CONTRACT NAS9-9953 MSC 02473
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SD 71-220

# MODULAR space station

## PHASE B EXTENSION

## MOCKUP REVIEW AND EVALUATION



PREPARED BY PROGRAM ENGINEERING
JANUARY 1972

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Space Division
North American Rockwell
12214 LAKEWOOD BOULEVARD
DOWNEY, CALIFORNIA 90241

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Approved by

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ABSTRACT
THIS DOCUMENT PRESENTS A DETAILED DESCRIPTION OF THE MODULAR SPACE STATION MOCKUP. EMPHASIS IS PLACED ON THE INTERIOR ARRANGEMENTS OF THE CREW LIVING SPACES, CONTROL CENTER, AND GENERAL PURPOSE LABORATORY FACILITIES. ALSO PRESENTED ARE THE RESULTS OF THREE MOCKUP REVIEWS--TWO BY NR MANAGEMENT AND THE FINAL REVIEW BY NASA PERSONNEL.

# FOREWORD

This document is one of a series required by Contract NAS9-9953, Exhibit C, Statement of Work for Phase B Extension-Modular Space Station Program Definition. It has been prepared by the Space Division, North American Rockwell Corporation, and is submitted to the National Aeronautics and Space Administration's Manned Spacecraft Center, Houston, Texas, in accordance with the requirements of Data Requirements List (DRL) MSC-T-575, Line Item.

Total documentation products of the extension period are listed in the following chart in categories that indicate their purpose and relationship to the program.

| ADMINISTRATIVE REPORTS | TECHNICAL REPORTS | | STUDY PROGRAMMATIC REPORTS | DOCUMENTATION FOR PHASES C AND D | |
|---|---|---|---|---|---|
| | | | | SPECIFICATIONS | PLANNING DATA |
| EXTENSION PERIOD STUDY PLAN DRL-62 DRD MA-207T SD 71-201 | MSS PRELIMINARY SYSTEM DESIGN DRL-68 DRD SE-371T SD 71-217 | MSS DRAWINGS DRL-67 DRD SE-370T SD 71-216 | EXTENSION PERIOD EXECUTIVE SUMMARY DRL-65 DRD MA-012 SD 71-214 | MSS PRELIMINARY PERFORMANCE SPECIFICATIONS DRL-66 DRD SE-369T SD 71-215 | MSS PROGRAM MASTER PLAN DRL-76 DRD MA-209T SD 71-225 |
| QUARTERLY PROGRESS REPORTS DRL-64 DRD MA-208T SD 71-213, -235, -576 | MSS MASS PROPERTIES DRL-69 DRD SE-372T SD 71-218, -219 | MSS MOCKUP REVIEW AND EVALUATION DRL-70 DRD SE-373T SD 71-220 | | | MSS PROGRAM COST AND SCHEDULE ESTIMATES DRL-77 DRD MA-013(REV. A) SD 71-226 |
| FINANCIAL MANAGEMENT REPORTS DRL-63 DRD MF-004 | MSS INTEGRATED GROUND OPERATIONS DRL-73 DRD SE-376T SD 71-222 | MSS KSC LAUNCH SITE SUPPORT DEFINITION DRL-61 DRD AL-005T SD 71-211 | | | MSS PROGRAM OPERATIONS PLAN DRL-74 DRD SE-377T SD 71-223 |
| | MSS SHUTTLE INTERFACE REQUIREMENTS DRL-71 DRD SE-374T SD 71-221 | INFORMATION MANAGEMENT ADVANCED DEVELOPMENT DRL-72 DRD SE-375T SD 72-11 | | | |
| | MSS SAFETY ANALYSIS DRL-75 DRD SA-032T SD 71-224 | | | | |

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# 1. INTRODUCTION

## 1.1 PURPOSE

The purpose of this document is twofold. First, it provides a description of the mockup and its representation of the preliminary design of the modular space station (MSS). Second, it describes the mockup review evaluation and reports the results of the evaluation.

## 1.2 SCOPE

This first portion of this document contains a detailed description of the MSS mockup. The description emphasizes the interior arrangement of the crew living quarters, Control Center No. 1, general-purpose laboratory, and a portion of the core module necessary to show two station modules berthed.

The second portion of the document contains the mockup review and evaluation. The reviews of the mockup fell into three basic categories: an informal in-house review of both soft mockups and the hard mockup by NR space station personnel, a brief NR management in-house review, and the NASA space station study management review. The informal in-house efforts used the soft mock-up to influence the preliminary design and to make final decisions on selected design details. The NR management review provided an opportunity to assure that the levels of fidelity employed were satisfactory to convey the preliminary design concept from the Phase B study.

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# 2. MSS MOCKUP DESCRIPTION

The MSS configuration (Figure 2-1) was developed in the Phase B study and is shown in the Modular Space Station Drawings document (SD 71-216). The initial station is a cluster of modules consisting of a basic core, four station modules, and a power boom supporting the solar arrays. Each station module is 14 feet in diameter and approximately 38 feet in length. The core module is 12 feet, 8 inches in diameter and 40 feet in length. The power boom is 88 inches in diameter and 27 feet 6 inches in length.

Electrical power for the MSS is provided by solar arrays and a fuel cell system. The 7000-square-foot solar panels are mounted on the power boom.

Ten docking ports are provided on the core module for docking of MSS modules and special modules. An airlock is provided in the core module for EVA/IVA purposes and to provide for separation of the MSS into two pressure volumes.

Figure 2-2 presents the MSS mockup and display area. The 33-foot-diameter space station mockup is shown in the foreground with the MSS mockup display in the background.

Figure 2-3 is a view of the MSS mockup presenting the mockup relationship of the station modules, SM-1 and SM-2, with respect to the partial core module. These modules were constructed to provide a capability for evaluation of the preliminary design and to collect additional data relative to the operational and habitability characteristics of the MSS.

The location and position of the two station modules with respect to the actual location in the MSS initial cluster as shown on Figure 2-1 was selected based on minimum cost of construction and to permit efficient viewing during evaluation and review. The fidelity of the mockup is somewhat less than that of some areas of the 33-foot-diameter station mockup. In addition, the interior lighting was not representative of the planned actual spacecraft lighting.

## 2.1 MOCKUP CONFIGURATION REQUIREMENTS

The statement of work for the MSS Phase B definition study required the delivery of full-scale soft mockups of selected elements to demonstrate as a minimum the following features:

1. Command and control center

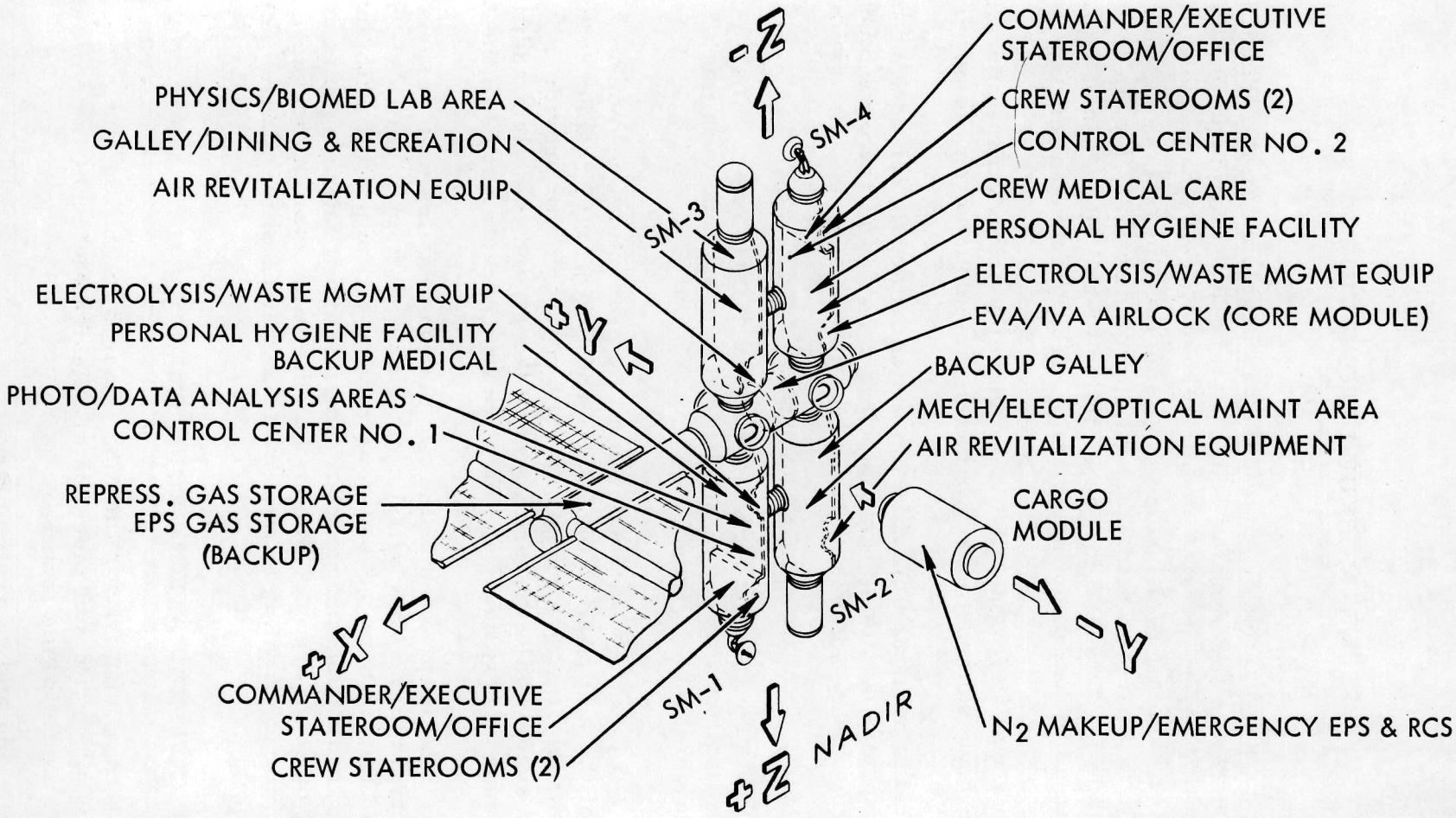



Figure 2-1. Interior Functional Arrangement





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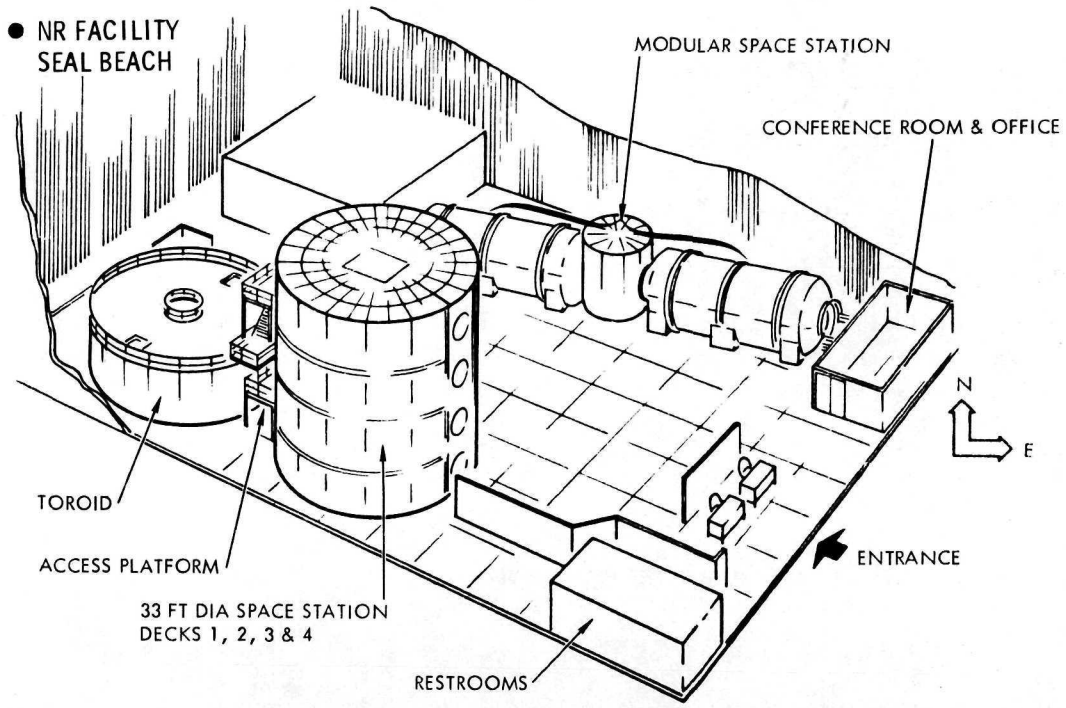



Figure 2-2. MSS Mockup and Display Area

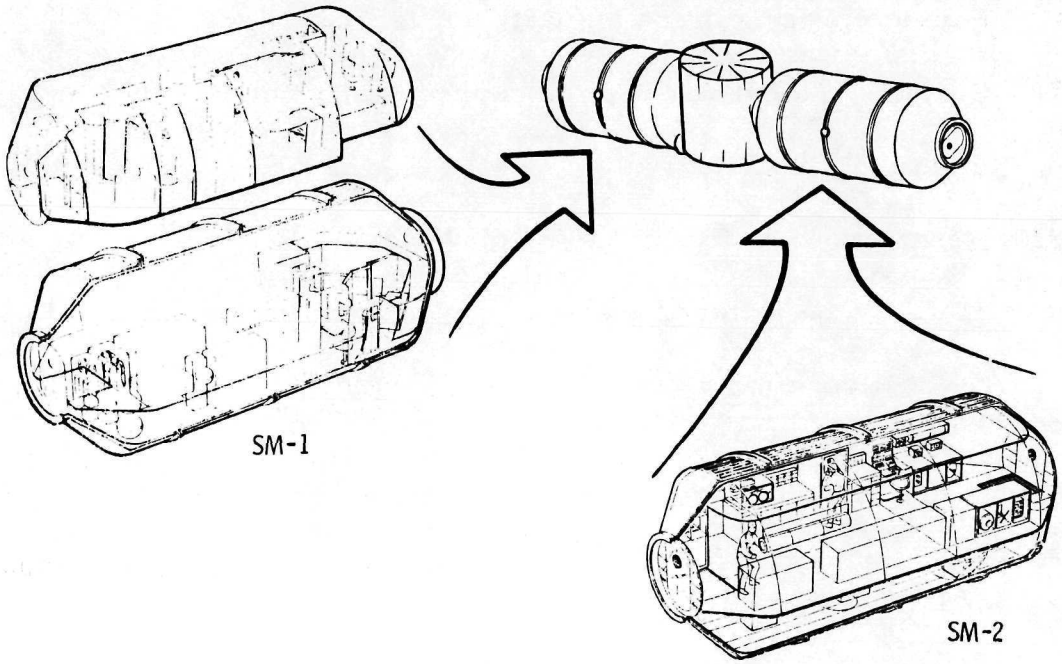



Figure 2-3. Mockup Configuration

2. Crew sleeping quarters and hygiene areas

3. Food management area

4. Experiments

5. Typical subsystem installations

The mockup was further defined by the MSS Program Phase B Definition Extension Period Study Plan (SD 71-201), which stated that one partial core module and two station modules would be fabricated with fidelity defined as follows:

1. Form and volume (furnishings and equipment represented by envelope size only)

2. Natural color tones throughout

3. Standard industrial lighting

4. Nonfunctional simulations

5. Access openings (doors, drawers, etc.) to be plant-ons or taped simulations

6. Panel representations by paste-on reproductions

7. Corners and edges not to be representative of MSS design

8. Taped joints and edges

9. Materials to be foam core or plywood

10. Finish to be painted, standard grade commercial material

11. No configuration definition or detail on docking ports and hatches.

Acceptance by NASA will be at the contractor's site. The following GFP items were furnished from the 33-foot-diameter space station mockup:

