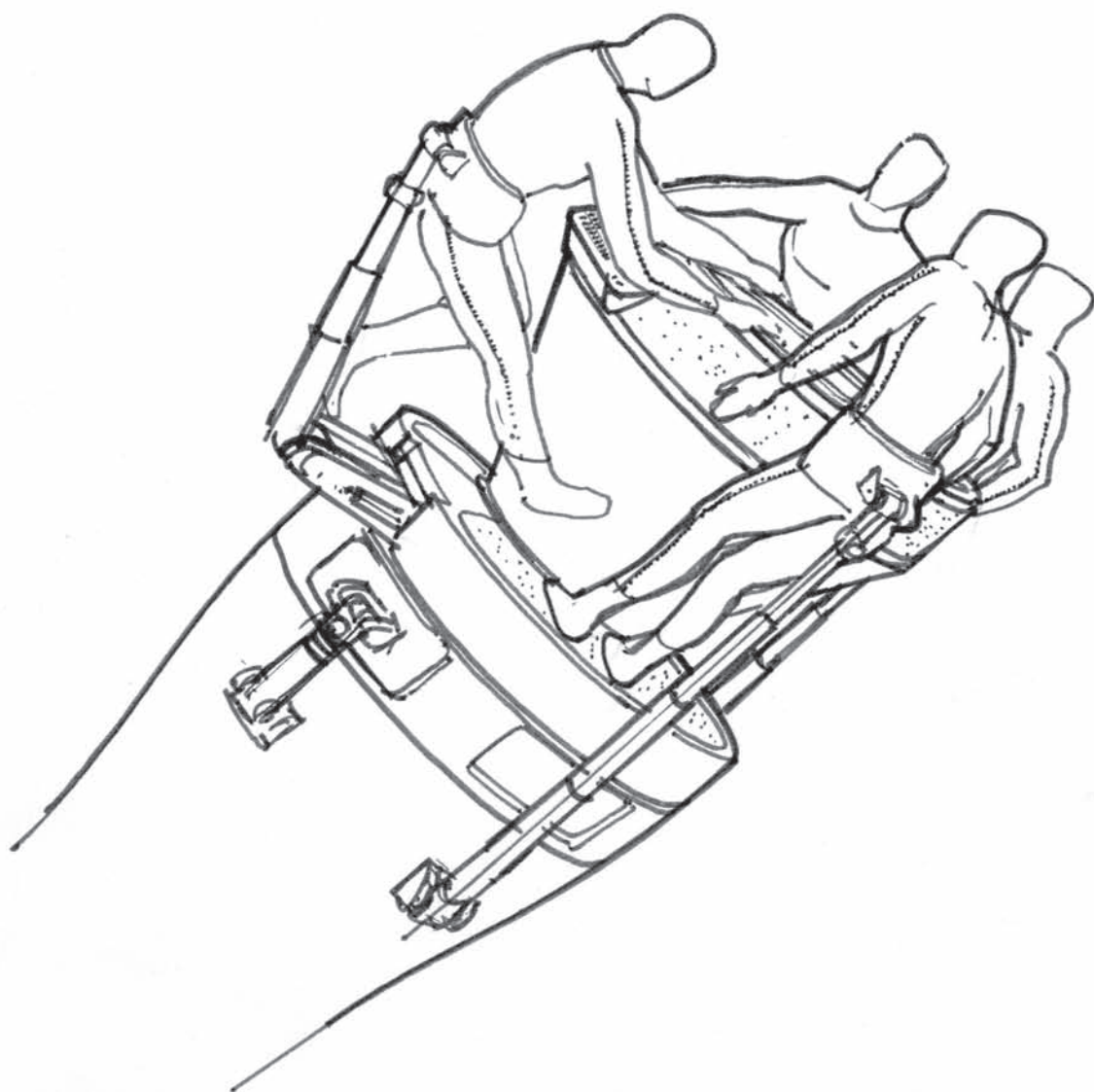


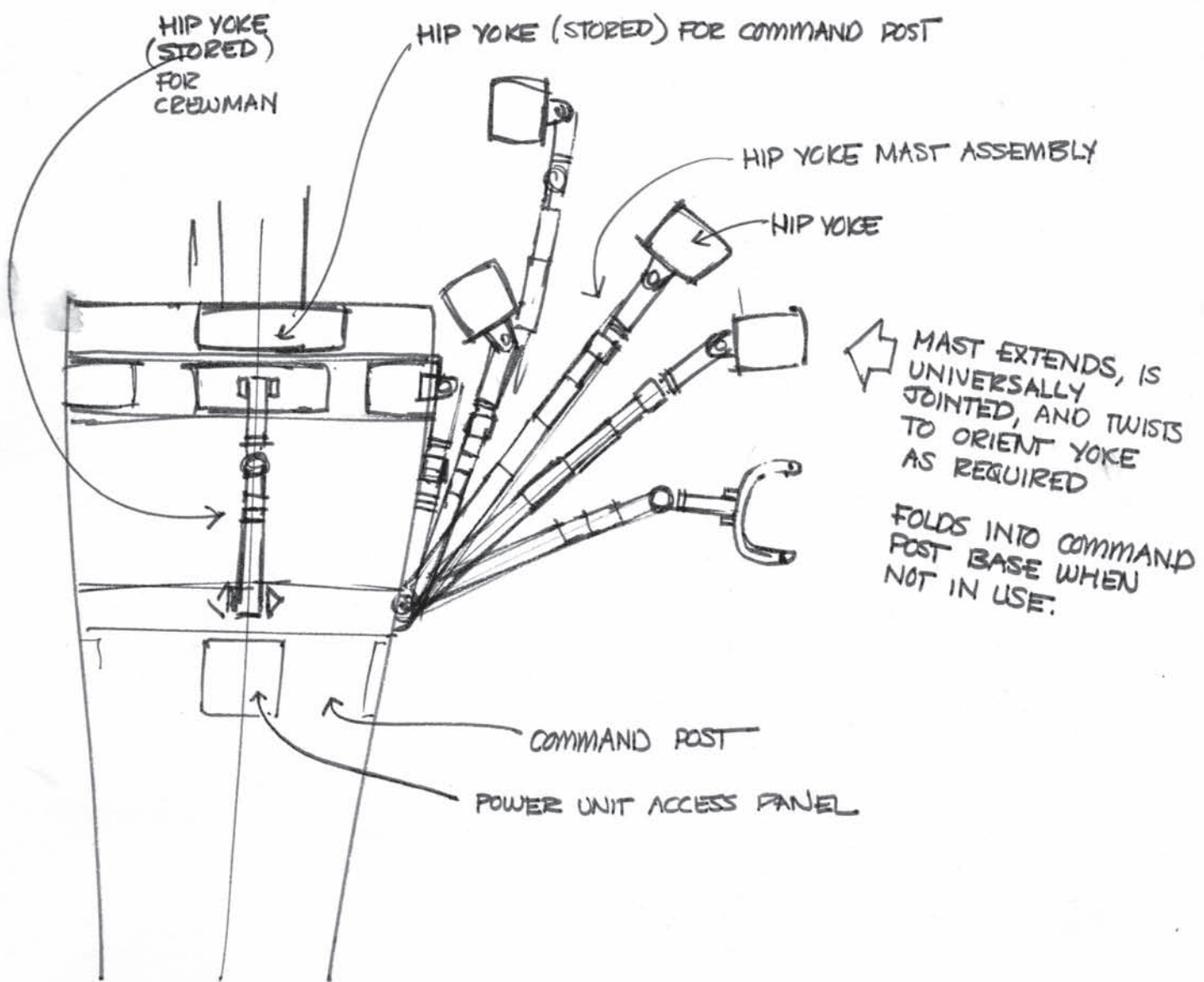
COMMAND POST



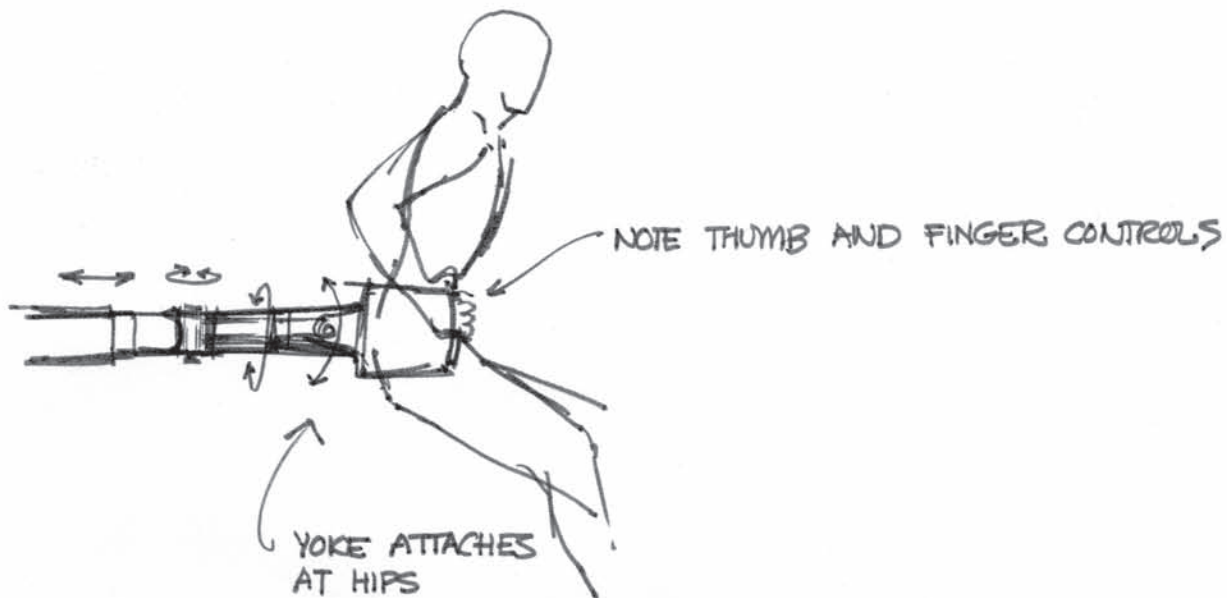
