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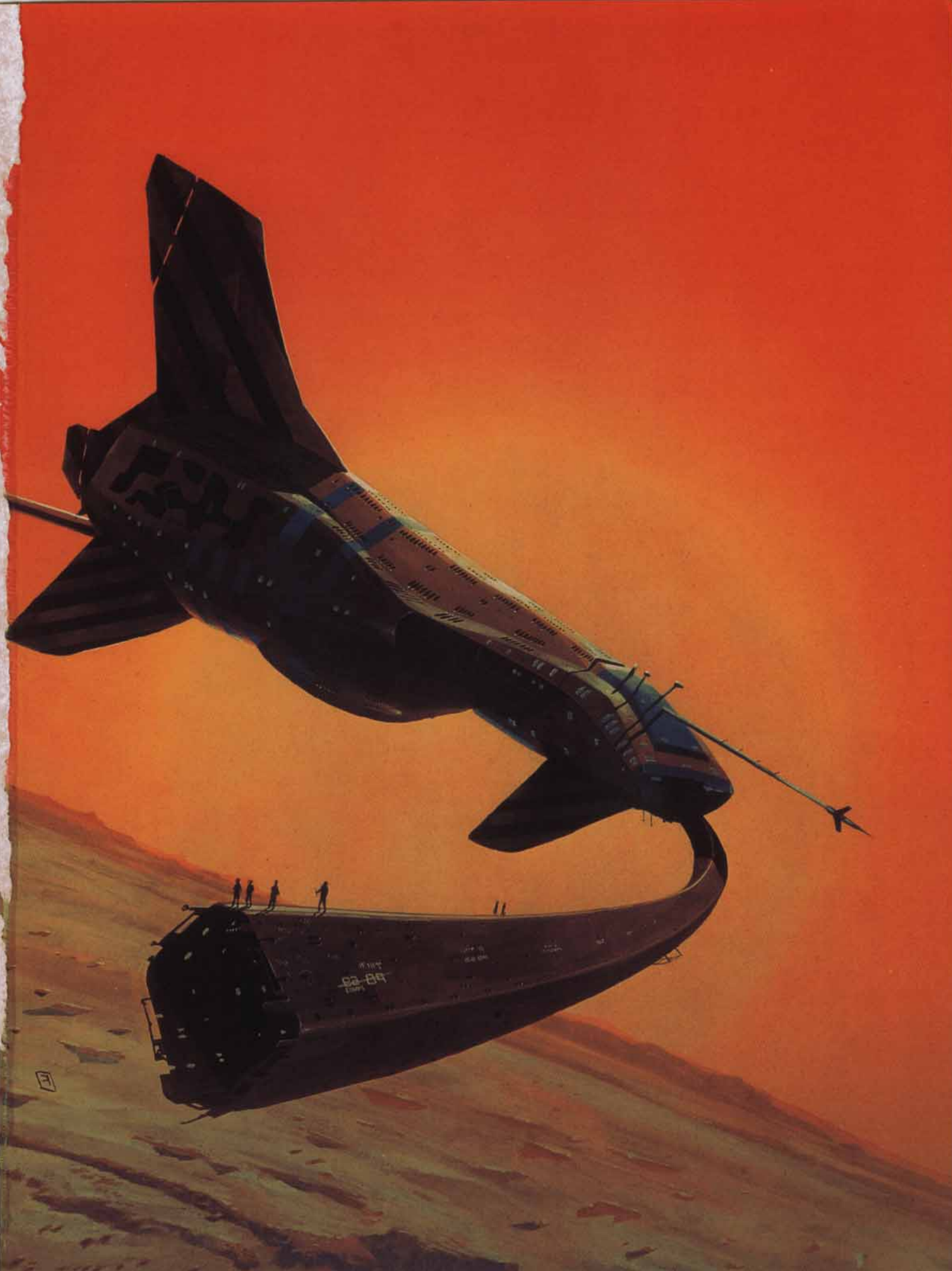

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NAVAL ARCHITECT'S MANUAL

Science-Fiction Adventure in the Far Future

The Future is Just Around the Corner

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Traveller®,
Science-Fiction Adventure in the Far Future
by Marc Miller

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The game and universe presented in this book envisions a referee or game master as the ultimate supervisor of game play. The publisher is prepared to answer questions about Traveller provided a stamped, self-addressed envelope accompanies the request.


Imperium Games, Inc.

TABLE OF CONTENTS


716

INTRODUCTION

The *Naval Architect's Manual* is the **Traveller** handbook of interior spaceship design. *Fire, Fusion & Steel* set standards, rules, and guidelines for ship and weapons design, and this manual allows the realistic creation of ships' interiors, from the small bridge of an interstellar scout to the hydroponics garden of a major liner. It answers such questions as "where should the emergency bridge by placed?" and "what sort of dinning facilities would a liner have?"

Suggested role-playing ideas have also been included as italicized text at the end of each entry. Our goal has been to provide the referee with enough details to flesh out even the most harrowing deep space scenario with enough details to create a realistic vision of the far future. This manual is less science oriented than previous products; there are no algebraic formulas here. Instead, the inclination is to suggest what living conditions are likely to be encountered aboard space vehicles of different classes and purposes and how those conditions affect passengers and crews.

This book is designed to be photocopied; the text is placed on the inside of the pages to make this easier. This manual is also laid out in a structured format, the first facilities (bridges) in front, less common ones toward the back. The Table of Contents should be used as a tool to find what you need quickly and easily.