1. Waste management items (sinks, showers, commodes, urinals, and draw curtain)

2. Control consoles and equipment racks

3. Airlock equipment

4. Free-standing partitions for rearrangement capabilities

5. Food reconstitution units

6. Functional electronic equipment

7. Medical equipment as required

8. Bunk matresses and pulldown bunks

9. Simulated intercom units

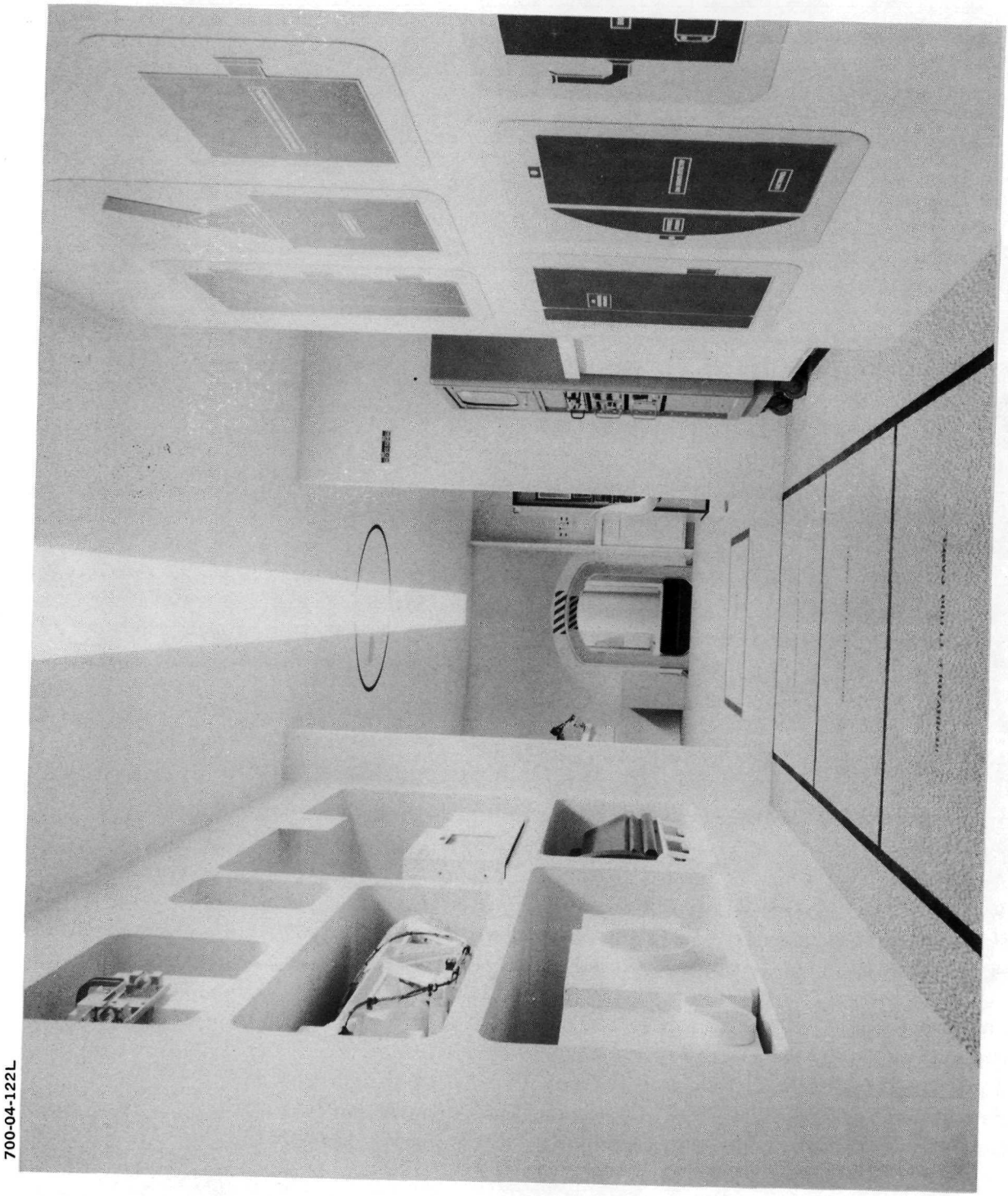
The mockup requirements were expanded, by issuance of Contract Amendment/Modification No. 17S, to provide increased mockup fidelity in the following areas of the core module: install a ceiling with a representative passageway; add representative raceways, a stowed berthing port cover, and a representative berthing port with internal definition only; and modify a berthing port by approximately 90 degrees between the common module and core module to facilitate viewing of module interconnections.

The main entrance into the upper deck of the mockup is via a set of external stairways from the main aisle of the display area. Because this stairway enters SM-2, inspection of the mockup would begin there and continue with the core module and then SM-1. Mockup module descriptions are therefore made in that sequence for simplicity.

Station Module 2

A mockup of the entire SM-2 was constructed, including both upper and lower decks. This module was constructed utilizing the preliminary design drawings, as were all of the mockup modules. Specifically, NR drawing V030-942203 (Sheets 2 through 5) presents the interior arrangement and callout of equipment in SM-2. Sketches in detail sufficient to construct the mockup to the required fidelity supplemented the preliminary design drawings.

Entrance to SM-2 is made through the nadir experiment airlock operations area (Figure 2-4), which occupies approximately one third of the upper deck floor area. This area normally would be occupied by various GFE associated with specific mission experiments for use in the experiment airlock. For mockup purposes, racks to hold such simulated equipment



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Figure 2-4. SM-2 Upper Deck, Experiment Operations

have been provided along with some typical stowed equipment. On the far right of this area is a data display system. Beyond this area on the right are an electrical/electronic/mechanical maintenance work bench, multipurpose test bench, and electronic all duty work station (Figure 2-5).

The backup galley is the last facility on the right and includes stowage cabinets for fried, freeze-dried, and thermo-stabilized foods and provisions for preparation of these foods.

On the left, upon entering SM-2, is the optical supply and maintenance area (Figure 2-6) which includes an optical calibration unit, infrared calibration unit, and microdensitometer as part of the mockup display. Just beyond this facility on the left are general emergency supplies, including stowage provisions for portable lights, emergency oxygen and masks, and first aid kits. For access to the lower deck of the SM-2 mockup, an opening was made in the lower deck area which would contain two assemblies of the air revitalization equipment. These are the lithium hydroxide stowage cabinets and temperature control sensible heat exchanger and fan assembly. While the auxiliary passages to and from the lower deck area are shown both above and below the deck, in the interest of safety, the actual cutouts were not made in the deck floor.

Upon entering the lower deck area, which has a maximum ceiling height of 62 inches, to the right, the large open area represents experiment storage. To the left (Figure 2-7) are simulations of air revitalization equipment including hydrogen accumulator, water electrolysis unit, humidity control unit, vent gas accumulator, $CO_2$ removal unit, $CO_2$ reduction unit, gas monitor and bacteria detector, water accumulator, and contaminant control unit.

Core Module

As noted previously, the position of SM-1 and SM-2 with respect to the core module is not representative of the actual initial station locations. The core module mockup description as well as all of the mockup descriptions which follow will be described utilizing X, Y, and Z axes as a baseline and will not always be consistent with the actual initial MSS axes. Figure 2-8 shows the MSS mockup arrangement with identifying axes utilized in the mockup descriptions.

The core module mockup consists of a portion of the MSS core module including the +X axis berthing port (power module port). Four additional simulated berthing ports are included in the core module mockup. SM-1 is berthed to the core +Z axis berthing port and SM-2 is berthed (for the mockup) to the core -Z axis berthing port.

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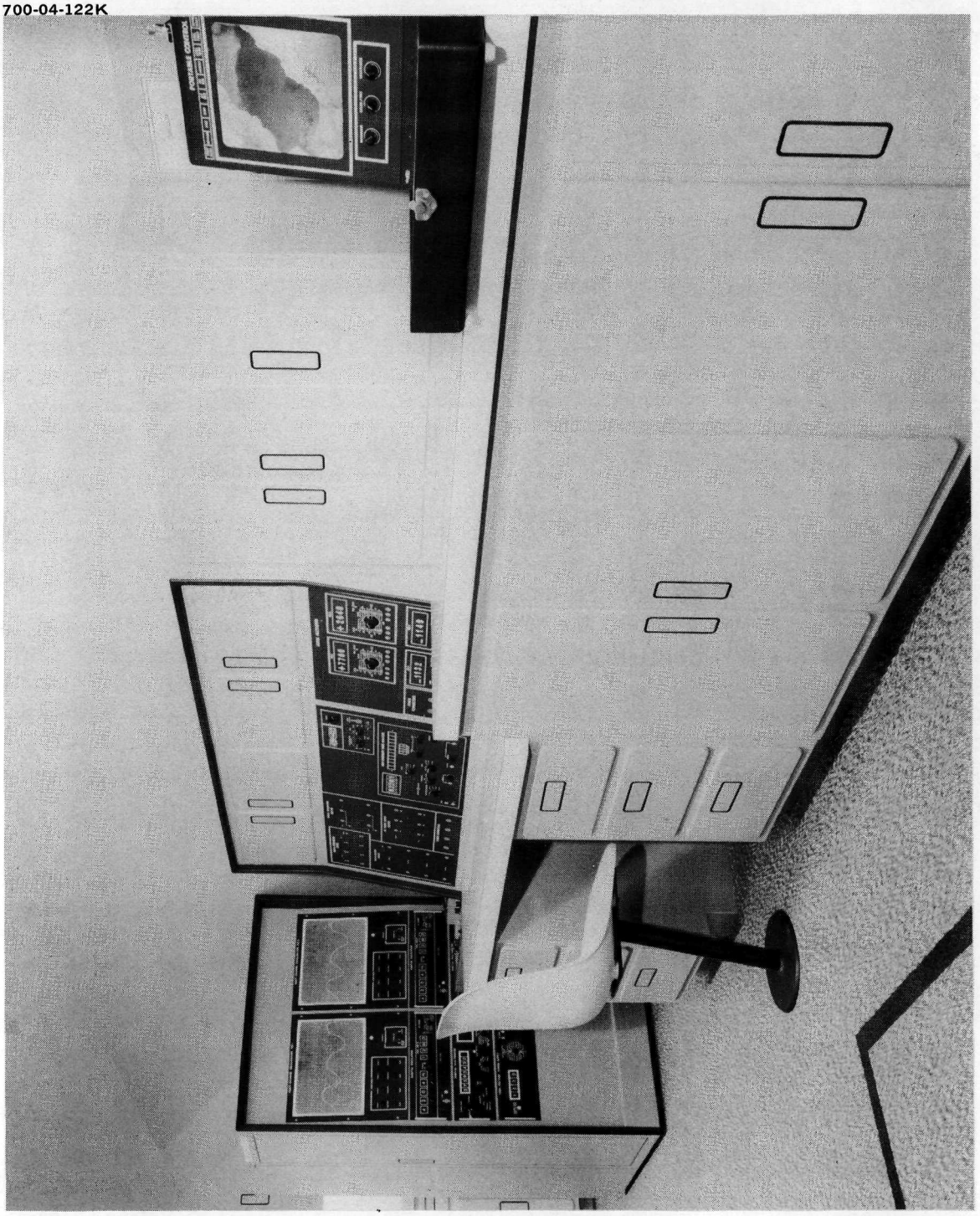