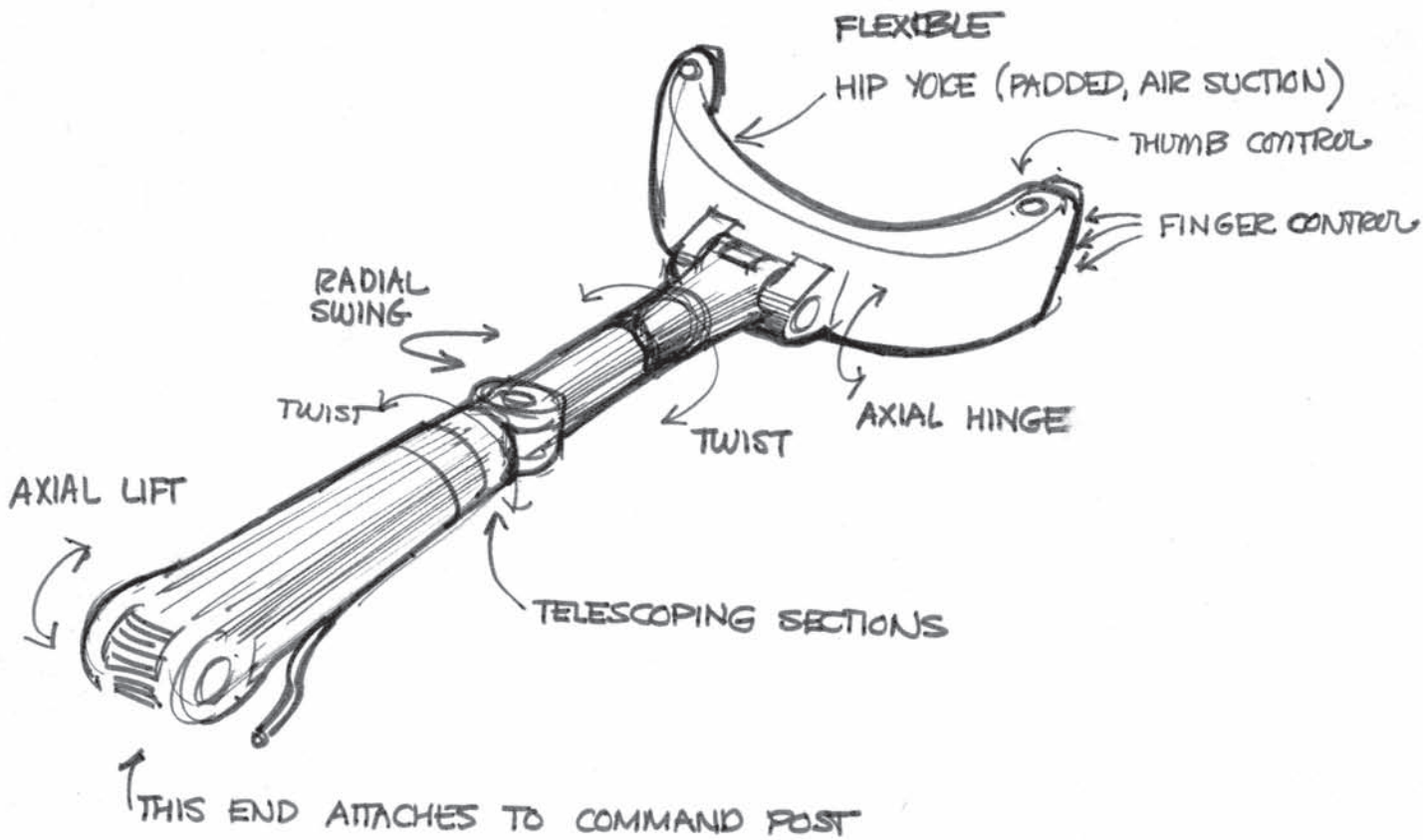
CONFERENCE SCENE AT COMMAND POST

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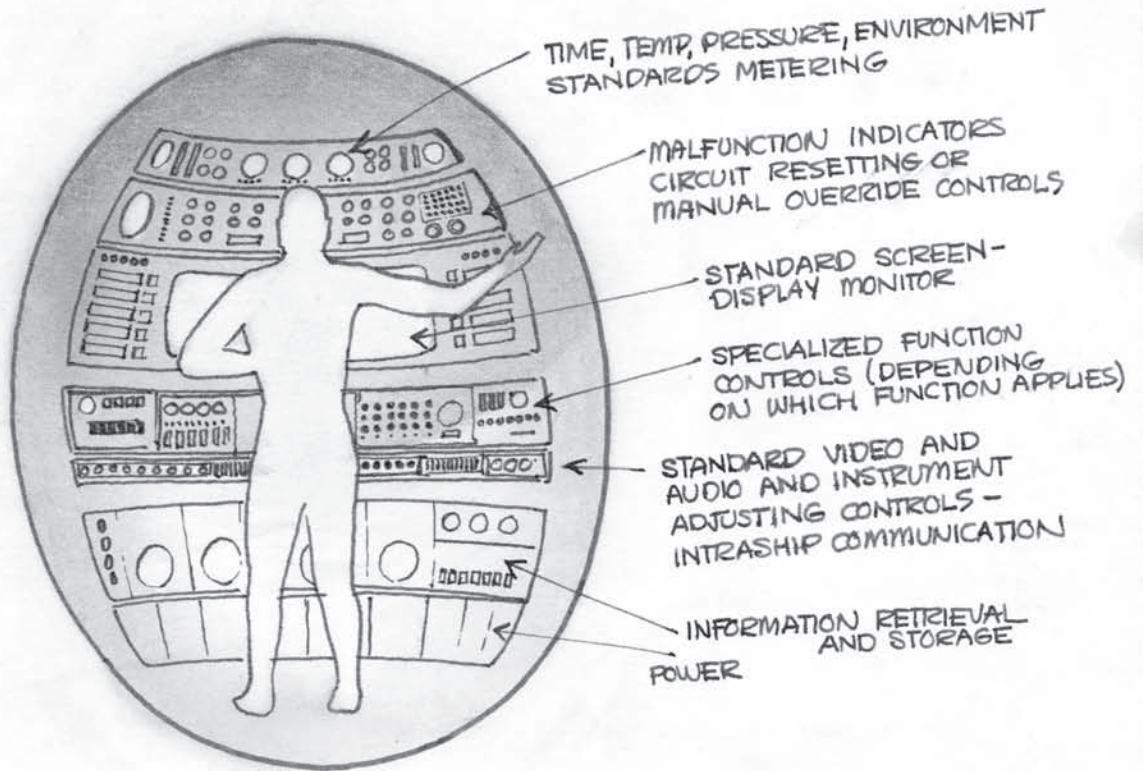