It is suggested that, if this is your first encounter with **Traveller**, you should begin with a small vessel. These are quick to generate, fun to use, and will teach the basics of ship design on a practical level.

Common Sense Rule

The primary thrust of this book is to provide *potentials*, not to create rigid forms. Everything described in this text may be altered, tinkered with, and exploited to suite your campaign. If a bridge structure is too big for your purposes, change it. Want a hydroponics garden in a small yacht, but the text says that they are huge and usually found only on liners? Scale it to fit the available space and use it. Photocopy and trim the drawings to fit your needs, cut, paste, and play.

BEGIN THE DESIGN

Before you can design the ship's interior, the outer hull configuration and the ship's main power plant should be established. To do this, it is necessary to create the ship's mission.

- How many crewmembers will be on board? The larger the vessel the more bodies it takes to staff her.
- What is the Technology Level of the builders? Is the ship to see only in-system service or is it an interstellar craft?
- What is the purpose of the vessel? Will its primary responsibility be military, mining, trade, exploration, or a luxury cruise?

Once these things are defined, follow the design sequence outlined in *Fire, Fusion & Steel.* First, resolve the size issue based on the projected crew complement (the number of player characters and non-player characters your campaign is designed to support) and then create the exterior design of your vehicle, her class, type, and weapons capability if applicable. When the outer hull, propulsion system, and other external components are completed, the interior design process may begin.

Limits

The TL of the ship's planet of origin limits not just propulsion and ship's structure, but it also constrains interior design. While most of the examples given here are for state-of-art vessels built by worlds of TL11+, they can be easily modified to fit any level. Pay close attention as well to the level limits of subcomponents. While a security officer on a TL14 liner might be armed with a net gun (TL8), it is not likely an officer aboard a TL8 shuttle would possess a light gauss pistol (TL14).

Of course, if a planet-wide cultural and scientific devolution occurred, this might. . .

Decks

Now that the ship's external structure and power systems are determined, deck space can be assigned. The content of each deck is determined by the purpose of the vessel. How many decks does the vehicle contain? A simple shuttle may have one. A heavy interstellar liner may have one hundred or more. Assuming that each deck is three meters in height and as wide as the ship at the point the deck joins the hull and a deck is about one meter thick. Divide the height of the ship in meters by four and count the number of decks possible for this ship. Note that every deck does not have to be assigned a purpose, but a ship's structural integrity is dependent on them and the decks must be there, at least in the form of frames and floors.

Many decks have a single purpose: the bridge, for example, or the engineering deck. But others may serve several different functions, as long as the combination is logical. Putting a defensive weapon station next to First Class restaurant does not make much sense; a weapons level sharing space with a repair facility is much better.

Still, if a small, converted liner actually saw service first as a navy corsair, then. . .

Remember too that rooms and stations placed closest to the inner hull follow the contours of the external hull at those points. In the keel section, the outer walls slope inwards and "down," the center portions slope outwards in both "directions," and the bridge follows whatever lines it is given, but generally its walls are inwards and "up."

At the Top

The superstructure is the highest point on the ship; it may also be one of the smallest decks. Naval architectural conventions frequently place bridges at this point, although there is no requirement that it be set there. This practice, while historically based, has no pragmatic foundation. The bridge, however, is the master control of the entire vessel and should be the first unit positioned, especially on warships and scouts. Select the bridge by size and located it on the map.

In the Belly

Once the bridge location is selected, chose the sites for the installations controlled by the bridge officers. Except for the engine room and engineering, all weapons and defensive positions, communications, and maintenance facilities should be within a quick jog from the bridge. Placement of most command functions should be close to the bridge, if not directly beneath it.

Beneath these positions, decks may be assigned a variety of tasks and purposes, depending on the vessel's mission and type. On a cargo ship, these spaces are allotted to holds, machinery, and equipment. On a troop transport, several decks are given over to quarters for soldiers or space marines. On a liner, yacht, or trader, anything is possible.

In the Keel

The engine room and engineering stations should always be placed together for maximum efficiency. The most common choice is at the very bottom of the ship, in the keel hold. This is done to protect the rest of the ship's company from hazards due to mechanical failures, but mainly because the engines and their control stations are the largest single components on any ship.

In some longer vessels there is room left over in the below-decks hold area. This space can be assigned a function (it's a good location for an emergency bridge, for example), or simply left empty and hollow.

Unused and rarely visited areas onboard ships tend to be havens for stowaways, spare old gear, and may even conceal the hidden lockers of smugglers.

Filling in the Blanks

We have now placed the basic control rooms and required command features. But, unless the ship's design is quite small, there is a lot of deck space left. How do you fill it?

Use the Table of Contents to ask questions. Does the ship need a briefing room? Is an executive conference room necessary? What about an office suite for the captain or merchant officers? What additional weapon workstations are needed? The answers to these questions depend on the ship's purpose. A warship may not need a Five Star restaurant, but a long-range scout might well want a small, low passage cryosleep chamber for its crew.

Special Stations

The ship's architect should not be limited by what is here. If a workstation or other area is required (for example, a large sensor array and workstation for a research vessel investigating a star gone nova), find a template similar to what is required and adapt it. Most workstations shown in these pages could easily be used for purposes other than the ones ascribed to them, and a few examples of these unusual setups are included here.