Figure 2-5. SM-2 Upper Deck, Electrical and Mechanical Maintenance

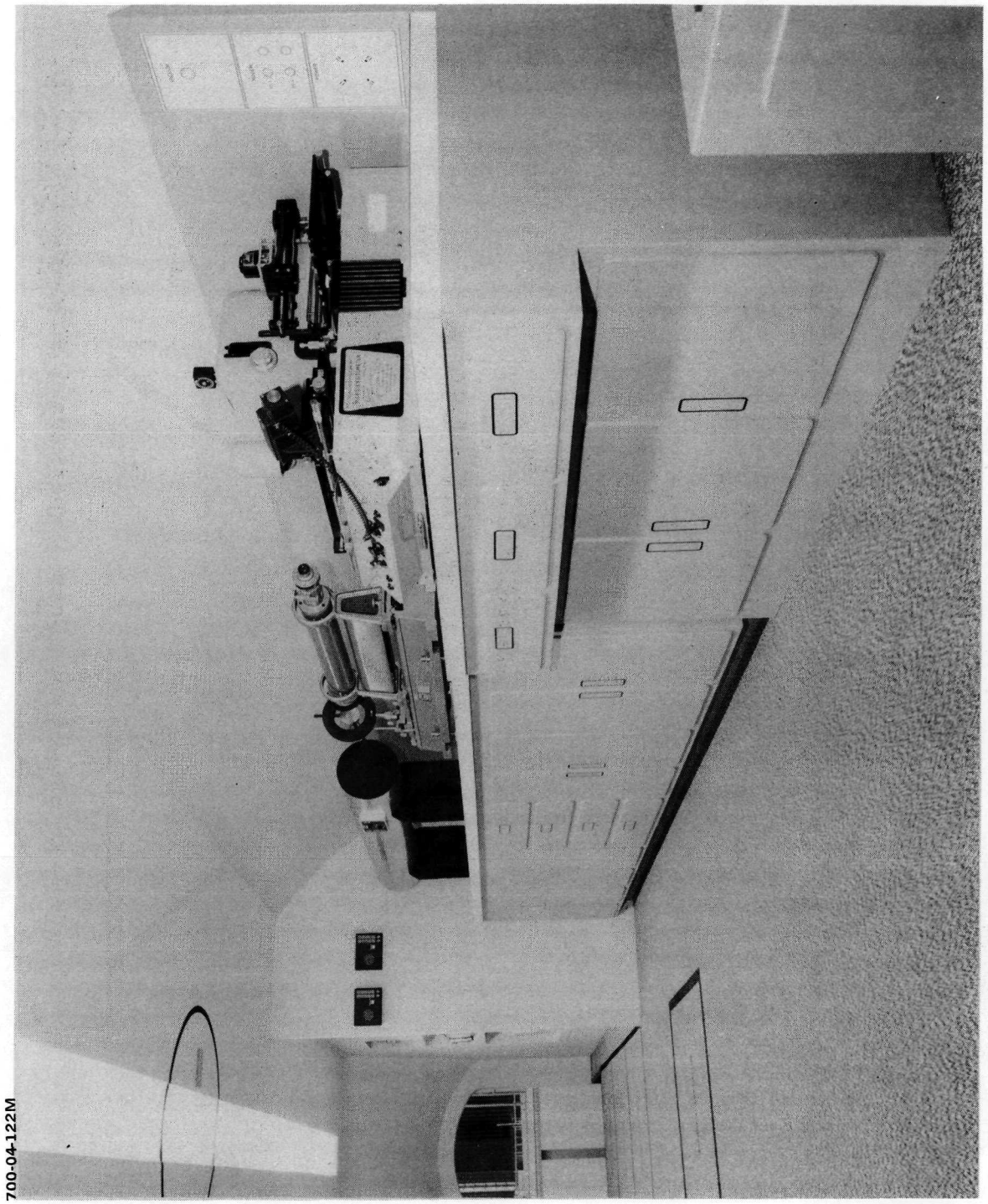



Figure 2-6. SM-2 Upper Deck, Optical Supply and Maintenance




Figure 2-7. SM-2 Lower Deck Area

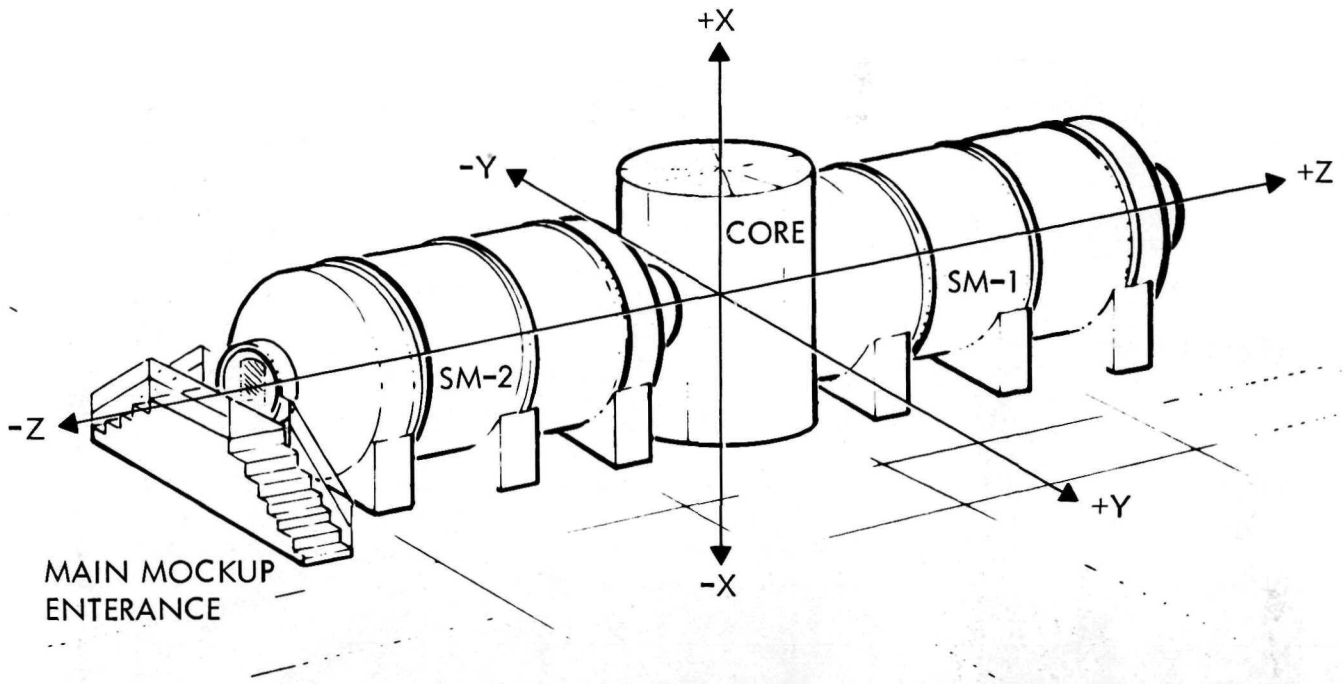
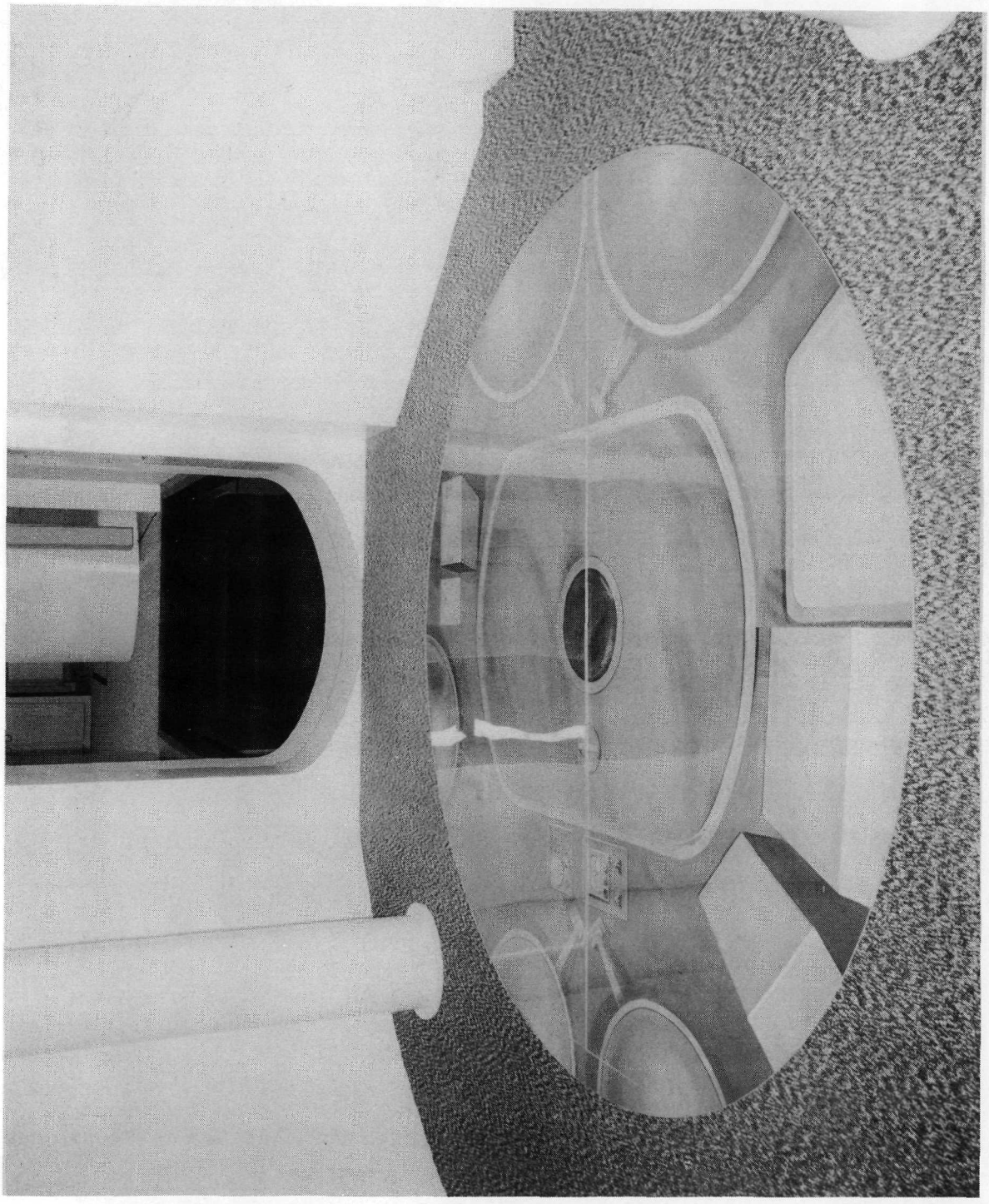



Figure 2-8. MSS Mockup With X, Y, and Z Areas

Upon entering the core module from SM-2 through the open -Z axis berthing port, the SM-1 interior is visible through the open +Z axis berthing port of the core module (Figure 2-9). Looking to the left, the open -Y axis berthing port is visible. Through this open berthing port is another entrance into the mockup from ground level by means of an external stairway. Looking to the right, the simulated closed +Y axis berthing port is visible. Looking down toward the -X axis of the core, a floor covered with a picture, representing an interior view of the core, is visible. This view is looking toward the EVA/IVA airlock with the airlock internal hatch visible along with the water storage tank and pump, environmental control subsystem ducting, oxygen accumulators, and other components shown around the periphery of the core module.

Station Module 1

The mockup of SM-1 contains split-level upper and lower decks. This module was constructed utilizing the preliminary design drawings supplemented with mockup sketches. Specifically, NR drawing V030-942202 (Sheets 2 through 6) presents the interior arrangement and callout of equipment in SM-1.



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Figure 2-9. Core Module Interior

Entrance to the upper deck of SM-1 from the core module is made through the open +Z axis berthing port of the core module.

Upon entering SM-1, on the right at the core/SM-1 interface is a cutaway showing typical utility connections between modules. Continuing through the passageway into SM-1, immediately to the right is the entrance into the personal hygiene area (Figure 2-10), with whole body shower on the left at the entrance. From right to left at the personal hygiene area entrance is the standup urinal, sink unit, storage cabinet, and, behind a privacy curtain, the fecal unit.

Directly across from the personal hygiene area is the data analysis area (Figure 2-11). The X-Y plotter is located just inside the core/SM-1 entry passageway on the left. Continuing through the data analysis area (on the left) is a film viewer/editor and a data color system including TV monitor, color select keyboard, built-in light table, and TV camera. A tape deck/strip chart is the last piece of equipment shown in the data analysis area.

Directly across from the data analysis area, just beyond the personal hygiene area on the right, is a photo processing area (Figure 2-12) with complete enclosure as a photo darkroom. A light table and Bimat processor represent some of the items associated with this area.

Just outside this area located in the center of the floor is an auxiliary access cover (represented by black lines on the floor). This represents the access to the lower deck area and the entrance to a flexport (not mocked up) which provides a second way out of SM-1 for emergency evacuation and dual egress requirements.

Continuing past this access, on the left, is Control Center No. 1 (Figure 2-13) consisting of a data analysis/photo process control console, a spacecraft/experiment control console, portable control console, and communication rack.

Opposite this area (Figure 2-14) is the backup medical care and exercise area. The area is shown with simulated medical supply cabinets. The folding examination/treatment table is not shown. The area includes a folding curtain for complete isolation of the area when required. A simulated ergometer is shown in place to represent flexibility of the area for use as crew conditioning, qualification, and exercise.

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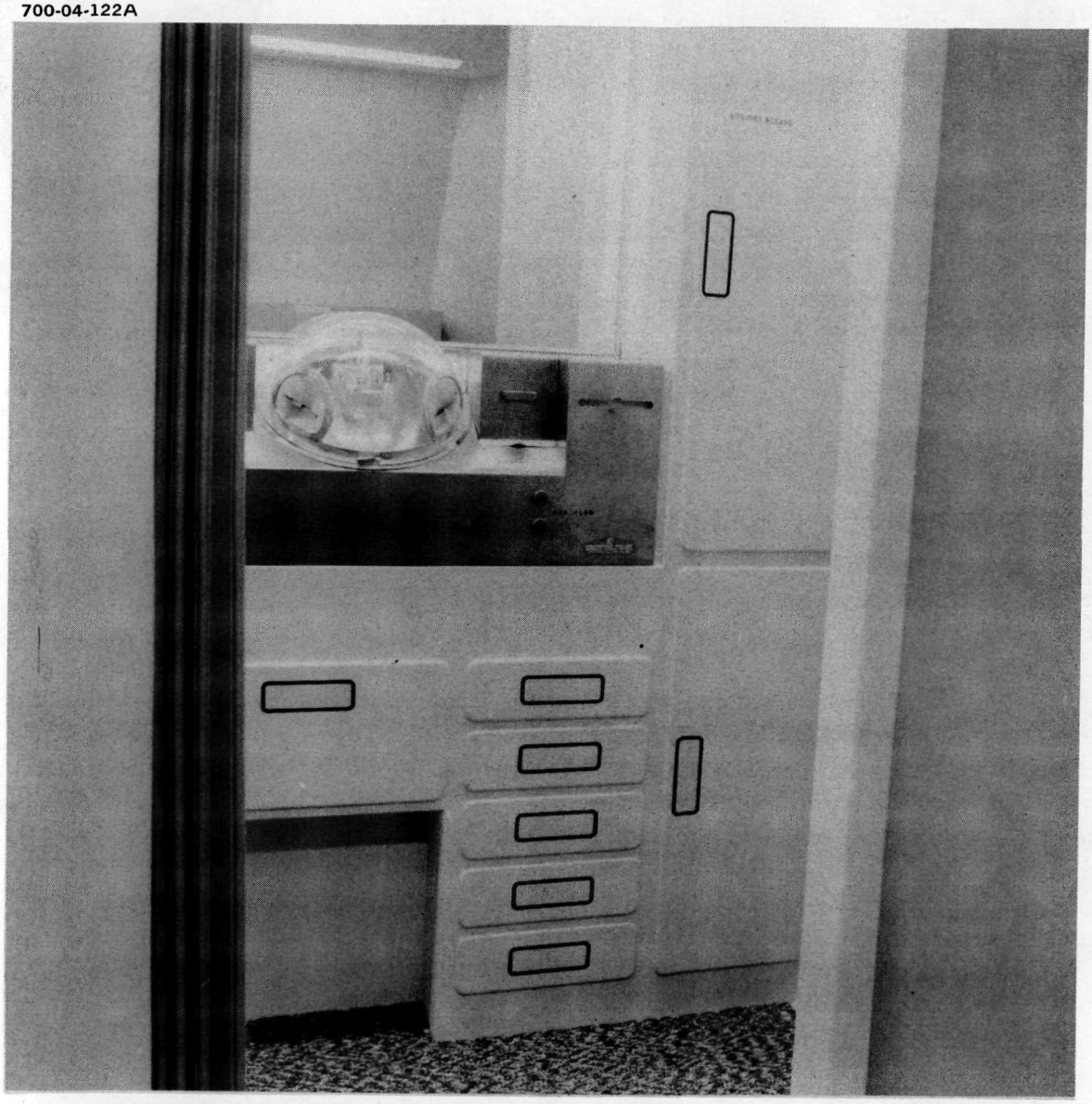


Figure 2-10. SM-1 Upper Deck, Personal Hygiene Area

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Figure 2-11. SM-1 Upper Deck, Data Analysis Area

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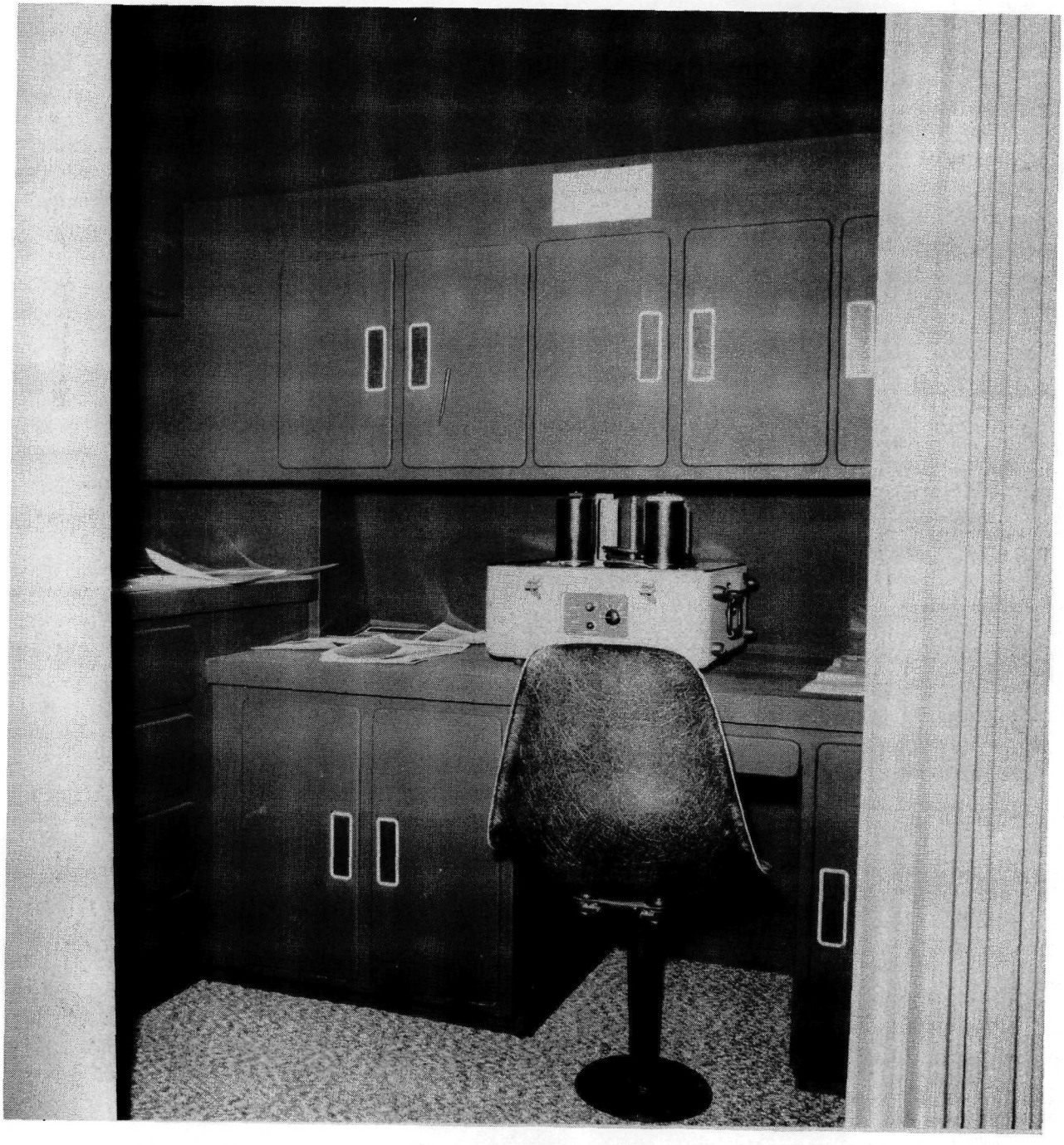