AL HAWTHORNE



WORK STATION

(11)



IBM "ATHENA" COMPUTER FOR FIIM: 2001

The overall dimension of this computer is twenty five feet high, exclusive of the observation blister (A-8) and twenty feet in diameter. The apparent large size of the device is deceiving because of the computer's base area of 314 square feet, 176 square feet of that area is work space for the Mission Commander and his crew. In other words, the computer is hollow and surrounds the men who operate it. This is a departure from the Earth and Moon based computers which are merely packages of components around which the men must move.

The Athena design offers the utmost in minimum traffic (movement of people) because it takes advantage of the little or zero gravity environment and the feasibility of "vertical" traffic movement, and because the layout of output devices is consistently circumferential. High efficiency is realized also in physically centralizing the command position to every other part of Athena.

While at his controls and the master monitor at the Command Post (A-5) the Mission Commander can see the entire interior of the computer and the on-duty crew. The Command Post rotates 360 degrees and when necessary can elevate itself hydraulically, lifting the Commander, still at his controls, into the observation blister.

Apart from the central Command Post, the interior of the computer is shaped somewhat like the inside of a very long egg, open at each end. The outboard end of the space is capped by the observation blister and its special shutter closure devices. Next to this, completely encircling the space for a depth of about five feet is a band of screen display monitors and monitoring instruments (A-1, 6, 7). The screen displays (A-6) can show closed circuit images of practically every area in the entire Discovery space ship that can be covered by miniature video cameras. They can also display an enlarged view of any meter, scope, or other control panel feature in any of the five work stations (A-9, 10, 11), as well as views of outer space required by the navigator and the commander. The display area is large enough so that engineering drawings stored in the computer's memory banks can be shown as well as the contents of all the books, movies, and other entertainment programs described in the story.

Adjoining the band of display equipment is a second "band", ten feet wide, a zone comprised of five oval areas that look as though the interior wall of the computer had been scooped out. Each "scoop" is a Work Station (A-9), and each Work Station is equipped for the particular crew member assigned to that Station. For example, the Navigation and Astronomy Officer's Work Station has several batteries of input-output devices linked directly to the navigational section of the computer's logic and memory cores. In addition to monitoring and evaluating maneuvering and course information, the Navigation

Officer has at his Work Station a standard wide screen video display. Like the Commander, he can also retrieve or select any visual material he requires and view it on the display screen. Similarly, the Propulsion Officer has a Work Station with special instrumentation that applies to his job and, of course, a wide screen display device, and so it goes with the other three members of the crew.

All the Work Stations also feature malfunction warning systems, with warning lights, voice warning and remedy output (from the Computer), and complete manual override controls. Each Work Station has intraship audio and video communication, and direct links to the base at Tycho and on Earth.

A third "band" or peripheral zone at the inboard end of the computer consists of access panels to electrical power distribution and to the major bulk of the computer, the logic and memory sections. Most of the "guts" of the computer are micro-miniature solid state circuitry packages. Servicing these consists of locating a malfunctioning circuit module (probably no bigger a matchbox) and keying the computer to switch its connections from the defective module to a replacement.

The Command Post is an interesting device to see in action, not only because of the mechanical flexibility of the parts of the Post, but primarily because of the unusual electronic display of the master monitor and the fantastic switching capability of the Mission Commander's console (C-22 through 27).

The combination video master monitor (C-20, 21) is circular display device mounted so that it can tilt up to face the Commander or lie flat when the crew members are in conference at the Command Post. It is far more intricate than the display monitors in the Work Stations. Not only does it show the camera views and other projected material, but it has a built-in system that creates in apparent three dimension a visualizing diagram of all elements of any maneuvering situation in which the ship may be involved. This aids the Commander (and the Navigator) to quickly understand and evaluate the automatic operations performed by the computer.

The circular surface of the visualizer is also adapted for light writing by the Commander. Any image that appears at any time on the visualizer is automatically recorded in the memory of the computer and can be instantly recreated by voice command to the computer or by keyboard input. Like the other video displays in the Work Stations, the display screen can "zoom" in to enlarge any part of any image, and can simultaneously display several inputs in any desired arrangement on its surface.

Special material is also displayed on the master monitor, such as electronic printing. As the Commander dictates into the recording log, for example, the printed images of his words are instantly constructed on the screen for his verification and examination. Should the Commander desire to change the wording of a report as he read what he has dictated, the deletions in the text occur automatically, and the revisions are inserted.

The control console at the Command Post is deceptively simple in its appearance. One might wonder how so many operations can be keyed on this console with so few pushbuttons and be monitored with so few indicator lights, etc. However, many of the inputs to the computer are verbal, (there is a microphone in the console, as there are at the Work Stations, and they can all communicate different messages simultaneously with the computer!), and most of the monitoring indications are routed to the displays adjoining the observation blister, and to the Work Station displays.

From his Command Post the Mission Commander can, however, put any part of any Work Station display on his master monitor, or remote the same program to the "overhead" band of screen displays. Also, any image that appears on his master monitor can be remotely displayed on the screen of any Work Station, or, any image can be remotod from the master monitor to any "overhead" display screen, freeing the master monitor to handle more important information.

Here is a typical situation:

The Mission Commander is dictating to the recording log, and as he speaks, the words appear in print on the master monitor before him. He is describing the difficulty he had had in distinguishing two certain stars during a visual navigation check, when a red light goes on in the Work Station of the Life Support System Officer. Simultaneously, a warning light flashes on in the overhead display indicating a malfunction in the Life Support System. He is immediately interrupted by the voice of Athena: "MALFUNCTION CLASS D (no immediate danger) LIFE SUPPORT, MALFUNCTION CLASS D, LIFE SUPPORT." If the difficulty had been a major threat to the safety of the ship or the crew, the computer would have announced a Class A or Class B Malfunction, started automatic remedial control procedures and displayed all necessary visual information on the master monitor.

The Commander decides that his log recording can wait, so he presses a transfer button on his console and the unfinished log is "put aside" electronically, and the visual display of the log disappears from the master monitor, and reappears on a "standby" screen in the overhead display. Next he presses a button marked LIFE SUPPORT MONITOR, and the malfunction panel appears in detail on the master monitor. It indicates

that cabin air pressure has decreased slightly and that the auxiliary compressors have been switched on by the computer, in the galley section of the Carousel. He then switches on the voice input to the computer: "STAND BY FOR EXTERNAL SCAN, SECTION SIX ALPHA...EFFECT INTERNAL ISOLATION SECTION SIX...ACKNOWLEDGE".

Athena replies: "ISOLATION, SECTION SIX CONFIRMED...EXTERNAL SCAN ON STAND BY".

Again the Commander instructs the computer, "COMMENCE SCAN... SWITCH SCAN TO INFRARED"

Before him on the master monitor, the Commander now sees through the externally mounted video scanning cameras a view of the outer skin of the galley compartment. As the computer switches the scanning circuit to the infrared wavelengths, he sees air leaking from an apparent pinhole in the compartment's skin. The temperature difference of the compartment's air and the space outside the skin make it show up immediately. As he turns the ZOOM knob clockwise, the view enlarges, and he brings the image of the leaking air to the center of the master monitor with a little "joy stick" control. He could even turn the image "upside down" by twisting the stick if he wanted to.