Damage Control: A large warship or a liner with insurance problems may need a separate damage control center rather than a station on the bridge. This might include a ready room for firefighters and emergency rescue and repair personnel, a DC officer's workstation connected directly to ship's communications with an override, and a display screen of the ship to pinpoint problems and status.

Science Bays: Dedicated research vessels require far more than simple labs, no matter how sophisticated. Entire decks are given over to the study of the specific science or sciences involved in the ship's mission. In this case, use the lab templates and expand them, designing the tools, sensors, and equipment based on the given prototypes, or invent your own.

For example, what would the requirements be of a ship sent to study a newly discovered and advanced, reptilian civilization?

Terror Ship: If you want to combine science fiction and horror, a terror ship is perfect. Its decks, however, are left to your own imagination, although they must be thoroughly detailed.

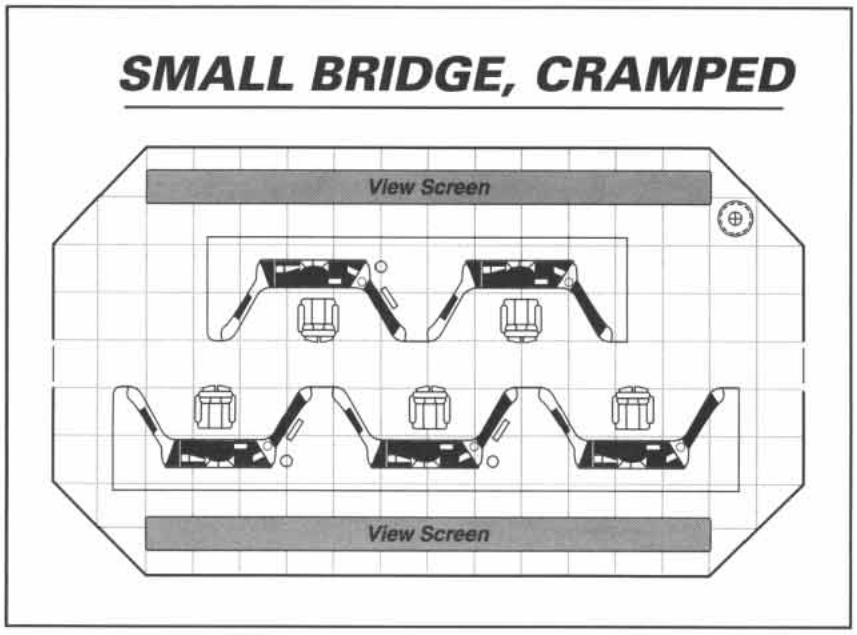
Playrooms: If your scenario calls for large quantities of children, a deck dedicated to play may be necessary. Playrooms should be designed with an eye toward teaching survival skills to groups of different ages, and they must be fun.

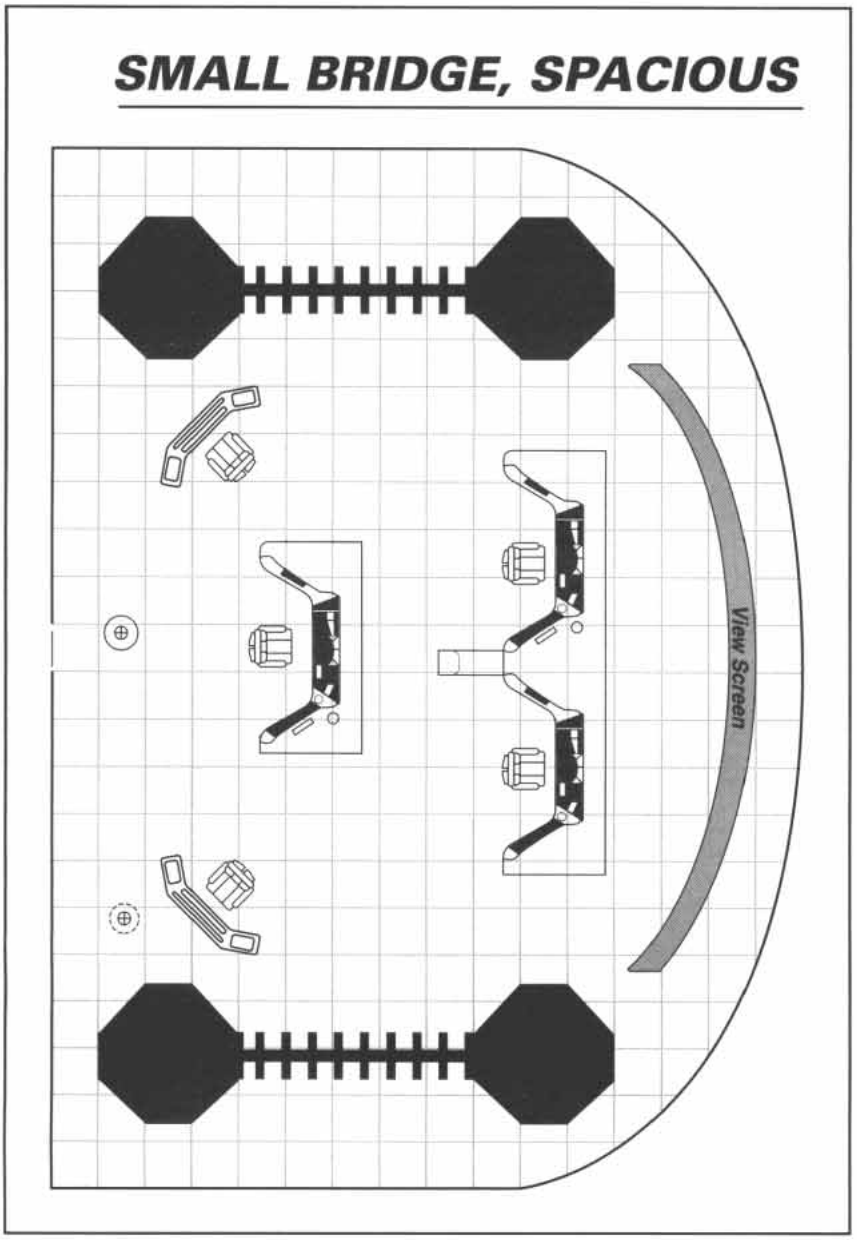
Perhaps it is an automated ship of orphans, or maybe they are the survivors of a planet-wide plague that killed everyone over the age of puberty.