Figure 2-12. SM-1 Upper Deck, Photo Processing Area

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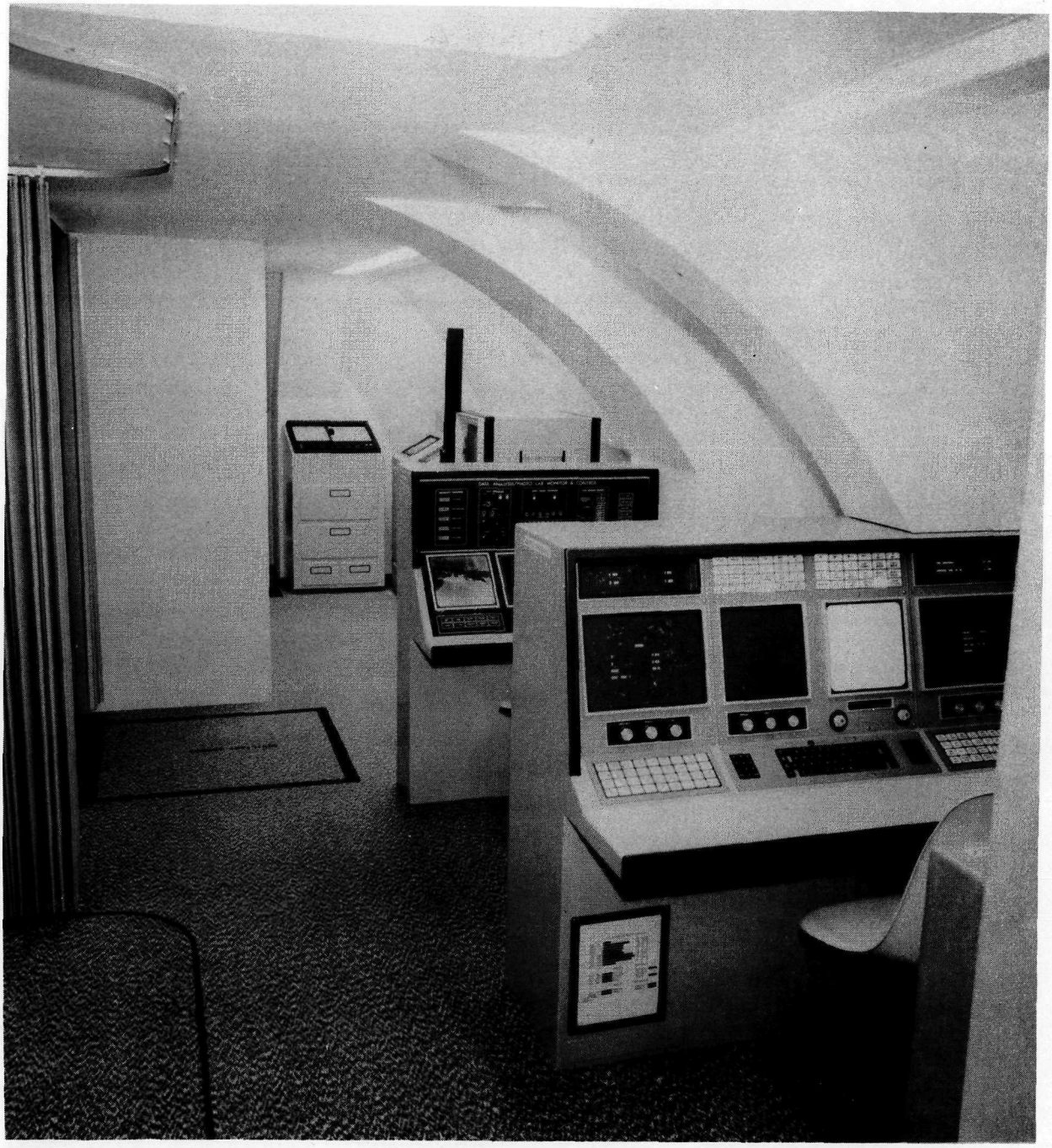


Figure 2-13. SM-1 Upper Deck, Control Center No. 1

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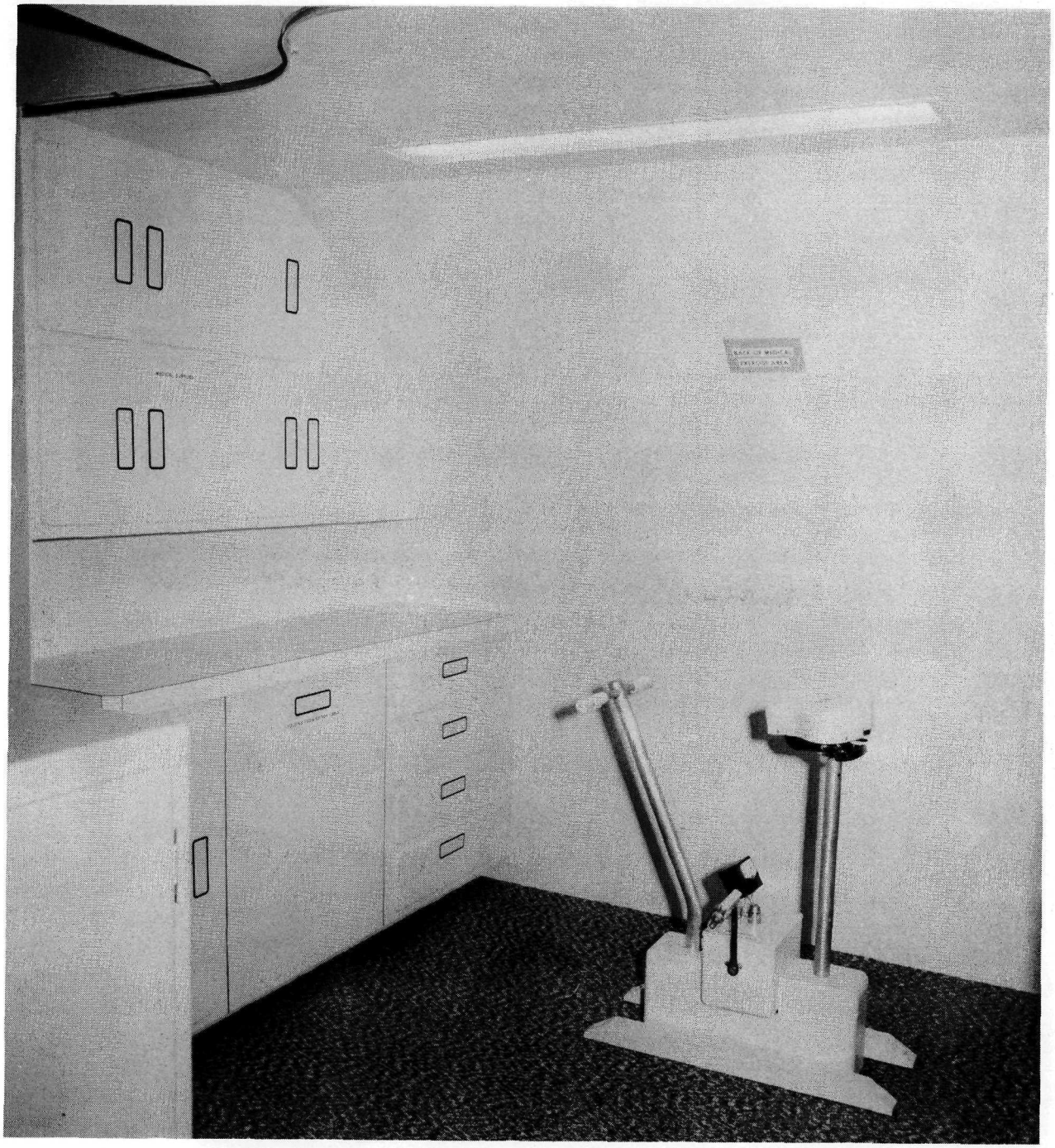


Figure 2-14. SM-1 Upper Deck, Backup Medical Care/Exercise

To enter the commander's quarters (Figure 2-15), a step up of 20 inches is required. This raised floor (split level) is required to provide adequate ceiling height for these quarters as well as the crewmen's quarters directly below. These will be described along with the entire lower deck area of SM-1 in subsequent paragraphs.

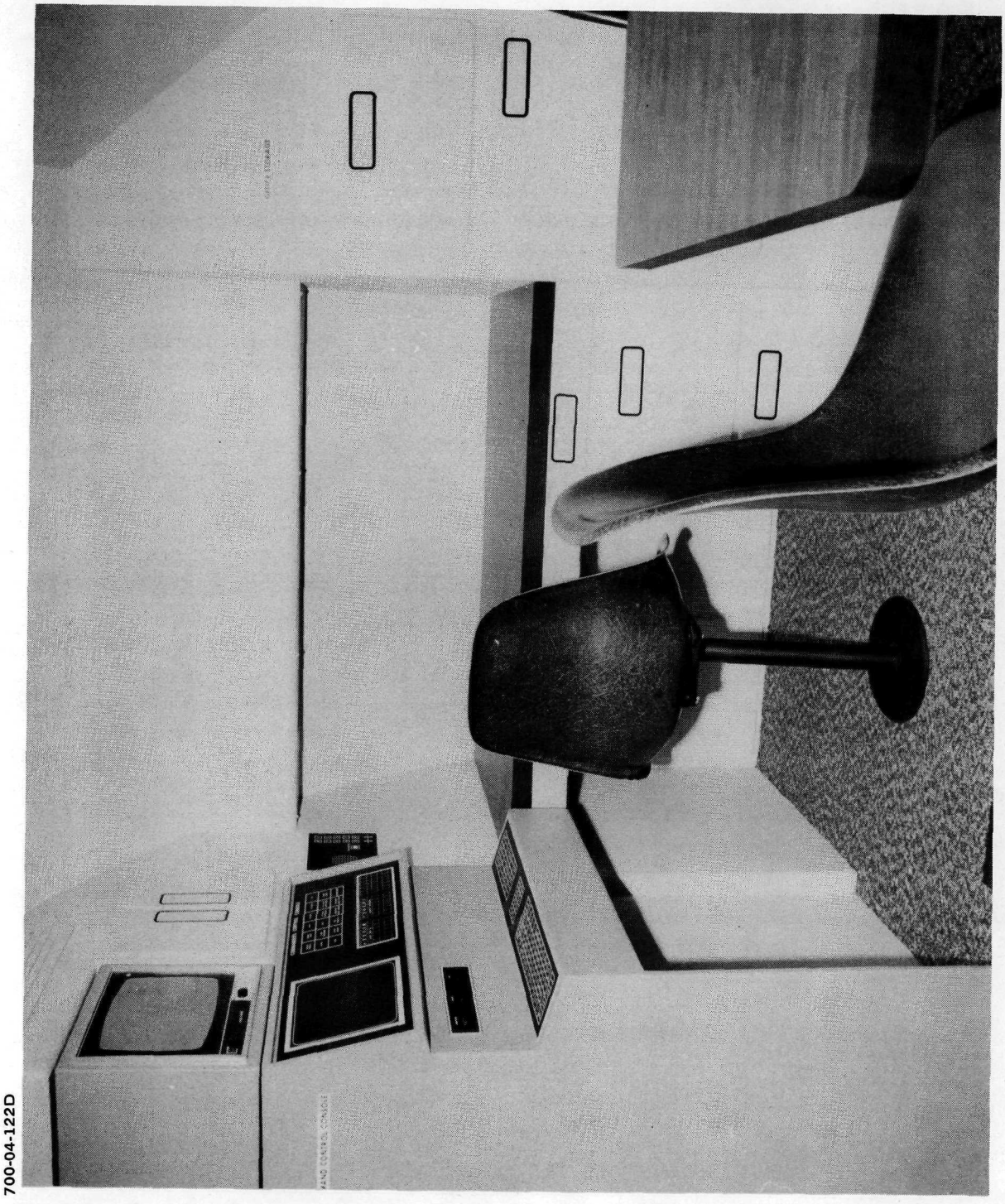
In the commander's quarters, to the right, is a bunk with stowage compartments below. Continuing from right to left is a walkin storage area, conference table and seats, desk, control console, and TV. Emergency access to and from the below-deck area (crewmen's quarters) is shown as two black lines on the floor at the entry to this area. This provides a second exit from the commander's quarters for emergency use only.

For mockup access to the lower deck area of SM-1, an opening has been made in the lower deck area which eliminates one of the two simulations of the electrical power system (EPS) electrolysis units.

Entering the lower deck area, directly to the right are stowage compartments for two pressure garment assemblies and two portable life support systems. Opposite these, a portion of the fire extinguisher package is visible. Simulated potable water tanks, water recovery unit vent accumulator, and pump are also shown. To the left when entering the lower deck area (Figure 2-16) are the other EPS electrolysis unit, explosives detector, and secondary bus equipment. Directly opposite is a gas barrier housing the Freon-water intercooler, Freon reservoir, water pump, and Freon pump. In the aisle is an auxiliary access cover represented by painted lines on the floor. As in the previous case, this is the access to a flexport located between SM-1 and SM-2 of the initial station cluster, and provides a second evacuation route.

Beyond this simulated access cover on the left is a sensible heat exchanger, secondary bus equipment, memory rack, fire detector, and fire extinguisher package. On the right is a stowage area general emergency equipment such as oxygen masks and mobility aids and other equipment.

Entrance into two crewmen's quarters requires a step up of 8 inches. This provides more flat floor area compatible with the interior arrangement. These quarters are separated by a folding curtain which, when closed, provides individual private quarters or, when open, provides one large area and can be altered at the discretion of the crew. Each of the two individual areas include bunk, stowage volume, desk, seat, and television. In addition, a stowed second bunk in each area is available for use of additional crew members during emergency conditions or during periods of cargo module resupply and crew overlap.



700-04-122D

Figure 2-15. SM-1 Upper Deck, Commander's Quarters

700-04-122E



Figure 2-16. SM-1 Lower Deck

All mockup floor areas, with the exception of the core module, are covered with carpeting for mockup purposes only to provide ease of maintenance and is not intended to reflect actual spacecraft floor treatment.

# 3. MSS MOCKUP REVIEW AND EVALUATION

## 3.1 SOFT MOCKUPS (ENGINEERING EVALUATOR)

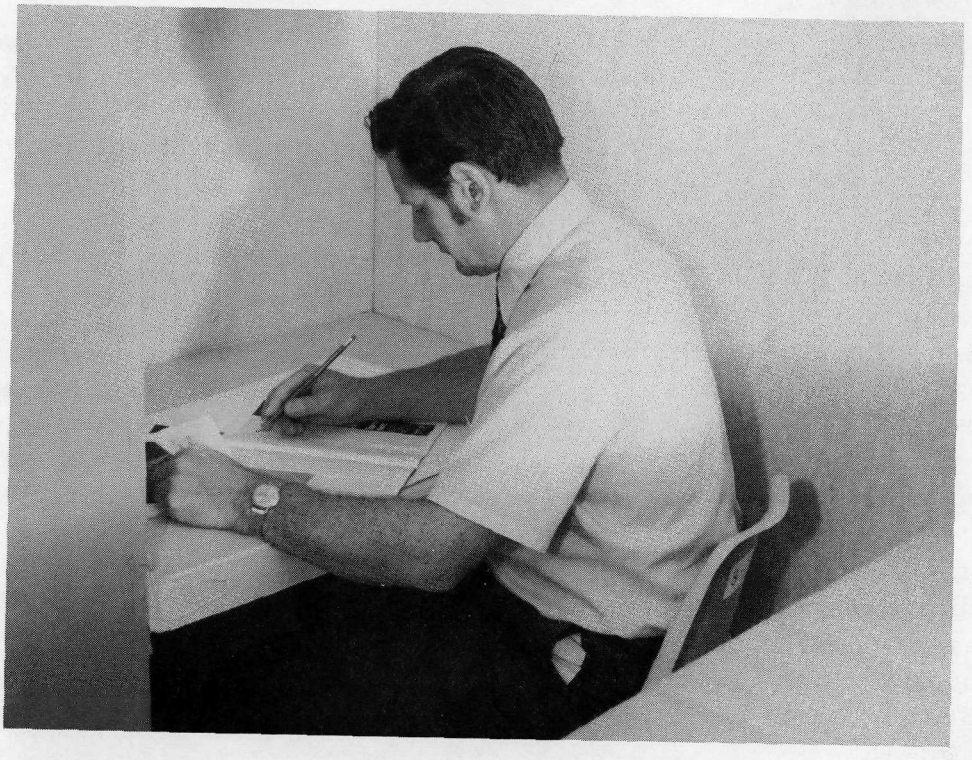
Many module configurations were considered during the MSS Phase B definition study to establish the most efficient interior arrangements and to minimize the total number of modules needed to satisfy the initial station requirements. Consequently, modules with longitudinal floors, using a two-level interior concept in which both upper and lower decks would be utilized for crew living quarters as well as for system installation and stowage, were recommended and adopted. Based on this concept, crew living quarters were arranged with commander's/executive quarters located on the upper level and crew quarters located directly beneath. To assist in selection of the final configurations of this concept, soft mockups, utilizing foam core construction, were developed to evaluate several possible arrangements.