"... CEASE SCAN...MAINTAIN ISOLATION SECTION SIX... REPORT ALL CHANGES STATUS THIS MALFUNCTION...ACKNOWLEDGE..." he says to the computer. He has found an air leak which he can repair later, unless it gets worse, in which case the computer will let him know.

"...RESUME INPUT TO RECORDING LOG WITH PRINTER." The computer switches the image of the Life Support Work Station back to the Work Station. The partially completed log image disappears from the overhead display where it had been put aside, and reappears on the master monitor, and the Commander goes on to finish his log for that day.

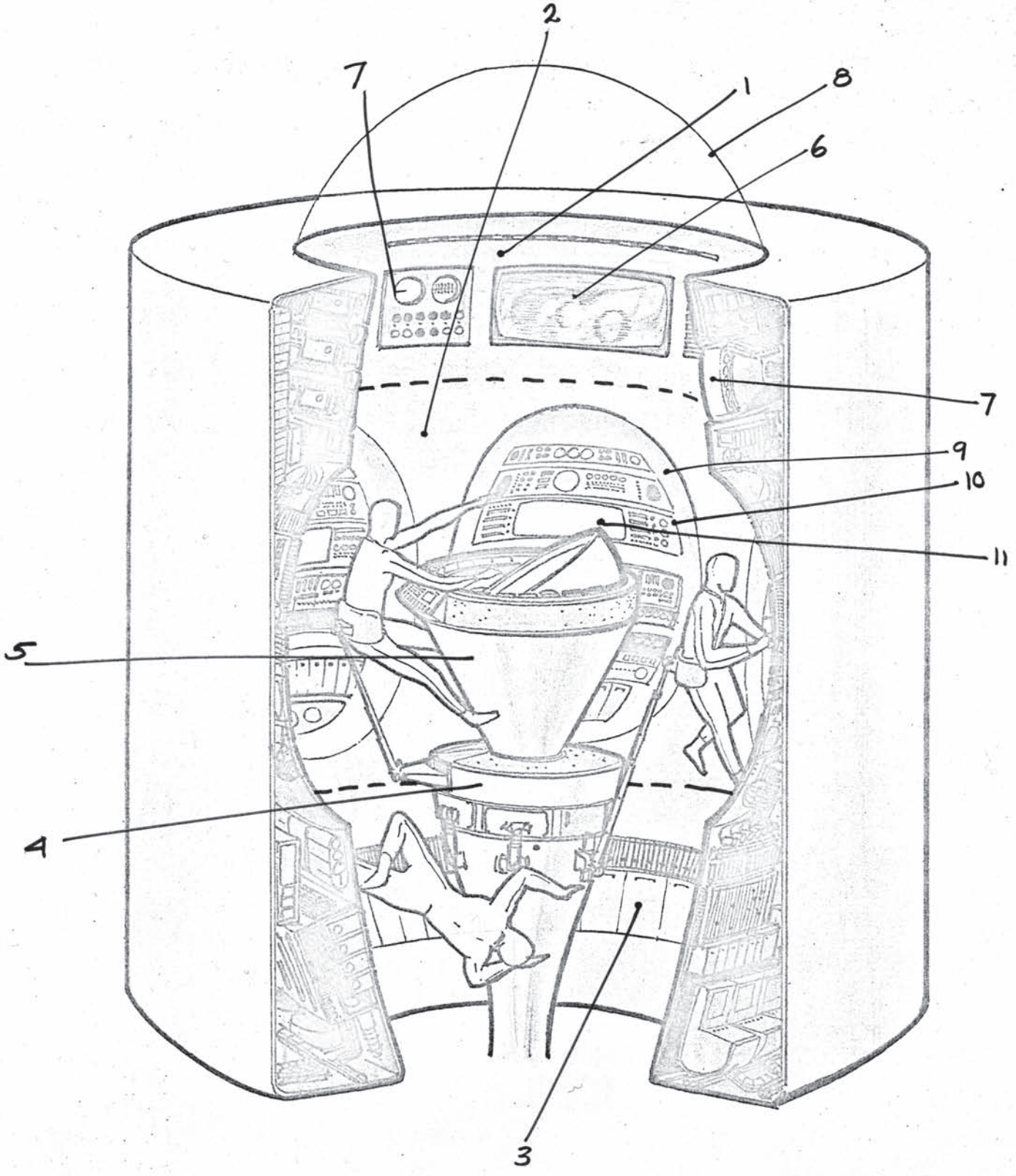
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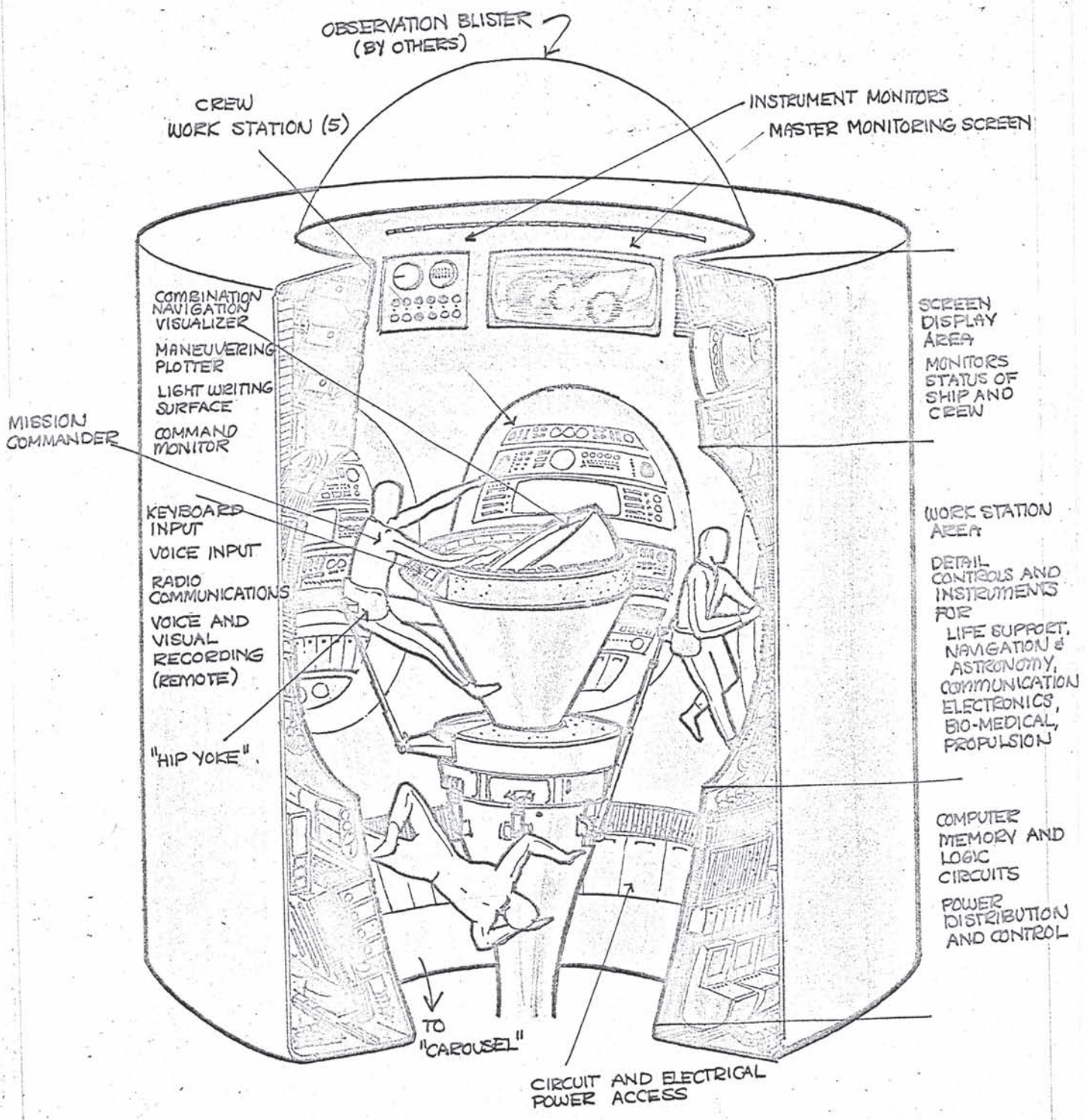
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DWG