Function Dictates Form

Finally, the ship you design can be used to generate your adventure. A colonial settlement ship has different problems and needs than a sophisticated Imperial Battlecruiser. A long-range scout may indeed go "where no one has gone before," but what plot lines are inspired by that concept? How about a liner? For all the scanning devises in its lobby, there are ways terrorists can slip through weapons, methods that allow assassins free access, and places where espionage is the norm, not the exception.

Large generation/world ships are an ancient staple of science fiction, but just because they've been done doesn't mean they shouldn't be used. Commercial vessels carrying exotic plants and aliens, gas giant atmospheric skimmers, mining ships, even vessels owned and used by traveling companies of entertainers. . . the only limit is the imagination. Once the bridge location is selected, chose the sites for the installations controlled by the bridge officers. Place the engine room and engineering, weapons and defensive positions, communications maintenance facilities. The potential is endless and the possibilities are infinite in **Traveller**.





Bridges

Small Bridge, Cramped

The small bridge is designed for a crew of no more than 5. All controls at each station fall close to hand, and the officers can monitor every condition on board. Even food and beverage dispensers are found an arm's length away. The large view screens report every detail within 1 light year of the vessel. This is a utilitarian bridge designed for function, not form.

Fighting on this bridge is not possible. Of course, an invader has only surprise on his side as little room exists for a stealthy approach.

Small Bridge, Spacious

This larger bridge is still rather small, but actually quite comfortable. While also designed for five crewmembers, provisions are made for exercise and relaxation. There is even a small water closet with a shower stall, sink, and a mirror (not shown). Set in the starboard and port bulkheads are narrow bunks that include under-slung storage lockers for personal items.

The primary controls are set in the pilot's station, although separate stations exist for navigation, engineering, communications and life support.

While this is technically a bridge for a small crew, many captains push the envelope, due to the size of the bridge. The uses to which the "extra space" is put are as varied as those who command the ships with this bridge structure are.

It is not uncommon, despite the fact that it is contrary to Imperium, corporate, and freebooter conventions and regulations, for pilots to take pets, wives, mistresses, or good friends along on voyages. When confronted, they usually justify their actions with claims of loneliness, efficiency, or "need."

A few are known to make a decent "bonus living" from creative usage of the additional space by transporting fugitives of many stripes to sectors of space in which they are unknown, and hence, safe from prosecution, persecution or assassination.

Medium Bridge, Cramped

The medium bridge is designed primarily for research vessels, light war ships and large, deep space merchant craft. While the construction of the bridge is different for each type of craft, they all have some features in common.

The medium bridge is designed for seven crewmembers or less, occupying several stations. On most ships that carry this type of bridge, the pilot's command chair holds the primary piloting and navigation controls, although a secondary navigation station is available. Another two or three stations, depending on type, control weapons, life support, communications, or long range scanning. Built into the port side bulkhead are food and beverage dispensers and often a small holotheater for the crew's entertainment. And all contain a single, fully functional, "head" (not shown).