Initial layouts of the crewmen's quarters located in the lower deck area of SM-1 arranged the bunks and desks in a rectilinear concept similar to the 33-foot station concepts. Because of the location in the module, however (quarters included the conical end of module), the walls of the quarters appeared to be closing in, making the area feel smaller than its 50 square feet. As a result, a soft mockup of this area was constructed. Figure 3-1 shows photographs of the interior of this mockup. Modifications to the mockup were made, removing some of the fairings that closed off the end of the module, revising some of the storage areas, relocating the desks, and shifting the bunks into a canted position, thus taking advantage of the additional area available.

Figure 3-2 shows photographs of this revised interior arrangement. As can be seen, the interior is now shown opened up, which removes the closed-in feeling. From this soft mockup interior arrangement, final preliminary drawings of the crewmen's quarters were prepared. Figure 3-3 is a sketch showing the resulting arrangement used in the mockup of SM-1.

In addition to the soft mockup development of the crewmen's quarters, soft mockups of the commander/executive quarters were developed. In a similar manner, a soft mockup of the commander/executive quarters was constructed based on initial drawings of the area. Figure 3-4 presents photographs of the initial mockup arrangement. Although this arrangement did not present any major problems, the location of the bunk with respect to

700-04-101A



700-04-101C

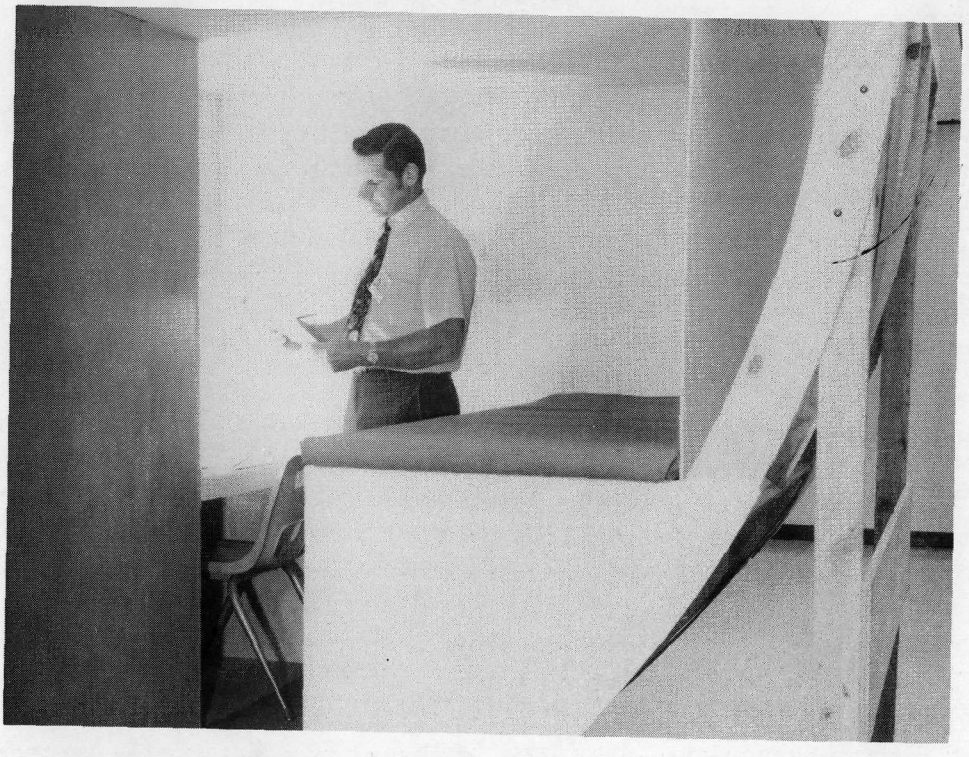
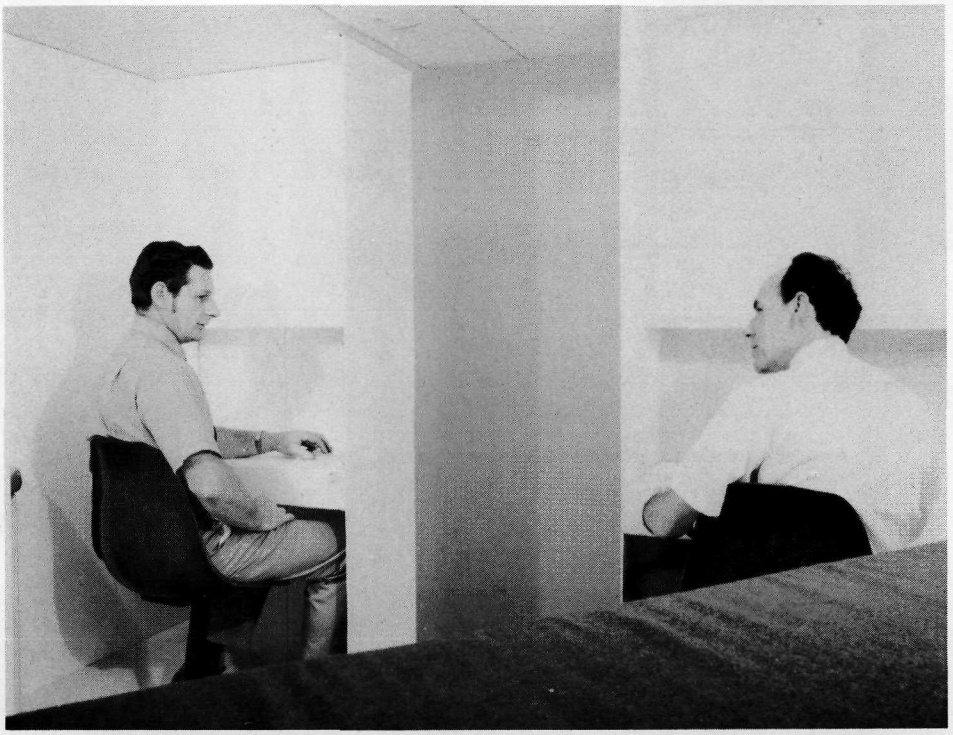


Figure 3-1. Crewman's Quarters - Initial Arrangement, Soft Mockup

700-04-105H



700-04-108C



Figure 3-2. Crewman's Quarters - Final Arrangement, Soft Mockup

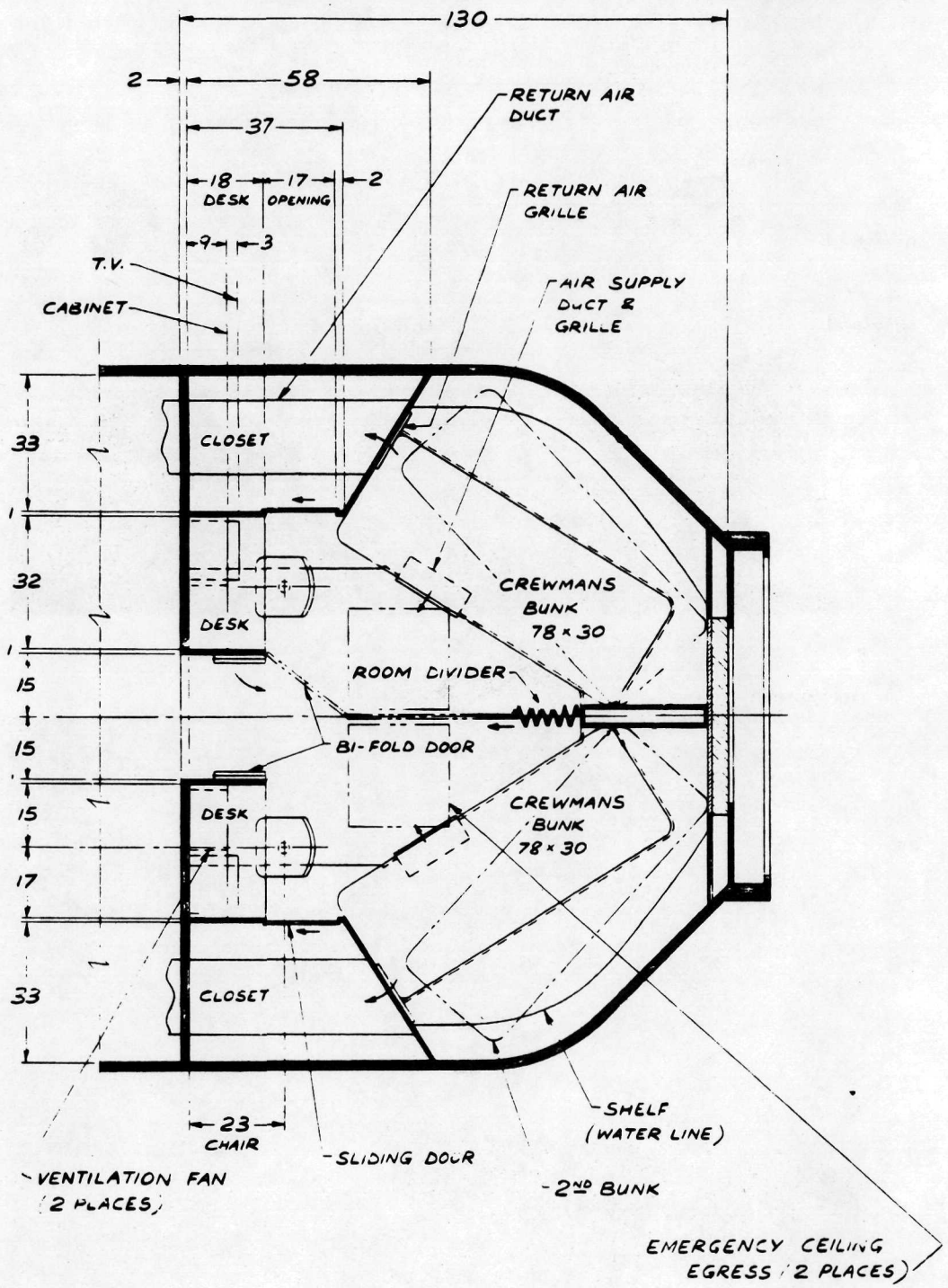
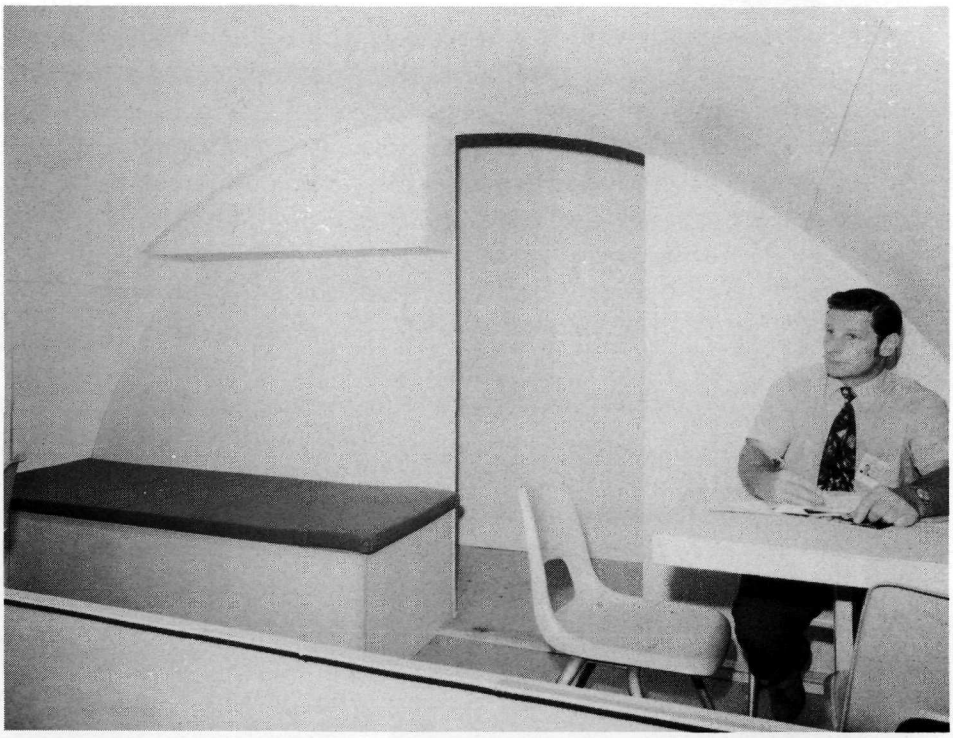



Figure 3-3. Crewman's Staterooms, Lower Deck - Final Configuration

700-04-101R



700-04-101S

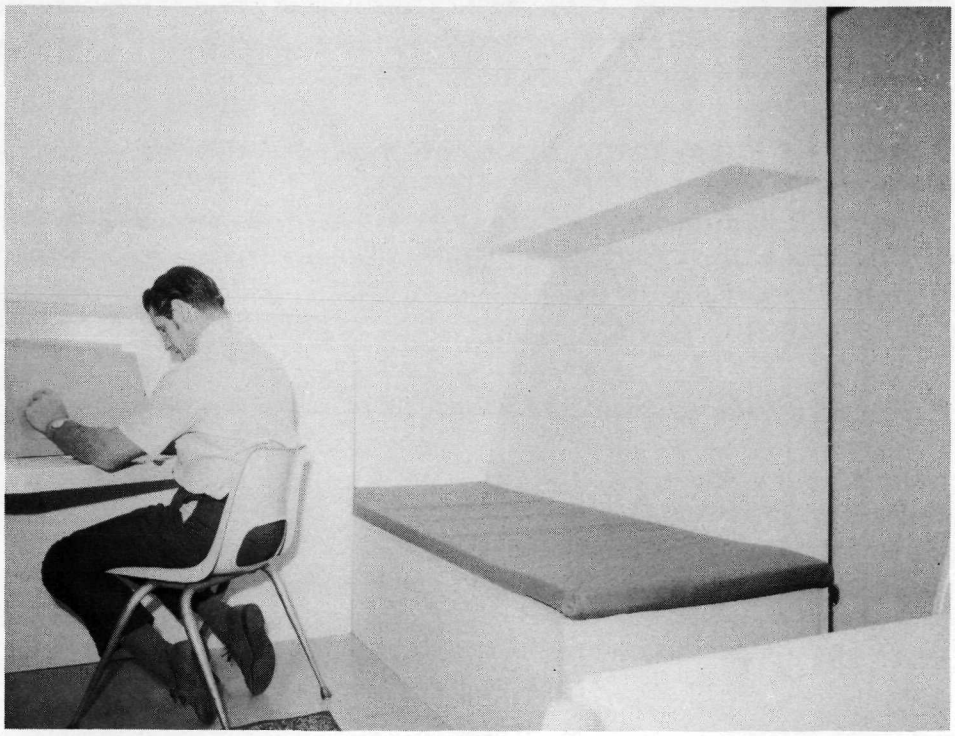


Figure 3-4. Commander/Executive Quarters - Initial Arrangement, Soft Mockup

the commander's control console, television, and other items was somewhat awkward and space utilization obviously was not optimized. Modifications were made by relocating the bunk, which resulted in a better arrangement for use of the desk, conference table, and control console as a work area. Figure 3-5 shows the close working relationship potential between the desk and conference table area in the revised mockup. The final preliminary drawings of the commander/executive quarters were based on this revised mockup. Figure 3-6 is a sketch of this final arrangement which was incorporated in the hard mockup of the SM-1 upper deck area.

## 3.2 IN-HOUSE MOCKUP REVIEW

An in-house review and evaluation of the MSS mockup was conducted three weeks before the contractually required NASA review to assure NR MSS management that the mockup reflected the MSS preliminary design and that the mockup fidelity was suitable, and to obtain any recommendations that would enhance the mockup for the NASA review.