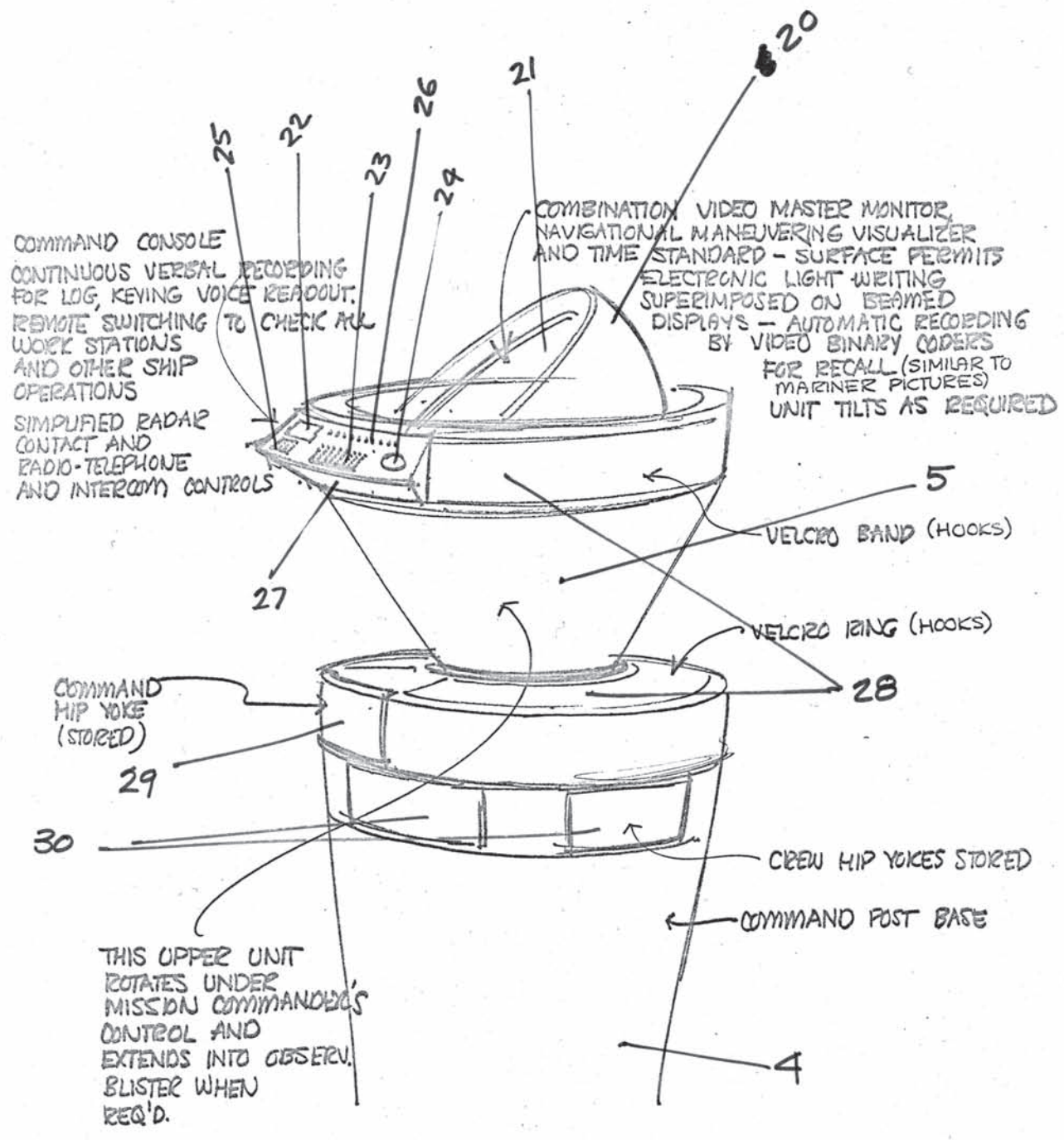
ATHENA[®] COMPUTER

A



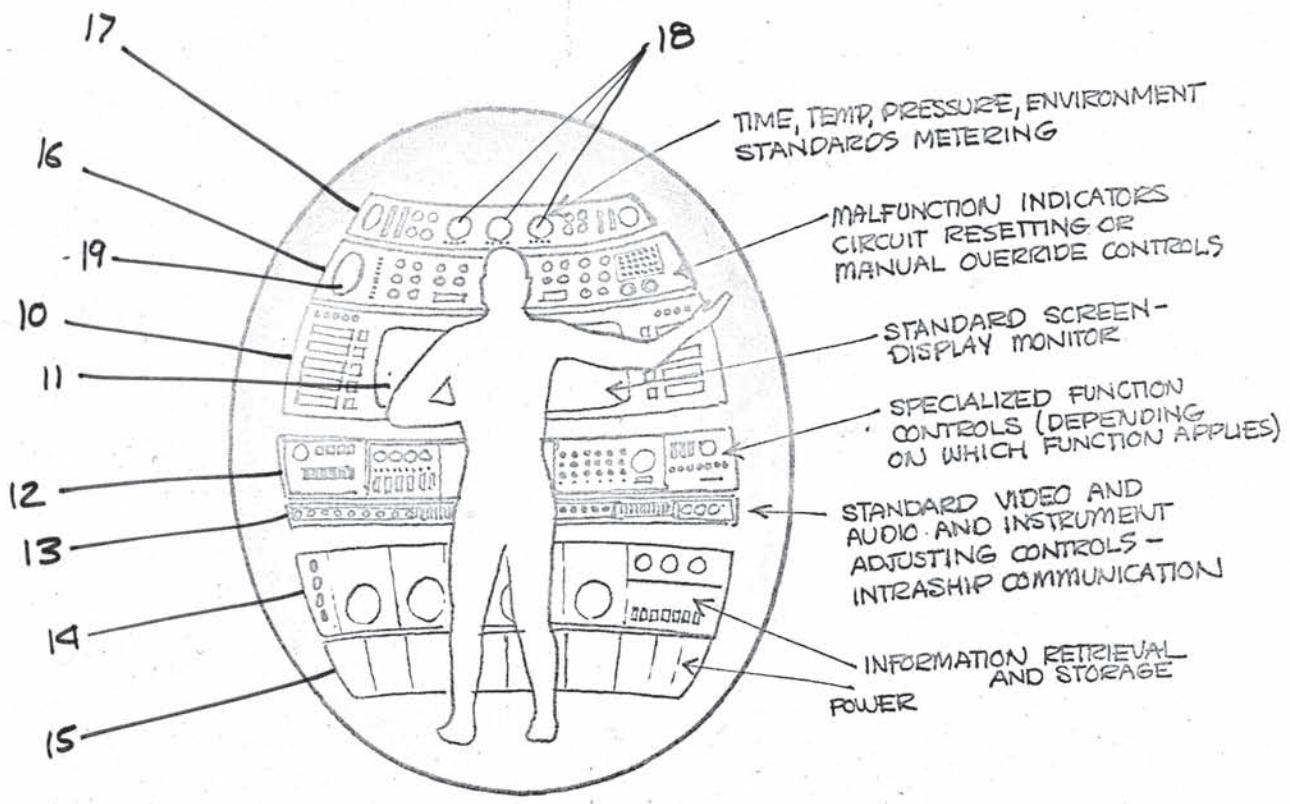


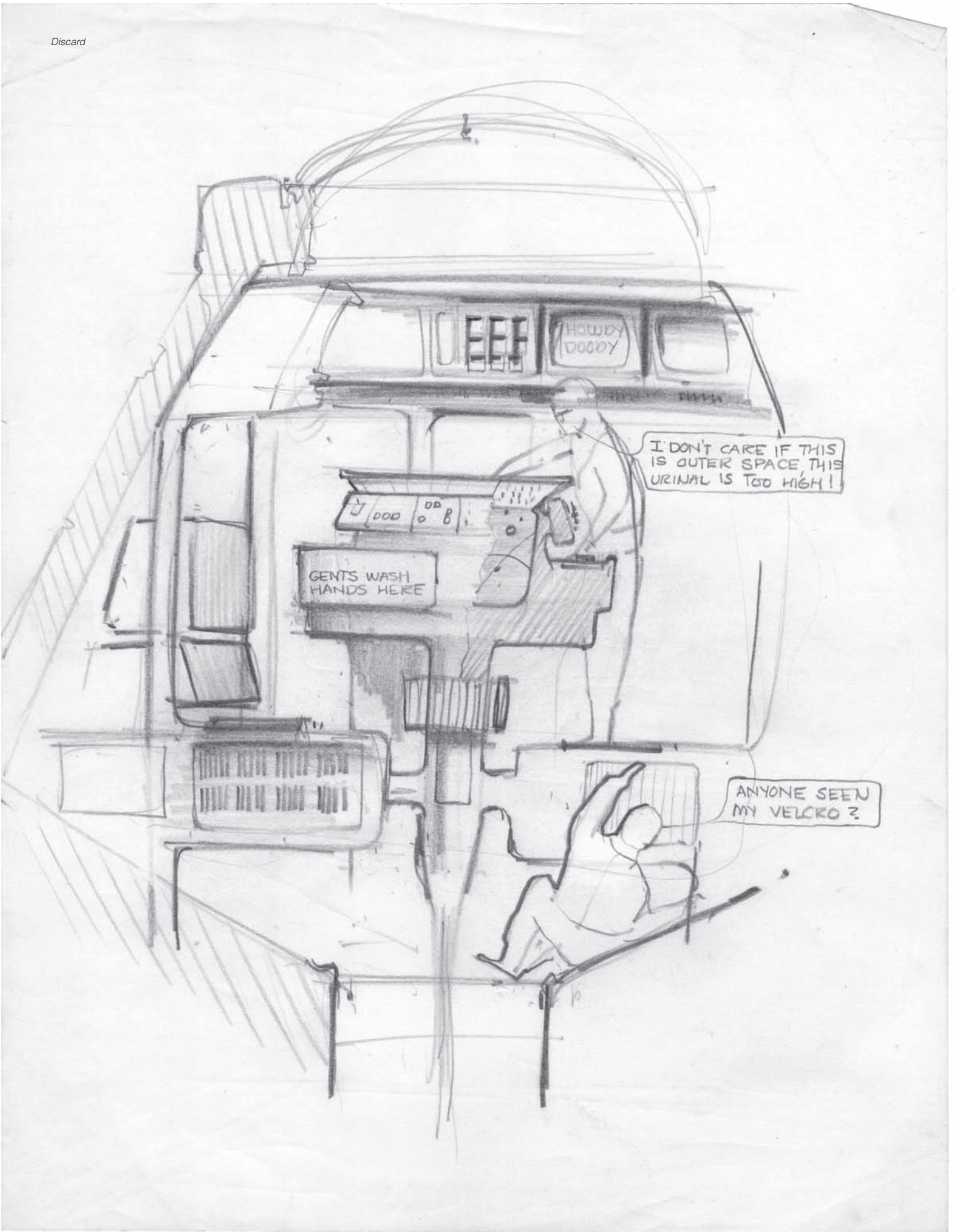
COMMAND POST



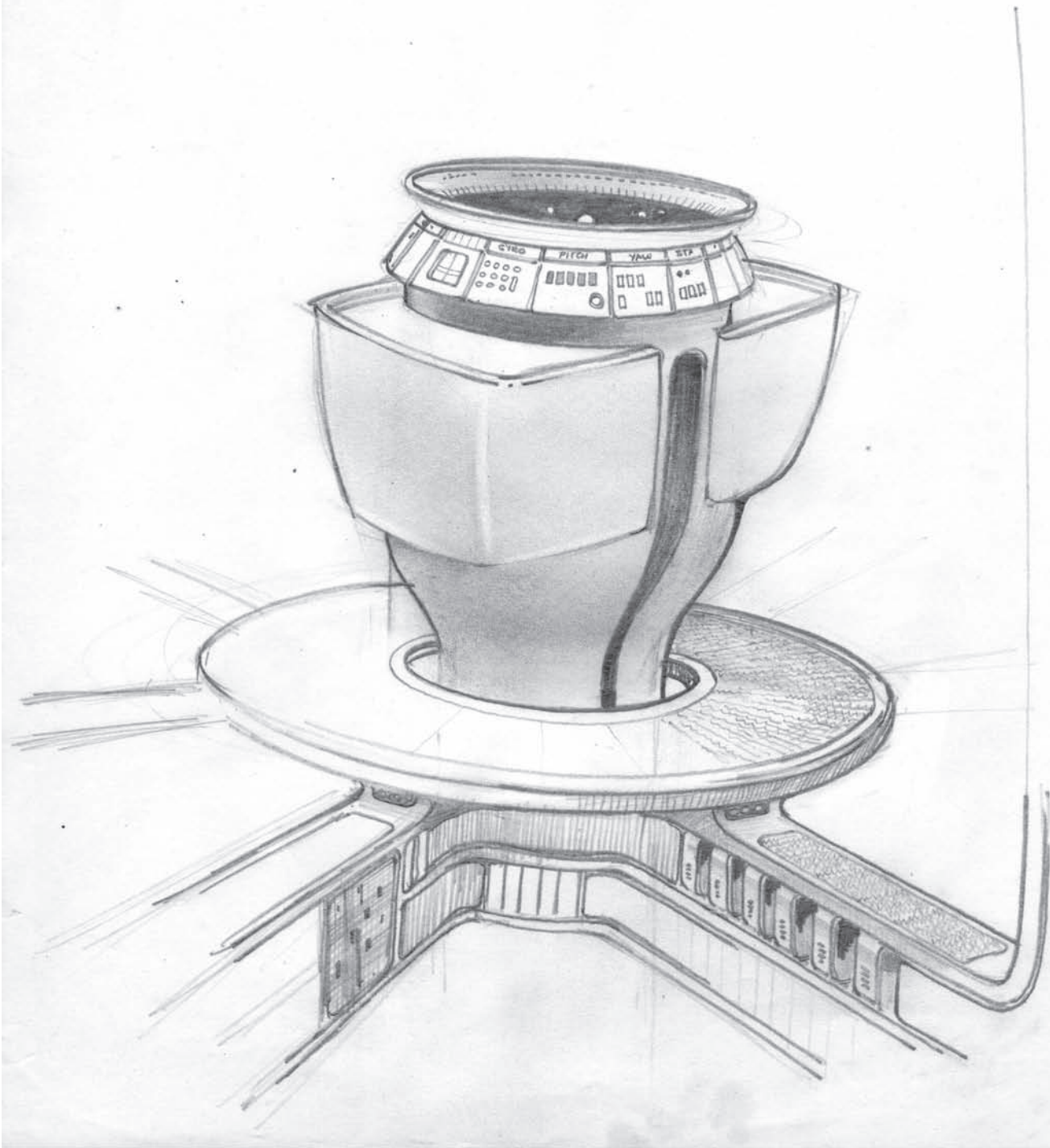
WORK STATION

DWG
D

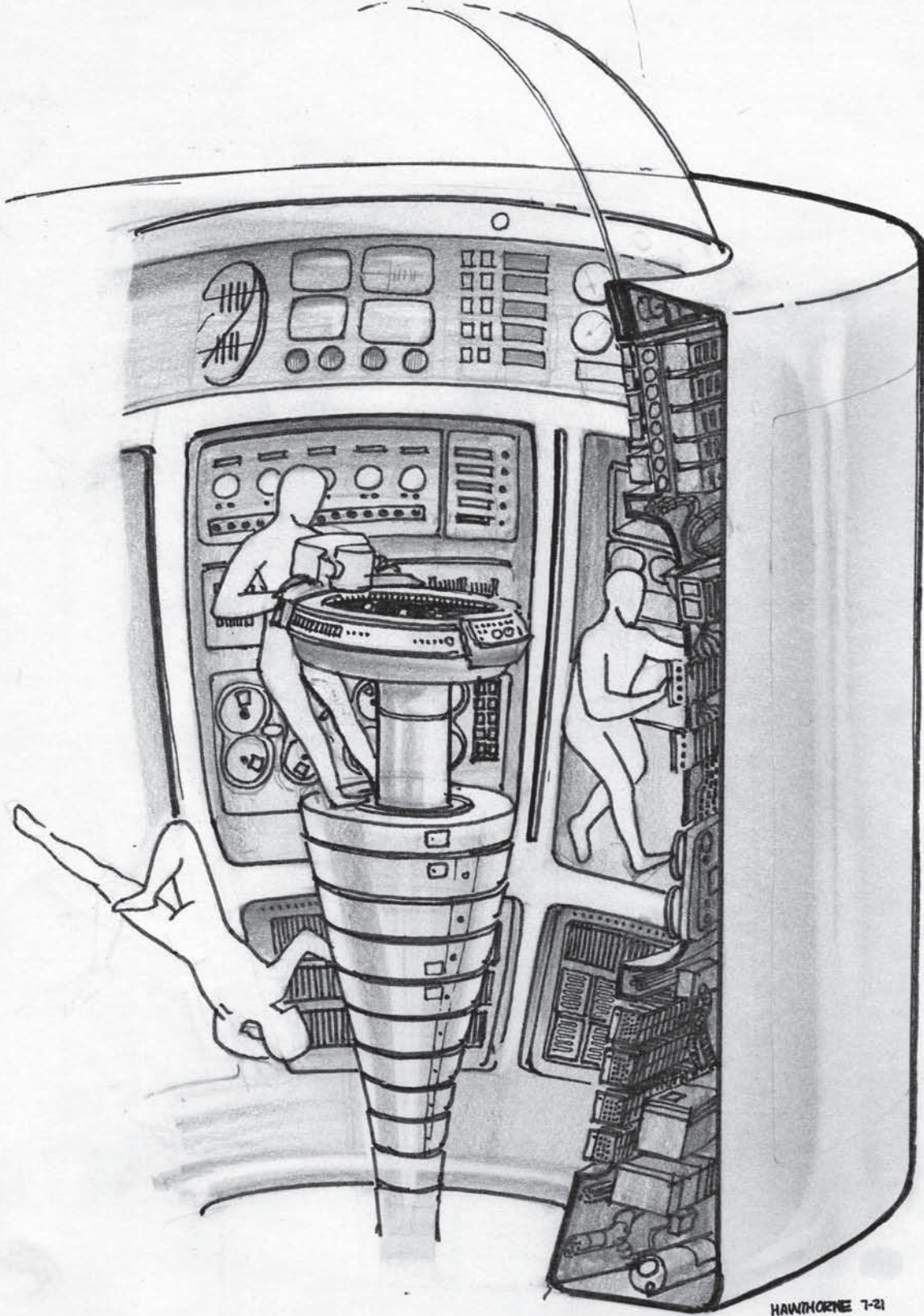




Discard

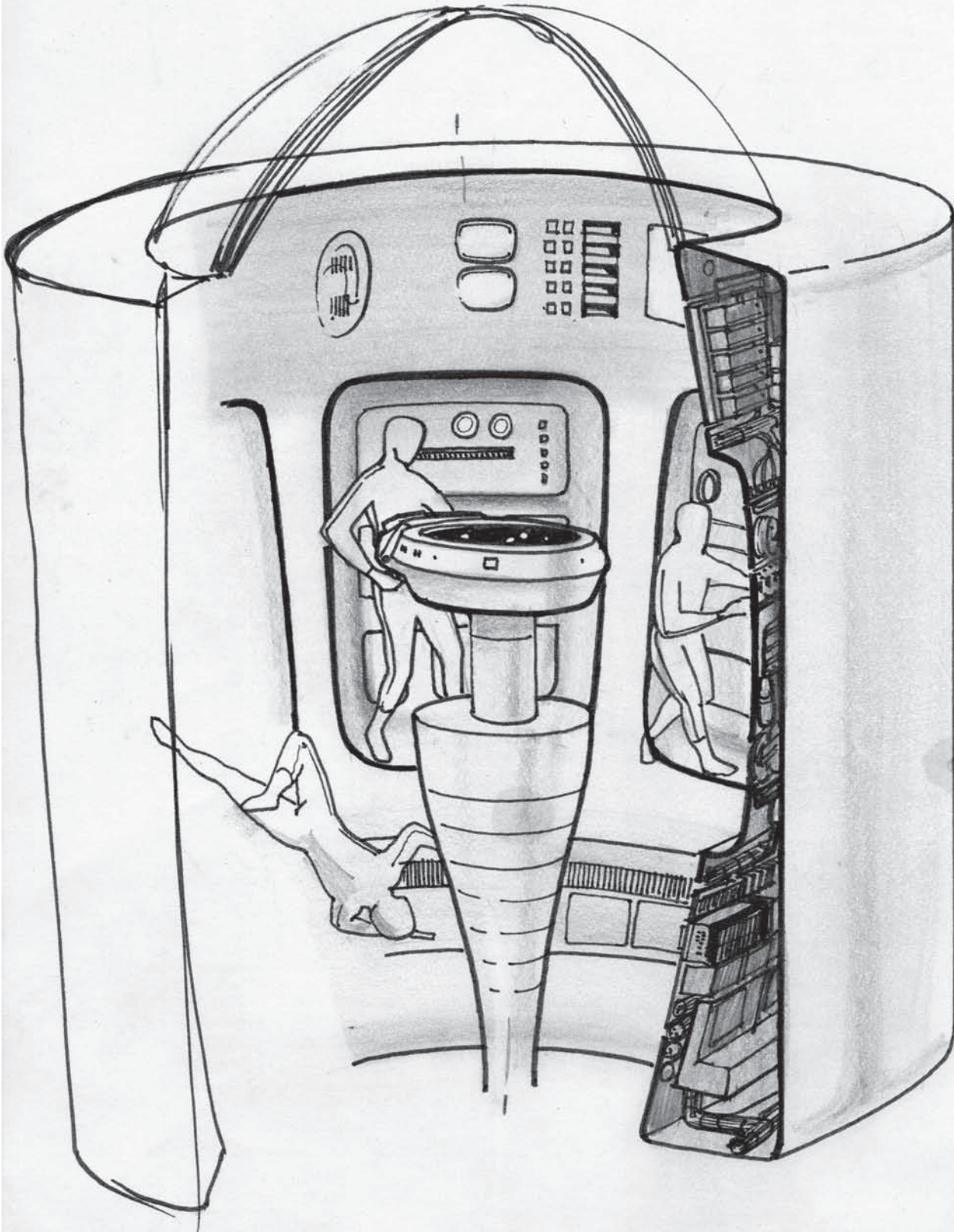


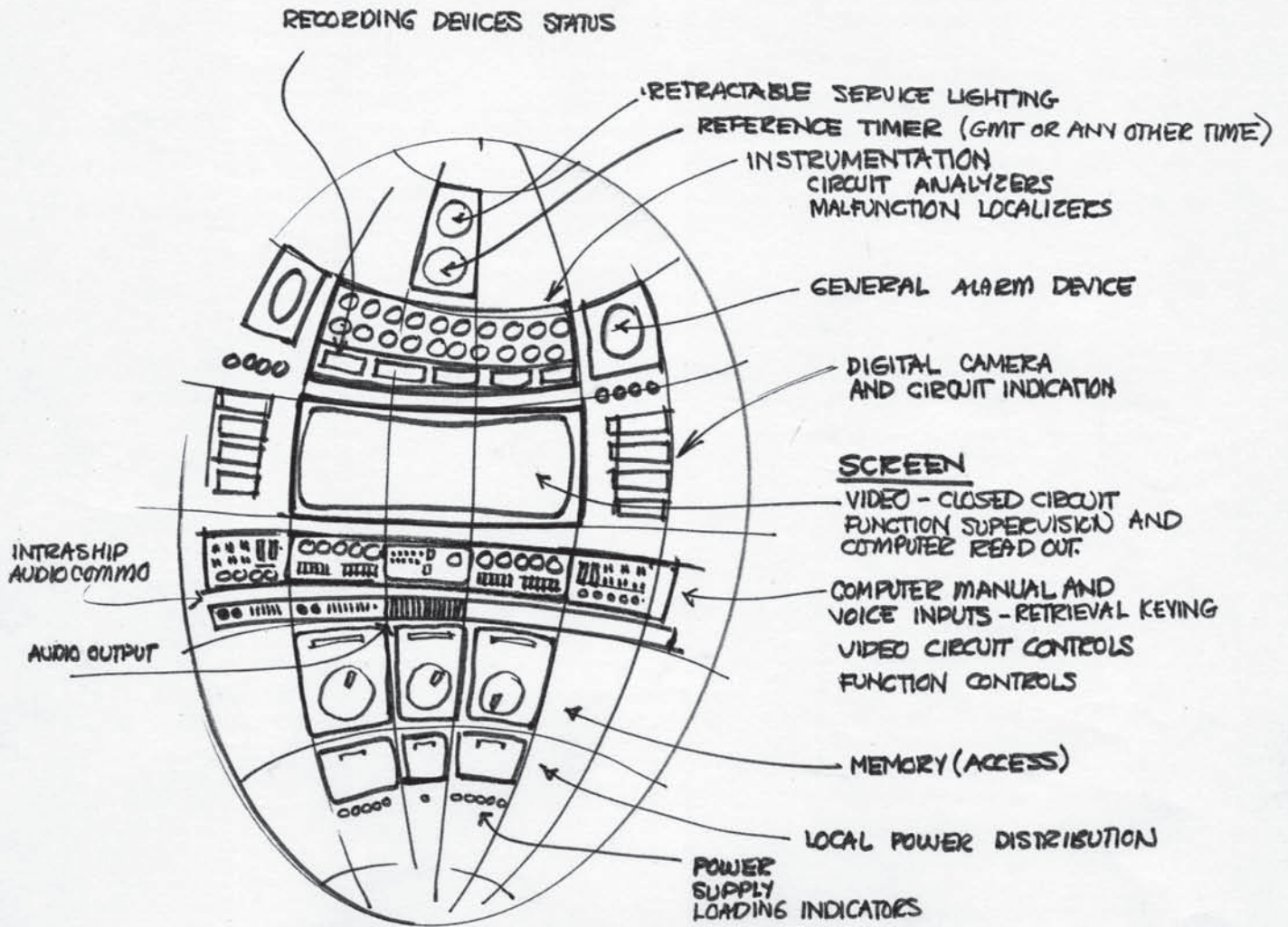
Discard



HAWTHORNE 7-21

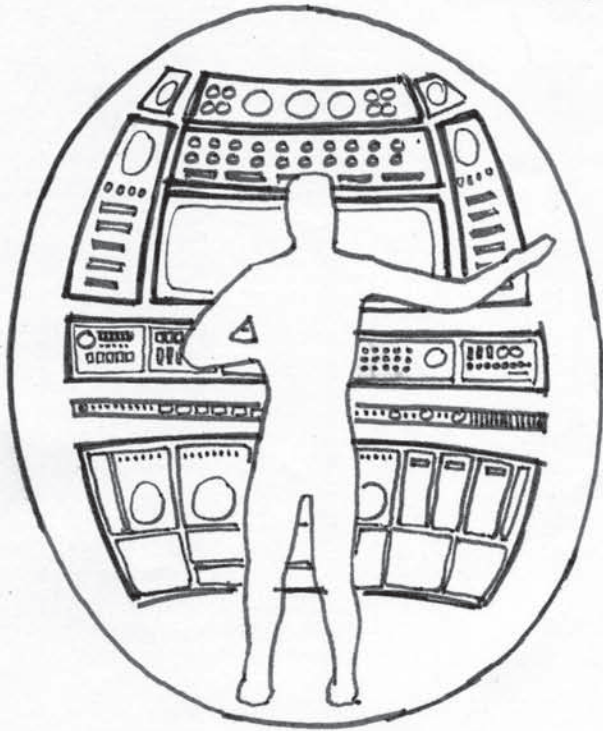
Discard





WORK STATION

SHOWING HOW INSTRUMENT-EQUIPMENT
ARRAY CONFORMS TO CONCAVE SURFACE OF STATION





12/27/77

Dear Mr. Hawthorne,

Enclosed is a picture of me in my spacesuit at the July '77 Star Trek convention. I'm sorry that the angle doesn't feature the control panel on the arm. I thought you might like to have it as a token of my thanks for the time & help you lent me. I really enjoyed meeting with you and if I'm ever in the area maybe I'll stop in again. Though I