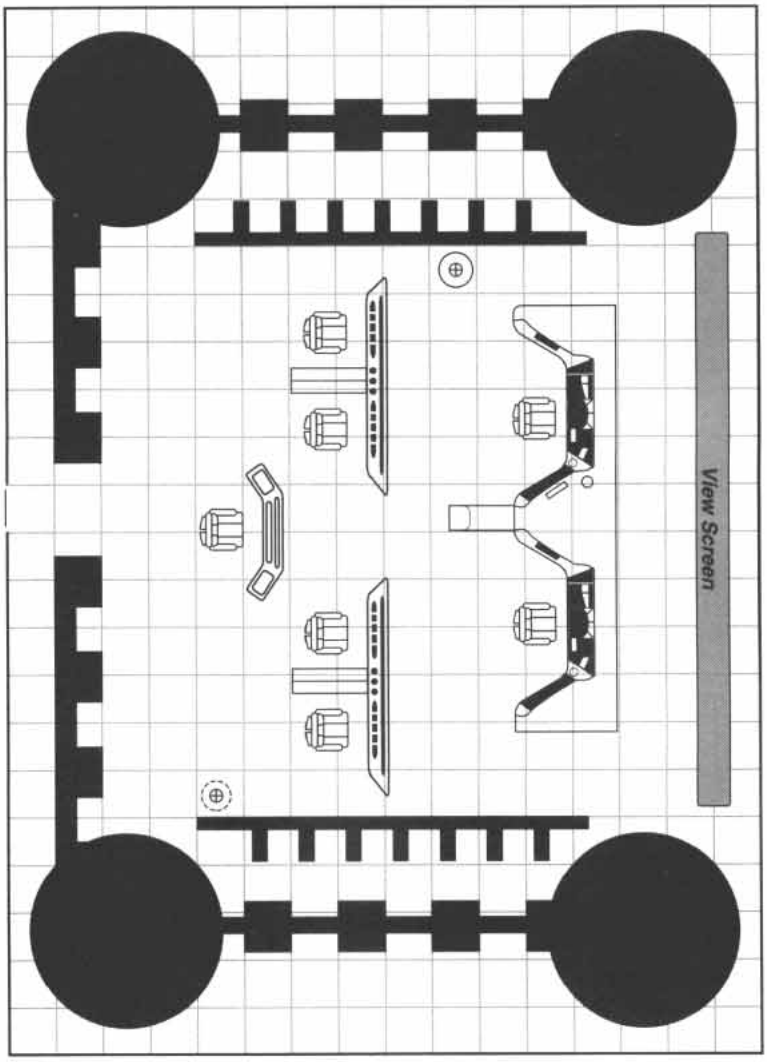
What cramps the bridge is the addition of positions for special purposes. For example, scientific vessels are notorious for one-way aisles and the "crab-walk" required movement to get from one post to the next. Merchant ships frequently possess life support and cargo conditioning control stations for transporting live, volatile, or dangerous payloads. War ships are crammed with extra weapon stations, experimental detection, and damage control systems.

Emergency Bridge

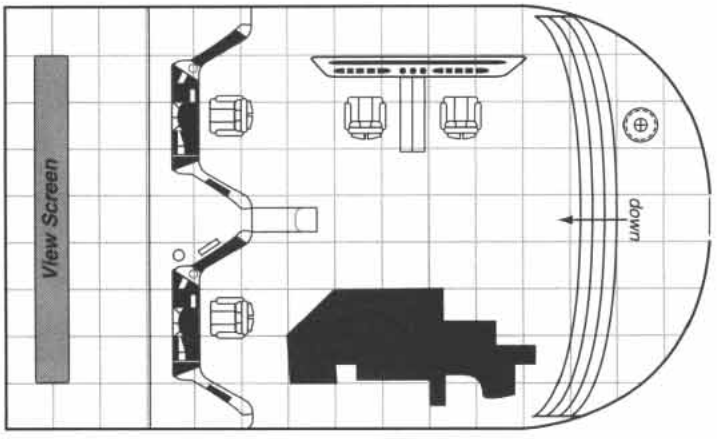
The emergency bridge is always located in the most protected area of the ship, centered behind the heaviest bulkheads and strongly reinforced. Independent life support and power systems ensure the survival of the ship and its crew as long as the engines remain undamaged. There are no creature comforts here, just the bare necessities of staying alive.

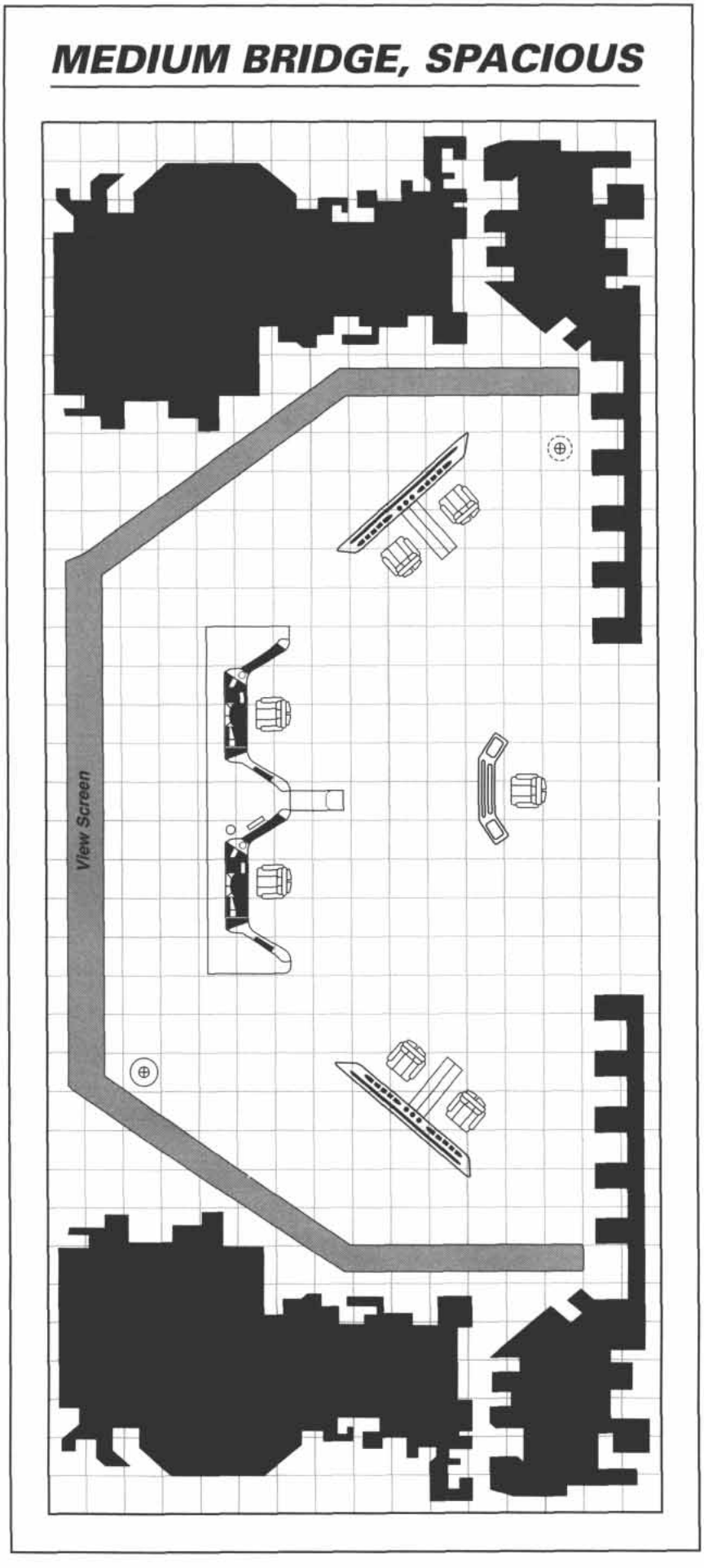
Because the emergency bridge is rarely used, some pilots take advantage of its potential for freebooting. Smuggling is an avocation for some of the more roughish pilots, who are known to carry everything from interdicted drugs and computer programs, to rare gems, beverages, small weapons, and even singular and ancient prepaid postal adhesives.