### Review Process

The review and evaluation process was preceded by a briefing that provided an overview of the MSS design, the mockup, and review and evaluation procedures to be followed. The evaluation was conducted by MSS Engineering management and the directorates of NR Space Division Central Engineering.

A total of 20 management personnel attended this briefing and subsequent tour of the mockup. The reviewers were instructed to take notes of discrepancies and recommend changes. All reviewers were invited to attend a meeting for general discussion of the discrepancies and recommendations for subsequent formal documentation on review item dispositions (RID's) and to establish disposition of each item.

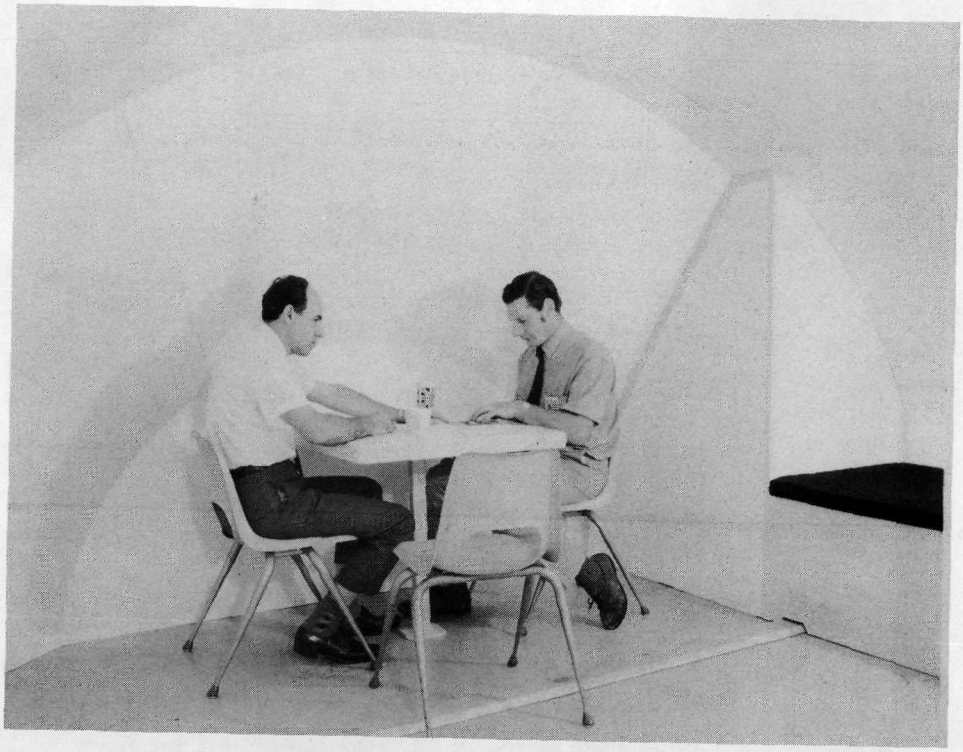
The categories available for classification of dispositions were as follows:

A - Accepted as written

B - Accepted with modification

C - Disapproved

700-04-105A



700-04-107D

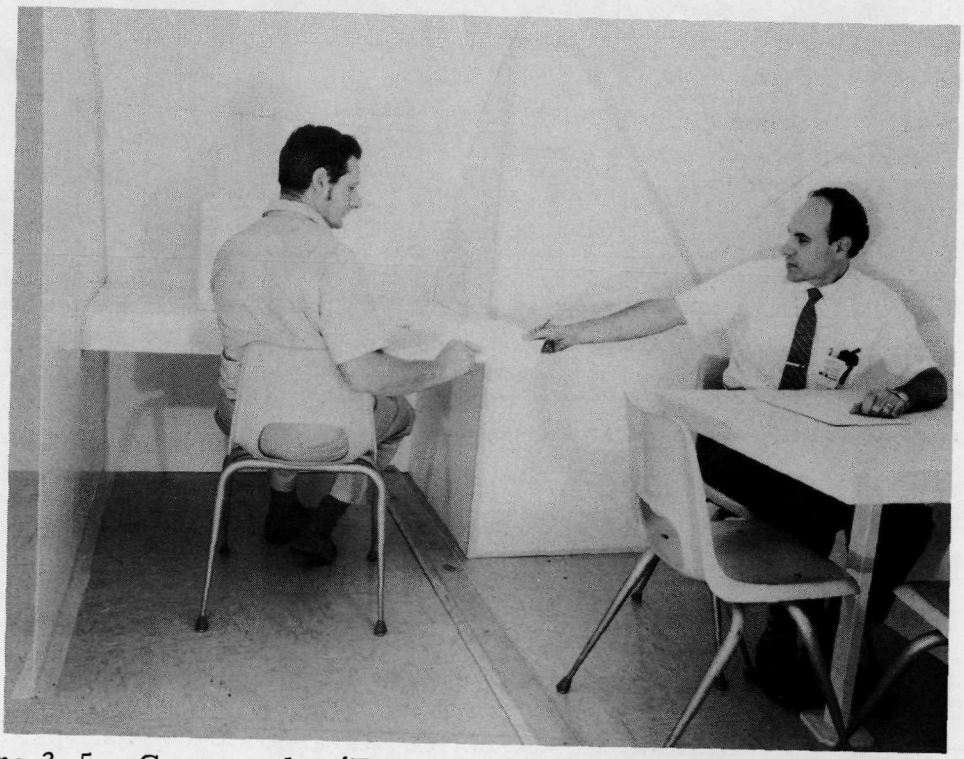


Figure 3-5. Commander/Executive Quarters - Final Arrangement, Soft Mockup

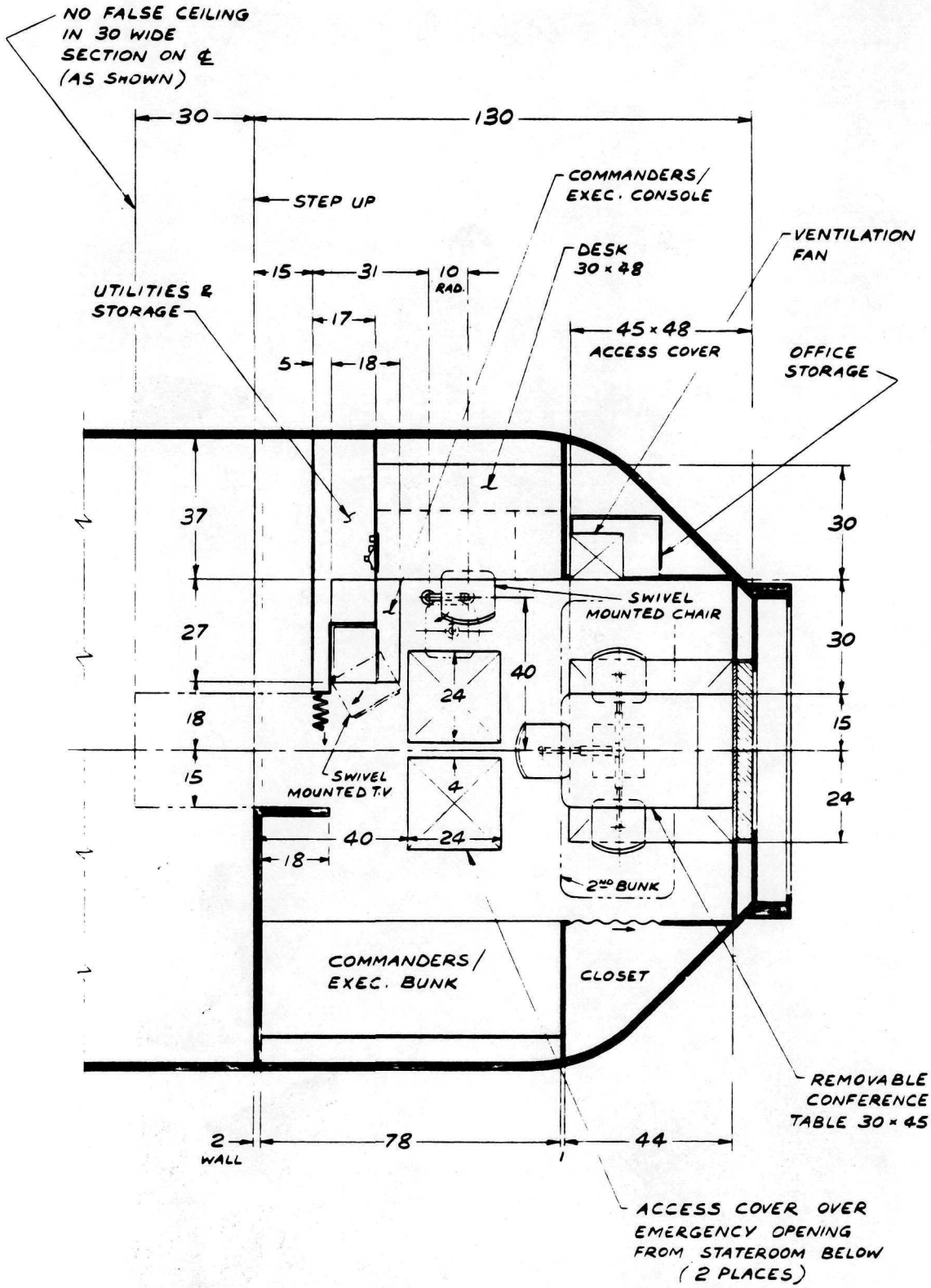



Figure 3-6. Commander/Executive Stateroom, Upper Deck - Final Configuration

Action to be taken on RID's in Categories A or B was:

1. Change mockup

2. Change specification at next update

3. Change design at next update

4. No change required - document in mockup review document.

For this review, action item designations 1, 2, and 3 inherently incorporated action designation 4.

The in-house review RID's were given an alphanumeric sequence. First came the corporate abbreviation, NR. Next came a set of digits which identified the location or module to which the RID is applicable. The last two digits designated the sequential order of the RID. Module number assignments were as follows:

| Module | Digit Assignment |
|---|---|
| SM-1 upper deck | 1/1 |
| SM-1 lower deck | 1/2 |
| SM-1 exterior | 1/X |
| SM-2 upper deck | 2/1 |
| SM-2 lower deck | 2/2 |
| SM-2 exterior | 2/X |
| Core Module interior | C/1 |
| Core Module exterior | C/X |

Where the RID could not be identified to a specific location, the letter "G" (general) was used. An example RID number is NR-G-01.

Review Item Disposition

A total of 17 RID's was prepared from the discrepancies and recommended changes resulting from the in-house review. All RID's were approved for mockup revision except one, RID NR-1/1-15, which was disapproved solely because the approach utilized in the mockup met the intended requirement.

The RID's are included at the end of this section. They identify the changes that were made to the mockup after the in-house review and before the NASA review.

## 3.3 NASA MOCKUP REVIEW

The formal NASA review and evaluation of the MSS mockup, conducted December 8, 1971, at the NR Seal Beach facility, was a scheduled activity in the MSS Program Phase B Definition Extension Period Study Plan (SD 71-201). It was conducted to provide an assessment of the MSS design features which are represented in the mockup. Specifically, the evaluation assessed:

1. The overall habitability environment provided.

2. The suitability of the configuration for

   a. Routine housekeeping
   b. Station operations and experiment operations

3. The functional furnishings and equipment concepts.

### 3.3.1 Review Process

The review and evaluation of the mockup was preceded by a briefing that provided an overview of the MSS design, the mockup, and the review and evaluation procedures to be employed. For the review and evaluation process, an MSC/NR mockup review organization was coordinated with NASA and established as shown on Figure 3-7. Review and evaluation team numbers were assigned to each of the three technical specialty areas and also to the review board for the purpose of identifying mockup tour sequence procedures.

A tour of the mockup was conducted in accordance with the procedures outlined on Figure 3-8 with NR tour guides established for each team. In support of the tour guides, NR assigned technical specialists to each of the four main areas of the mockup: SM-1 above and below deck and SM-2 above and below deck. These specialists were assigned solely to assist the tour guides by answering any NASA questions.

Following the mockup tour, each review team was given approximately two hours to prepare comments and discussion for presentation to the review board.

The final part of the review process was the review board meeting, in which each team chairman provided a summary concerning general comments relating to the MSS concept as presented by the mockup. Review team members were present during the summary presentations and short discussions followed each team chairman presentation.

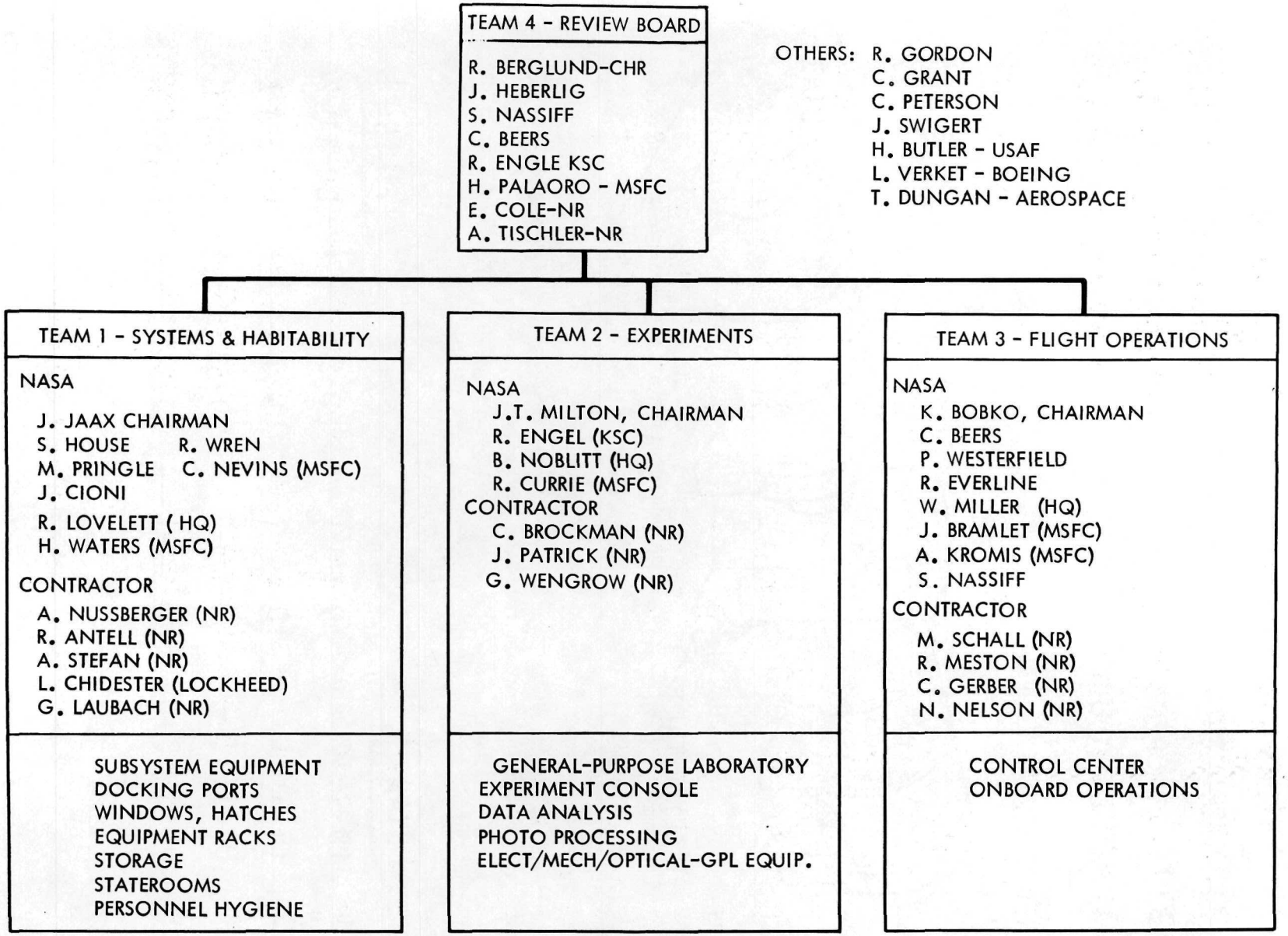



Figure 3-7. Space State Phase B Definition Study MSC-NR Mockup Review Organization