liked "Star Wars" and I thought "Close Encounters" was great, "2001: A Space Odyssey" is still the greatest and it's a privilege for me to meet anyone connected with it.

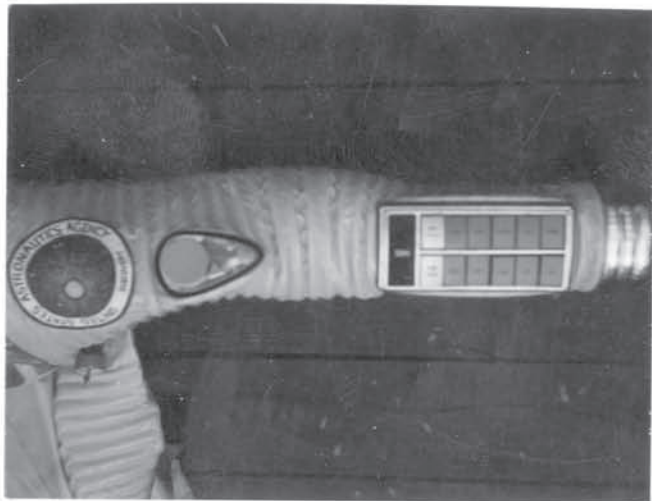
Perhaps my greatest benefit from meeting you was the inside information that was made available to me - the Discovery Computer photocopies and your offer to lend me the "2001" preliminary script so that I might have a copy made. Any other information you have, such as about the hibernation units, would also be helpful. I may construct one of them next. I also plan to contact Mr. Ernest Bevilacqua as you suggestion. I hope, eventually, to compile all these things into a book about "2001."

Again, many thanks for all the help you've given me, and I await your reply.

Sincerely,

Joe R. Frinzi

Joe R. Frinzi