MEDIUM BRIDGE, CRAMPED



EMERGENCY BRIDGE





Medium Bridge, Spacious

The centerpiece of this larger medium bridge is its bulkhead-to-bulkhead virtual view screen (left). The screen can function as a communications system, as a large weapons heads-up display, and even as a holo-theater.

Wide aisles eliminate the necessity for the "crab-walk" on smaller bridge structures, and work stations are well laid out with large displays and easily viewed on-screen information readouts.

Creature comforts, while limited, are seen to as well. The station chairs are comfortable, with most of the controls located in the broad, flat arms of the console seats. Cup holders for stimulants and sliding trays to hold meals are built-in. The berths are on the bridge, in the bulkheads, as in smaller types, but they are more spacious, fully two meters in length, wider, and all are equipped with privacy screens. There are two heads, side-by-side is the normal configuration, and each has two shower stalls.

This type of bridge usually has several redundant stations and the crews are ordinarily cross-trained in several specialties. All crewmembers are also trained to operate life support and communications in an emergency.

Life on board a vessel equipped with a bridge like this is comfortable and harmonious, although fights do break out. There are unwritten laws that combatants may not break anything vital to a ship's control, nor can projectile/energy weapons be used. Some captains do encourage fighting, based on the theory that impromptu combat "relieves tension" and is "good for readiness."

Most commanders, however, run "tight-ships" and enforce harsh punishment on infractions of discipline and routine. Then too, there are other ways to insure combat readiness and relieve tensions. Games are standard equipment aboard all but short-haul vessels. While military ships officially tend toward strategy and tactical games, merchant and cargo ships are more drawn to games of chance, dice, cards, and virtual gambling.

Large Bridge, Cramped

In spite of the size of this bridge-style, its functional dimensions are crowded, close, and cramped. Commonly found on research and larger combat vessels, the amount of equipment carried by such craft forces the crew to return to the crab-walk conditions of smaller ships.