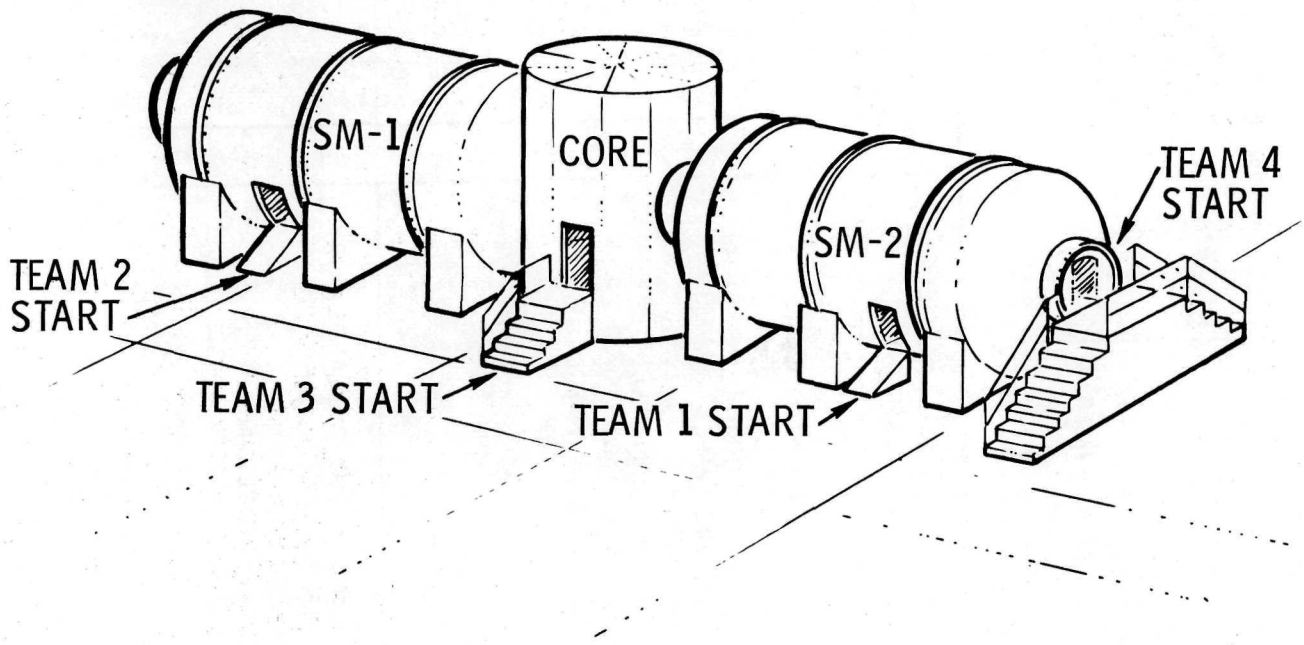
TEAM 1 - SYSTEMS & HABITABILITY -- GUIDE: AL STEFAN

TEAM 2 - EXPERIMENTS -- GUIDE: CARL BROCKMAN

TEAM 3 - FLIGHT OPERATIONS -- GUIDE: MYRON SCHALL

TEAM 4 - REVIEW BOARD -- GUIDE: ASH TISCHLER

TOUR SEQUENCE:




| | START | | | FINISH |
|---|---|---|---|---|
| TEAM 1 | LD-SM-2 → | LD-SM-1 → | UD-SM-1 → | UD-SM-2 |
| TEAM 2 | LD-SM-1 → | LD-SM-2 → | UD-SM-2 → | UD-SM-1 |
| TEAM 3 | UD-SM-1 → | UD-SM-2 → | LD-SM-2 → | LD-SM-1 |
| TEAM 4 | UD-SM-2 → | UD-SM-1 → | LD-SM-1 → | LD-SM-2 |

Figure 3-8. Mockup Tour Procedure

The review board chairman, R. A. Berglund, NASA/MSC, Manager, Modular Space Station Project Office, accepted the NR mockup, with concurrence of personnel from NASA Headquarters, Marshall Space Flight Center, Kennedy Space Center, and Manned Spaceflight Center.

Review Board Summary Comments

The mockup comments by each of the three technical review teams have been reviewed and edited for incorporation in this report. The comments have not been altered in any way; however, NR discussion has been added where applicable. These comments are presented as Tables 3-1, 3-2, and 3-3.

Although some comments were duplicated to some degree by the three teams, it was the intention of the Mockup Review Board to document the total comments as presented in this report.

A review of these mockup comments indicated that no major discrepancies exist with the MSS design as presented or with the mockup itself. Some excellent recommendations were made in the comments which are of value for future phases of a manned space station program.

Table 3-1. Mockup Review Comments—Team 1, Systems and Habitability

| NASA Comments | NR Comments |
|---|---|
| General | |
| 1. Cargo handling and mobility aids are areas which require more study. | |
| Habitability | |
| 1. Docking ports on end of modules are obscured internally by staterooms and equipment layouts, and externally by antennas and airlocks which detract from using that part for any docking. | Ports were established for ease of replacement of antenna packages and airlocks. Not intended for docking operations with shuttle. |
| 2. In SM-1, commander's stateroom is next door to the station control console which does not permit commander to "get away" from his work environment and may be a psychological problem. Flight Operations Review team wants the current location. | |
| 3. The commander's stateroom is located on the upper floor and is almost twice as large as the crewmen's staterooms which are on the lower level. In addition, the crewmen must go through the subsystems area (cellar) to get to their staterooms. Recommend that the commander's room be subdivided - sleep area, conference area - as a possible solution to the difference in room size. | |
| 4. Windows should be added in the crewmen's staterooms to provide them with a "view" of their environment. | |
| 5. The locations of the control console and experiments support console do not permit eye-to-eye crew contact during operations and do not permit two or more chairs to be located at the consoles. Recommend that the consoles be turned 90° to face the wall. Placement of the control center window is an issue for further analysis. | Control console located perpendicular to cylinder wall to permit crewman visual cue through window. |

Table 3-1. Mockup Review Comments—Team 1, Systems and Habitability (Cont)

| NASA Comments | NR Comments |
|---|---|
| Subsystems | |
| 1. Both modules gave the appearance of a low packaging density and perhaps inefficient utilization of the available volumes. However, this excess volume may be only a situation that exists today and may dissolve in the future as subsystems and equipment are better defined. It should be noted that the packaging volumes and accessibility to the ECLSS and ISS assemblies were commendable. | Low density is a factor of weight margin. As weight increases beyond present design, density will increase. |
| 2. It appeared that there was limited accessibility to the structural wall behind the packages in the lower levels of SM-1 and SM-2. Consideration should be given to using hinges to swing packages for accessibility. | |
| 3. It is felt that the floor in SM-1 and SM-2 is a necessary piece of structure which significantly constrained the location of equipment. Therefore, if it was removed, the interior layout of the module may be significantly different which is contrary to previous opinions. | Universal module concept permits floor/no floor. The NR design is based on a longitudinal floor (non-load-bearing other than inertia loads). |
| 4. It is felt that the proposed vacuum jacketing of the "dangerous" subsystems may make maintenance and visual inspection of components very difficult. | |
| 5. Is it necessary to have the panel coverings on the utility lines below in the lower level of the modules? It limits accessibility to the pressure wall for inspection. | |

Table 3-2. Mockup Review Comments—Team 2, Experiments

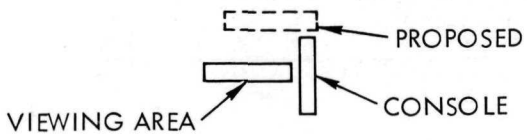
| NASA Comments | NR Comments |
|---|---|
| General<br><br>1. In GPL work areas there are no details for storage of tools and how tools may be restrained. Tools storage was not shown or implied, or trash associated with experiments. (Contents of boxes should be shown.)<br><br>2. Food preparation area is in same area as optical bench work - this could cause food particles to contaminate sensitive equipment - calibration/maintenance activities - consider relocation of backup galley.<br><br>3. Lighting areas or light-sensitive work (optics) should be shielded from overall light levels in the module - optical bench, data analysis (same as photo lab area).<br><br>4. Experiment airlock areas should have been mocked up along with GPL docking because it is a normal extension of the functional capability of the GPL and (in future work) should be mocked up.<br><br>5. Need windows to view from the GPL what is being deployed out of the airlock - antennas, for example.<br><br>6. Would like to have capability to attach RAM's in any orientation and not be limited to horizontal viewing (at ISS).<br><br>7. Contamination measuring device should be located in the airlock and readout possible via ISS before exposing instruments to environment.<br><br>8. Data analysis console should be relocated so that this console can be viewed simultaneously with data analysis viewing area.<br><br>  <br><br><br>Also, remote location of this function from actual hardware is inconvenient (filter changes, adjustments, etc.). | |

Table 3-3. Mockup Review Comments — Team 3, Operations

| NASA Comments | NR Comments |
|---|---|
| Control Center | |
| 1. The console is not arranged so two crewmen could conveniently work together. | |
| 2. The console presently located in commander's stateroom may be more effectively utilized in the control center. | |
| 3. More provisions should be made for stowage of items such as flight data files, books, etc., in the immediate area of the control console. | |
| 4. The data reduction center next to the control center appears satisfactory and perhaps preferred. | |
| 5. There was discussion among the group about the display of experiment operations in the station control area - especially experiment-critical parameters. | Mockup was configured to depict "station operations" in SM-1. Audio and visual of critical experiment parameters is within the capability of the design. |
| 6. The general-purpose CRT displays are difficult to evaluate since there is no display as to how they will interface with the subsystems. | |
| Staterooms | |
| 1. Commander's room is good sized - others appear adequate. | |
| 2. Lower quarters access appears to have staterooms in a cellar (i.e., one has to go through equipment racks to get to the staterooms). | |

Table 3-3. Mockup Review Comments—Team 3, Operations

| NASA Comments | NR Comments |
|---|---|
| Staterooms (Cont)<br>3. Drawers in the lower bunks interfere with the curtain.<br>4. It would be better to have the hygiene closer to the staterooms if noise was not a problem.<br>SM-2<br>1. Operations group not capable of commenting on detailed equipment in the module.<br>2. The area outside the airlock should not have a floor to make a large volume for the assembly and working on large items.<br>3. Local lighting should be provided for experiment operations.<br>4. A window would probably be desirable for habitability and to help experiment operations.<br>Below Decks<br>1. Significant room, but stowage is not specified.<br>2. Perhaps more backup items could be included below decks (e.g., backup galley).<br>3. Communications units appear to be dangling in the lower area and subject to damage. | |

Table 3-3. Mockup Review Comments—Team 3, Operations

| NASA Comments | NR Comments |
|---|---|
| Safety<br><br>1. In SM-2 the $H_2$ and $O_2$ accumulabors are in close proximity.<br><br>General<br><br>1. The station appeared to be roomy and open.<br><br>2. Flexport arrangement is difficult to visualize.<br><br>3. Stowage is not specified.<br><br>Core<br><br>1. A mockup of the core would be helpful in determining the arrangement of the core and the interface with the airlock.<br><br>2. Volume appears adequate for the storage of additional pressure suits so all members of crew would have a suit.<br><br>3. The mockup has some discrepancy in the location of the air ducts. | |

| TYPE OF REVIEW M/U | REVIEW ITEM DISPOSITION | NUMBER NR-G-01 |
|---|---|---|
| VEHICLE MSS | | COORDINATION |
| DATE 11-17-71 | | TEAM NAME |
| INITIATOR C. Allen | ORGANIZATION SYSTEM RE&T | |

DISCREPANCY PROBLEM — TITLE Mockup Appearance

Mockup gives appearance of being too fancy, too plush. Should give more appearance of workshop with much utility.

JUSTIFICATION

Appearance philosophy not readily understood.

RECOMMENDATION

1) Omit carpets
2) Change "stateroom" to "quarters"

CONTRACTOR'S COMMENT

1) Carpets are for M/U use only.
2) Agree with recommendation 2) above.
3) Add data sheets, working papers, books, and personal items to various areas of mockup to improve image of operational facility.
4) Investigate availability of textured paper to add to curved wall surfaces within staterooms - due 11/23.

TEAM CAPTAIN RECOMMENDATION

| CATEGORY | REMARKS |
|---|---|
| ACTION | Textured paper ordered and will be installed. |
| SUSPENSE | |

BOARD ACTION

| CATEGORY B-1 | | |
|---|---|---|
| ACTION | | |
| SUSPENSE | | |
| ACTION | [X] APPROVED | SIGNATURE OF BOARD CHAIRMAN |
| SUSPENSE | [ ] DISAPPROVED | |

Temp. Form SSEO 10-24

| TYPE OF REVIEW M/U | REVIEW ITEM DISPOSITION | NUMBER NR-G-02 |
|---|---|---|
| VEHICLE MSS | | COORDINATION |
| DATE 11-17-71 | | TEAM NAME |
| INITIATOR M. Schall | ORGANIZATION SSE SYSTEM | |
| DISCREPANCY PROBLEM | TITLE Hatch Handles | |

Handles not shown on hatches.

JUSTIFICATION

Handles are required per design.

RECOMMENDATION

Paint or mark handles on all hatches.

CONTRACTOR'S COMMENT

Agree with recommendation.

TEAM CAPTAIN RECOMMENDATION

| CATEGORY | REMARKS |
|---|---|
| ACTION | Handles made and installed. |
| SUSPENSE | |

BOARD ACTION

| CATEGORY A-1 | | |
|---|---|---|
| ACTION | | |
| SUSPENSE | | |
| ACTION | ☒ APPROVED | SIGNATURE OF BOARD CHAIRMAN |
| SUSPENSE | ☐ DISAPPROVED | |

Temp. Form SSEO 10-24

| TYPE OF REVIEW M/U | REVIEW ITEM DISPOSITION | NUMBER NR-G-03 |
|---|---|---|
| VEHICLE MSS | | COORDINATION |
| DATE 11-17-71 | | TEAM NAME |
| INITIATOR M. Schall | ORGANIZATION SEE SYSTEM | |
| DISCREPANCY PROBLEM | TITLE Flexport Routes | |

Neither SM-1 or SM-2 shows flexport exit route.

JUSTIFICATION

Required to illustrate dual egress capability from module.

RECOMMENDATION

Illustrate flexport location within modules.

CONTRACTOR'S COMMENT

Agree with recommendation--paint on ceiling surface for SM-2 and recommend how to handle for carpeted area of SM-1. (Due 11/23)

TEAM CAPTAIN RECOMMENDATION

| CATEGORY | REMARKS |
|---|---|
| ACTION | A ring has been painted on the false ceiling of SM-2 and on the floor of SM-1 below deck. |
| SUSPENSE | |

BOARD ACTION

| CATEGORY A-1 | | |
|---|---|---|
| ACTION | | |
| SUSPENSE | | |
| ACTION | ☒ APPROVED | SIGNATURE OF BOARD CHAIRMAN |
| SUSPENSE | ☐ DISAPPROVED | |

Temp. Form SSEO 10-24

| TYPE OF REVIEW M/U | REVIEW ITEM DISPOSITION | NUMBER NR-G-04 |
|---|---|---|
| VEHICLE MSS | | COORDINATION |
| DATE 11-17-71 | | TEAM NAME |
| INITIATOR A. Jones | ORGANIZATION SEE | SYSTEM |
| DISCREPANCY PROBLEM | TITLE Location References | |

Decal references to core, SM-1, SM-2, flexports for emergency reaction are not visible.

JUSTIFICATION

Required to identify evacuation route in the event of an emergency.

RECOMMENDATION

Add decals and arrows for emergency exit from modules.

CONTRACTOR'S COMMENT

Agree with recommendation.

TEAM CAPTAIN RECOMMENDATION

| CATEGORY | REMARKS |
|---|---|
| ACTION | Evacuation routes will be identified -- signs are being made. |
| SUSPENSE | |

BOARD ACTION

| CATEGORY A-1 | | |
|---|---|---|
| ACTION | | |
| SUSPENSE | | |
| ACTION | [X] APPROVED | SIGNATURE OF BOARD CHAIRMAN |
| SUSPENSE | [ ] DISAPPROVED | |

Temp. Form SSEO 10-24

| TYPE OF REVIEW M/U | REVIEW ITEM DISPOSITION | NUMBER NR-G-05 |
|---|---|---|
| VEHICLE MSS | | COORDINATION |
| DATE 11-17-71 | | TEAM NAME |
| INITIATOR A. Jones | ORGANIZATION SSE SYSTEM | |

DISCREPANCY PROBLEM — TITLE Time Reference

Clock or time reference not visible to crew.