Eliot Noyes and Associates, architectural and industrial design consultants for several major corporations in the United States, including IBM, created appearance concepts in 1965 of some imaginary, but believable computer-linked devices for use as properties in a feature-length film being planned then by Stanley Kubrick; it eventually became the well-known movie, "2001; A Space Odyssey".

Our designers, in New Canaan, used the script story by Arthur Clarke, in very preliminary form at that time, as the basis for proposing how the computer (a central "character" in the story), and its accessory hardware might appear in the year 2001 aboard the spacecraft "Discovery".

One item that seems to have attracted some comments and inquiries, conceived by us as part of the computer, was a cathode ray tube display and keyboard control unit for personal use, incorporated into the forearm sleeve of the astronauts' spacesuits.

Like a simple box in shape, but gently arched to rest securely against a person's forearm, the unit was about 150mm long, 60mm wide and 25mm thick. The left-hand portion of its control panel contained eight bright blue keybuttons and two frosted silver ones, set in flush, and marked with binary exponents and special codes. The the right on the same panel was a tiny video screen (CRT) with a non-glare black surrounding mask, a combined speaker and microphone grille for audio communications when only partially suited up and a green monitoring signal light.

The frosted silver housing in which we mounted this miniature terminal was not visible in the film because it was buried in the bulk of the sleeves of the spacesuits worn by actors Keir Dullea and Gary Lockwood.

Eliot Noyes and Associates also contributed design ideas for the hibernation facilities and controls seen in the film and provided appearance design consulting for selected properties for the film during its production in England.