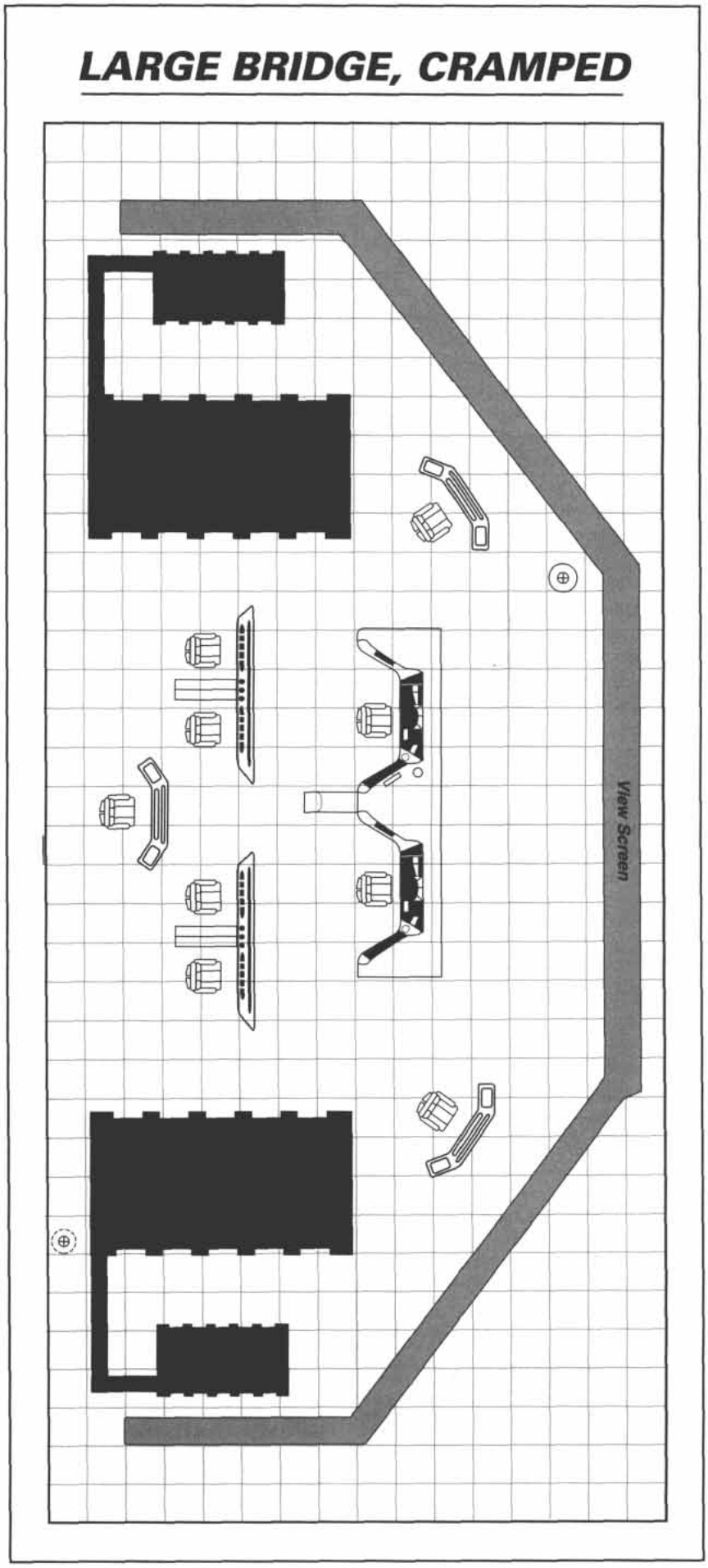
Research vessels carry extra stations and observation positions, tailored to the needs of the specific task assigned to the scientific command staff. A ship investigating black holes, for example, may have several massive contra-gravity generators, each requiring a separate monitoring station and controls, besides the specialized stations equipped to study the anomalies.

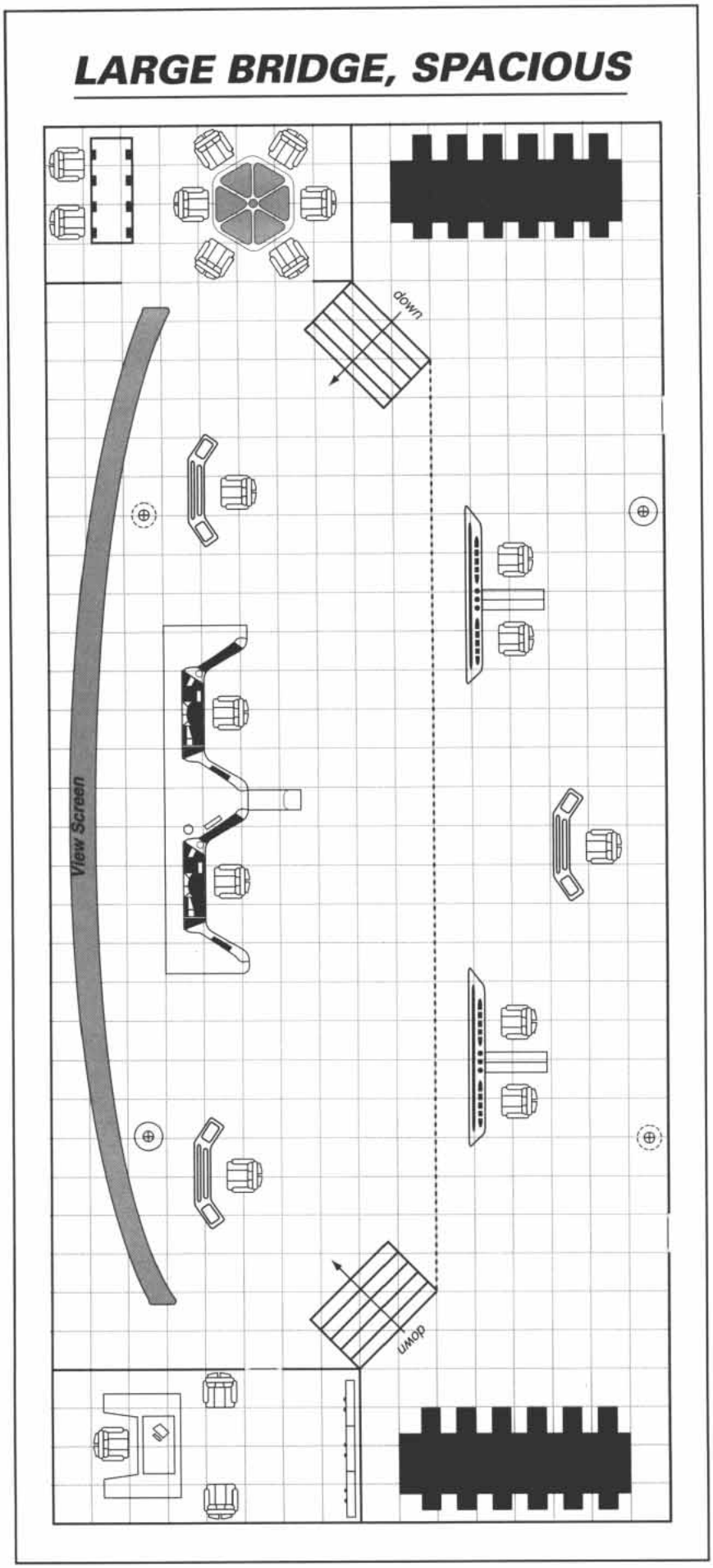
Heavy warships are so jammed with weapon posts and detection units that just getting from one job to the next challenges even the most resourceful crewman. This is not to say that they are poorly laid out, simply that there is so much equipment, both offensive and defensive, that there is little space left for comfort.