JUSTIFICATION

RECOMMENDATION

Add picture of 24 hour clock face at selected locations within SM-1 and SM-2.

CONTRACTOR'S COMMENT

Agree with recommendation--investigate possible digital clock display at core module end of SM-1 and at both ends of SM-2. (Due 11/23)

TEAM CAPTAIN RECOMMENDATION

| CATEGORY | REMARKS |
|---|---|
| ACTION | In SM-1 locate on partition behind control center above communication rack. In SM-2 locate on partition between airlock and lab - one facing core and one facing experiment airlock. |
| SUSPENSE | |

BOARD ACTION

| CATEGORY A-1 | | |
|---|---|---|
| ACTION | | |
| SUSPENSE | | |
| ACTION | [X] APPROVED | SIGNATURE OF BOARD CHAIRMAN |
| SUSPENSE | [ ] DISAPPROVED | |

Temp. Form SSEO 10-24

| TYPE OF REVIEW M/U | REVIEW ITEM DISPOSITION | NUMBER NR-G-06 |
|---|---|---|
| VEHICLE MSS | | COORDINATION |
| DATE 11-17-71 | | TEAM NAME |
| INITIATOR B. Boyken | ORGANIZATION RE&T SYSTEM | |
| DISCREPANCY PROBLEM | TITLE Color Coding of Equipment | |

Inadequate identification of color coding of equipment items located below deck.

JUSTIFICATION

Not clear as to purpose or intent of color coding.

RECOMMENDATION

Clarify color coding scheme.

CONTRACTOR'S COMMENT

Agree with recommendation--add sign to entrance of mockup describing equipment/line color coding.

TEAM CAPTAIN RECOMMENDATION

| CATEGORY | REMARKS |
|---|---|
| ACTION | Locate color code identification sign outside SM-1 and SM-2 adjacent to lower deck entrances. |
| SUSPENSE | |

BOARD ACTION

| CATEGORY A-1 | | |
|---|---|---|
| ACTION | | |
| SUSPENSE | | |
| ACTION | [X] APPROVED | SIGNATURE OF BOARD CHAIRMAN |
| SUSPENSE | [ ] DISAPPROVED | |

Temp. Form SSEO 10-24

| TYPE OF REVIEW M/U | REVIEW ITEM DISPOSITION | NUMBER NR-G-07 |
|---|---|---|
| VEHICLE MSS | | COORDINATION |
| DATE 11-17-71 | | TEAM NAME |
| INITIATOR M. Olson | ORGANIZATION RE&T SYSTEM | |

DISCREPANCY PROBLEM

TITLE Space Utilization Below Decks

Lower deck areas (except staterooms) gives appearance of "wasted" space.

JUSTIFICATION

Appears that space is required for maintenance but message doesn't come through.

RECOMMENDATION

Add side panel decals or lines between a couple of items as typical. Would improve image.

CONTRACTOR'S COMMENT

Investigate ways to improve image of maintainability. (Due 11/23/71)

TEAM CAPTAIN RECOMMENDATION

| CATEGORY | REMARKS |
|---|---|
| ACTION | Handles and paneled doors added to items to reflect access and clearance required for maintenance. |
| SUSPENSE | |

BOARD ACTION

| CATEGORY | | |
|---|---|---|
| ACTION | | |
| SUSPENSE | | |
| ACTION | [X] APPROVED | SIGNATURE OF BOARD CHAIRMAN |
| SUSPENSE | [ ] DISAPPROVED | |

Temp. Form SSEO 10-24

| TYPE OF REVIEW M/U | REVIEW ITEM DISPOSITION | NUMBER NR-G-08 |
|---|---|---|
| VEHICLE MSS | | COORDINATION |
| DATE 11-17-71 | | TEAM NAME |
| INITIATOR B. Boyken | ORGANIZATION RE&T SYSTEM | |
| DISCREPANCY PROBLEM | TITLE Identify Gas Storage Pressures | |

Identify working pressure of bottles located below deck.

JUSTIFICATION

For communication purposes.

RECOMMENDATION

Add decals denoting bottle pressure.

CONTRACTOR'S COMMENT

Agree with recommendation. (Factor of safety not required to be noted)

TEAM CAPTAIN RECOMMENDATION

| CATEGORY | REMARKS |
|---|---|
| ACTION | Add decals to bottles identifying working pressure. |
| SUSPENSE | |

BOARD ACTION

| CATEGORY A-1 | | |
|---|---|---|
| ACTION | | |
| SUSPENSE | | |
| ACTION | [X] APPROVED | SIGNATURE OF BOARD CHAIRMAN |
| SUSPENSE | [ ] DISAPPROVED | |

Temp. Form SSEO 10-24

| TYPE OF REVIEW M/U | REVIEW ITEM DISPOSITION | NUMBER NR-G-09 |
|---|---|---|
| VEHICLE MSS | | COORDINATION |
| DATE 11-17-71 | | TEAM NAME |
| INITIATOR B. Boyken | ORGANIZATION RE&T SYSTEM | |
| DISCREPANCY PROBLEM | TITLE Restraints and Mobility Aids | |

No visible identification of restraints or mobility aids while operating in zero gravity environment.

JUSTIFICATION

Aids required for zero 'g' operation.

RECOMMENDATION

CONTRACTOR'S COMMENT

1) Not within scope of M/U fidelity requirements.
2) Make sign to be placed at entrance to the mockup which describes mockup fidelity.
   1. Restraints and mobility aids not included
   2. Not space lighting
   3. Sharp corners not typical

TEAM CAPTAIN RECOMMENDATION

| CATEGORY | REMARKS |
|---|---|
| ACTION | Install sign describing fidelity. |
| SUSPENSE | |

BOARD ACTION

| CATEGORY B-1 | | |
|---|---|---|
| ACTION | | |
| SUSPENSE | | |
| ACTION | [X] APPROVED | SIGNATURE OF BOARD CHAIRMAN |
| SUSPENSE | [ ] DISAPPROVED | |

Temp. Form SSEO 10-24

| TYPE OF REVIEW M/U | REVIEW ITEM DISPOSITION | NUMBER NR-C/1-10 |
|---|---|---|
| VEHICLE MSS | | COORDINATION |
| DATE 11-17-71 | | TEAM NAME |
| INITIATOR A. Tischler | ORGANIZATION SSE SYSTEM | |

DISCREPANCY PROBLEM — TITLE EVA/IVA Hatch Handle and Controls

Handles and external controls not shown on hatch in picture located on the floor of core module.

JUSTIFICATION

Hatch handles and controls are required for hatch operation.

RECOMMENDATION

Add handles and controls to picture.

CONTRACTOR'S COMMENT

Agree with recommendation.

TEAM CAPTAIN RECOMMENDATION

| CATEGORY | REMARKS |
|---|---|
| ACTION | Revise painting on floor to include hatch handles and controls. |
| SUSPENSE | |

BOARD ACTION

| CATEGORY A-1 | | |
|---|---|---|
| ACTION | | |
| SUSPENSE | | |
| ACTION | [X] APPROVED | SIGNATURE OF BOARD CHAIRMAN |
| SUSPENSE | [ ] DISAPPROVED | |

Temp. Form SSEO 10-24

| TYPE OF REVIEW M/U | REVIEW ITEM DISPOSITION | NUMBER NR-1/1-11 |
|---|---|---|
| VEHICLE MSS | | COORDINATION |
| DATE 11-17-71 | | TEAM NAME |
| INITIATOR B. Boyken | ORGANIZATION RE&T SYSTEM | |
| DISCREPANCY PROBLEM | TITLE Sharp Edges | |

Sharp edges within mockup.

JUSTIFICATION

Sharp edges presents safety hazard (to head) in split level quarters areas (particularly at 1 'g').

RECOMMENDATION

Protect sharp edges.

CONTRACTOR'S COMMENT

Provide form of protection on all sharp edges which could be bumped into--add barberpole striping around edge of docking ports.

TEAM CAPTAIN RECOMMENDATION

| CATEGORY | REMARKS |
|---|---|
| ACTION | Striped tape will be added as requested. |
| SUSPENSE | |

BOARD ACTION

| CATEGORY A-1 | | |
|---|---|---|
| ACTION | | |
| SUSPENSE | | |
| ACTION | ☒ APPROVED | SIGNATURE OF BOARD CHAIRMAN |
| SUSPENSE | ☐ DISAPPROVED | |

Temp. Form SSEO 10-24

| TYPE OF REVIEW M/U | REVIEW ITEM DISPOSITION | NUMBER N R-1/1-12 |
|---|---|---|
| VEHICLE MSS | | COORDINATION |
| DATE 11-17-71 | | TEAM NAME |
| INITIATOR M. Olson | ORGANIZATION RE&T SYSTEM | |

DISCREPANCY PROBLEM — TITLE ISS Computer Size and Mounting Shelf

Communication equipment behind control center is wider than shelf which supports it.

JUSTIFICATION

Does not give appearance of good design practice.

RECOMMENDATION

Make equipment compatible with shelf.

CONTRACTOR'S COMMENT

Investigate method to decrease depth of communication equipment. Due 11/23

TEAM CAPTAIN RECOMMENDATION

| CATEGORY | REMARKS |
|---|---|
| ACTION | Reduce depth of communication rack by approximately 2-1/8". |
| SUSPENSE | |

BOARD ACTION

| CATEGORY | | |
|---|---|---|
| ACTION | | |
| SUSPENSE | | |
| ACTION | [X] APPROVED | SIGNATURE OF BOARD CHAIRMAN |
| SUSPENSE | [ ] DISAPPROVED | |

Temp. Form SSEO 10-24

| TYPE OF REVIEW M/U | REVIEW ITEM DISPOSITION | NUMBER NR-1/1-13 |
|---|---|---|
| VEHICLE MSS | | COORDINATION |
| DATE 11-17-71 | | TEAM NAME |
| INITIATOR R. Hartley | ORGANIZATION SSE SYSTEM | |
| DISCREPANCY PROBLEM | TITLE Curtain Floor Tracks | |

Track not shown on floor for sliding curtains

JUSTIFICATION

Upper and lower track required for proper guiding and securing of curtain.

RECOMMENDATION

Add indication of track on floor.

CONTRACTOR'S COMMENT

Investigate best method to illustrate lower track installation - due 11/23.

TEAM CAPTAIN RECOMMENDATION

| CATEGORY | REMARKS |
|---|---|
| ACTION | Simulate track with black paint sprayed on top of carpet. |
| SUSPENSE | |

BOARD ACTION

| CATEGORY | | |
|---|---|---|
| ACTION | | |
| SUSPENSE | | |
| ACTION | [X] APPROVED | SIGNATURE OF BOARD CHAIRMAN |
| SUSPENSE | [ ] DISAPPROVED | |

Temp. Form SSEO 10-24

| | | |
|---|---|---|
| TYPE OF REVIEW M/U | **REVIEW ITEM DISPOSITION** | NUMBER NR-1/1-14 |
| VEHICLE MSS | | COORDINATION |
| DATE 11-17-71 | | TEAM NAME |
| INITIATOR C. Brockman | ORGANIZATION SSE SYSTEM | |

DISCREPANCY PROBLEM — TITLE Backup Medical Area Isolation/Privacy Curtain

Curtain for backup medical area does not completely close off area.

JUSTIFICATION

Will not provide required isolation of this area.

RECOMMENDATION

Provide required closure.

CONTRACTOR'S COMMENT

Provide fill-in around medical cabinets so that curtain seals off area.

TEAM CAPTAIN RECOMMENDATION

| | |
|---|---|
| CATEGORY | REMARKS |
| ACTION | Add filler panel approximately 9"x12" to side of cabinet to close off open area. |
| SUSPENSE | |

BOARD ACTION

| | | |
|---|---|---|
| CATEGORY A-1 | | |
| ACTION | | |
| SUSPENSE | | |
| ACTION | ☒ APPROVED | SIGNATURE OF BOARD CHAIRMAN |
| SUSPENSE | ☐ DISAPPROVED | |

Temp. Form SSEO 10-24

| TYPE OF REVIEW M/U | REVIEW ITEM DISPOSITION | NUMBER NR-1/1-15 |
|---|---|---|
| VEHICLE MSS | | COORDINATION |
| DATE 11-17-71 | | TEAM NAME |
| INITIATOR M. Olson | ORGANIZATION RE&T SYSTEM | |

DISCREPANCY PROBLEM

TITLE Backup Medical Surface Working Volume

Medical cabinet is narrow as far as free area in front of cabinets above.

JUSTIFICATION

Additional depth of shelf required to permit adequate work surface.

RECOMMENDATION

CONTRACTOR'S COMMENT

Approach meets intended requirement.

TEAM CAPTAIN RECOMMENDATION

| CATEGORY | REMARKS |
|---|---|
| ACTION | No action. |
| SUSPENSE | |

BOARD ACTION

| CATEGORY C-4 | | |
|---|---|---|
| ACTION | | |
| SUSPENSE | | |
| ACTION | ☐ APPROVED | SIGNATURE OF BOARD CHAIRMAN |
| SUSPENSE | ☒ DISAPPROVED | |

Temp. Form SSEO 10-24

| TYPE OF REVIEW M/U | REVIEW ITEM DISPOSITION | NUMBER NR-2/1-16 |
|---|---|---|
| VEHICLE MSS | | COORDINATION |
| DATE 11-17-71 | | TEAM NAME |
| INITIATOR M. Olson | ORGANIZATION RE&T SYSTEM | |

DISCREPANCY PROBLEM — TITLE Utilization of Laboratory Space

Lab area appears to be too spacious or "open."

JUSTIFICATION

Does not appear to have good utilization of available space.

RECOMMENDATION

Identify with placards or paste-ons on the walls or top of cabinets what will be there so as to identify space utilization.

CONTRACTOR'S COMMENT

1) Provide suitable placards or decals denoting other facilities or utilities that would normally be provided. Examples would include emer. $O_2$ face masks, utility outlets, fire extinguishing equipment, etc.
2) Add I.R. calibration simulator to work bench.
3) Move work benches toward aisle per drawing (see NR 2/1-17)

TEAM CAPTAIN RECOMMENDATION

| CATEGORY | REMARKS |
|---|---|
| ACTION | 1) Decals will be provided.<br>2) Calibrator has been made.<br>3) Benches have been moved and back panels added. |
| SUSPENSE | |

BOARD ACTION

| CATEGORY A-1 | | |
|---|---|---|
| ACTION | | |
| SUSPENSE | | |
| ACTION | ☒ APPROVED | SIGNATURE OF BOARD CHAIRMAN |
| SUSPENSE | ☐ DISAPPROVED | |

Temp. Form SSEO 10-24

| TYPE OF REVIEW M/U | REVIEW ITEM DISPOSITION | NUMBER NR-2/1-17 |
|---|---|---|
| VEHICLE MSS | | COORDINATION |
| DATE 11-17-71 | | TEAM NAME |
| INITIATOR M. Olson | ORGANIZATION RE&T SYSTEM | |

DISCREPANCY PROBLEM — TITLE Working Volume above GPL Work Benches

Depth of optical and IR work benches appear to be too shallow.

JUSTIFICATION

When you lean over bench, your head can hit the curved portion of the ceiling.

RECOMMENDATION

Space is available for wider benches.

CONTRACTOR'S COMMENT

1) Work benches to be moved toward aisle per drawing, and a facing sheet added to back of bench and up to curved portion of ceiling.
2) Add simple stool in front of work benches.

TEAM CAPTAIN RECOMMENDATION

| CATEGORY | REMARKS |
|---|---|
| ACTION | 1) See RID NR-2/1-16.<br>2) Chair will be installed in front of multi-purpose test bench. |
| SUSPENSE | |

BOARD ACTION

| CATEGORY A-1 | | |
|---|---|---|
| ACTION | | |
| SUSPENSE | | |
| ACTION | ☒ APPROVED | SIGNATURE OF BOARD CHAIRMAN |
| SUSPENSE | ☐ DISAPPROVED | |

Temp. Form SSEO 10-24