Both efficiency and morale suffer in these conditions, even more than on smaller vessels with fewer crewmen. Tempers flare even though the crews have separate quarters on these vessels. The close proximity of six to ten sweaty bodies in a high-stress environment is a recipe for disaster.

While those who pay for these ships are in a quandary, designers are not. New advances in ship design call for separate bridges, a single command bridge and supplemental, special purpose sub-units tied to the mission commander through the control chair. However, naval architects propose, but politicians and bureaucrats dispose — to date, none of these designs exist except on the private drafting boards of brilliant and ignored specialists — the same company you now keep.

Still, it is just possible that these recommendations will eventually be incorporated into standard ship design. A few more incidents of "celestial fever" may convince even the most hardened bean-counter.





Large Bridge, Spacious

This type of bridge is generally found only on large commercial vessels and flagships. It is designed to provide a comfortable, relaxed atmosphere, even when under fire. The workstations are large, with ample display screens angled so that the command chair can read the situation-updates on any view screen without asking a crewman for a report. Under normal conditions, protocol requires the Bridge Officer to request summaries from subordinates, but under fire, in the confusion of battle, this single feature is an advantage.

The aisles are large enough for two people to pass without bumping into each other. Equipment is evenly distributed to eliminate cramped corners, and each unit is readily accessible for repairs and maintenance.

A large central holo-screen is programmed to function as a read-out repeater for any single workstation. It can display star maps for navigational purposes, be used as a communications screen, and provides exterior views of the ship from hull cameras to observe damage. At the push of a button, it also doubles as a computer monitor. Its normal setting shows the field of stars before the ship, although an anterior view may be brought online at the flick of a switch.

No matter how intense the action, this bridge is purposefully designed to convey the impression of strength, almost of invulnerability, to the crew and to keep their confidence under pressure. The interior is always done in pastel colors with contrasting appointments on the workstation chairs and upper level safety rails. Light music plays continuously, but just under the range of conscious hearing. Some companies, as well as some commanders, build subliminal messages into the music banks of the ship's computer to aid in the discipline and control of their crews.

Liner Bridge

Liner bridges resemble, in both style and comfort, the spacious bridges of the great flagships, but with several modifications.

In the large forward space usually occupied by holographic displays on other ships, there is a large table with several seats facing the exterior view screens and three or four seat across from them for the captain and officers. It is here that guests are seated, sipping exotic beverages, viewing the space that awaits them ahead, and exchanging pleasantries with the crew.

A small galley and wet bar are built into the starboard bulkhead (not shown). This is the workstation for the Chief Service Attendant who has the duty of serving the bridge.

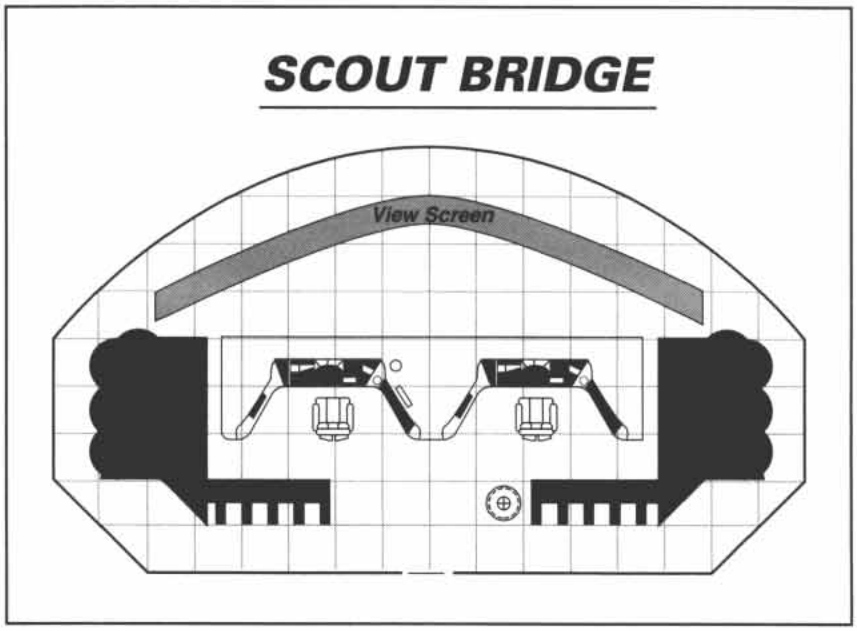
Because liner captains frequently ask VIP guests to "come forward for some refreshments," defensive workstations are usually hidden or disguised in order to prevent passengers from "thinking about the unthinkable." The stations may be thinly veiled by something as simple as a sign over a firing or defensive position that reads "Entertainment Officer," to an elaborate system of false walls and secret view screens, depending on the regions of space normally visited.

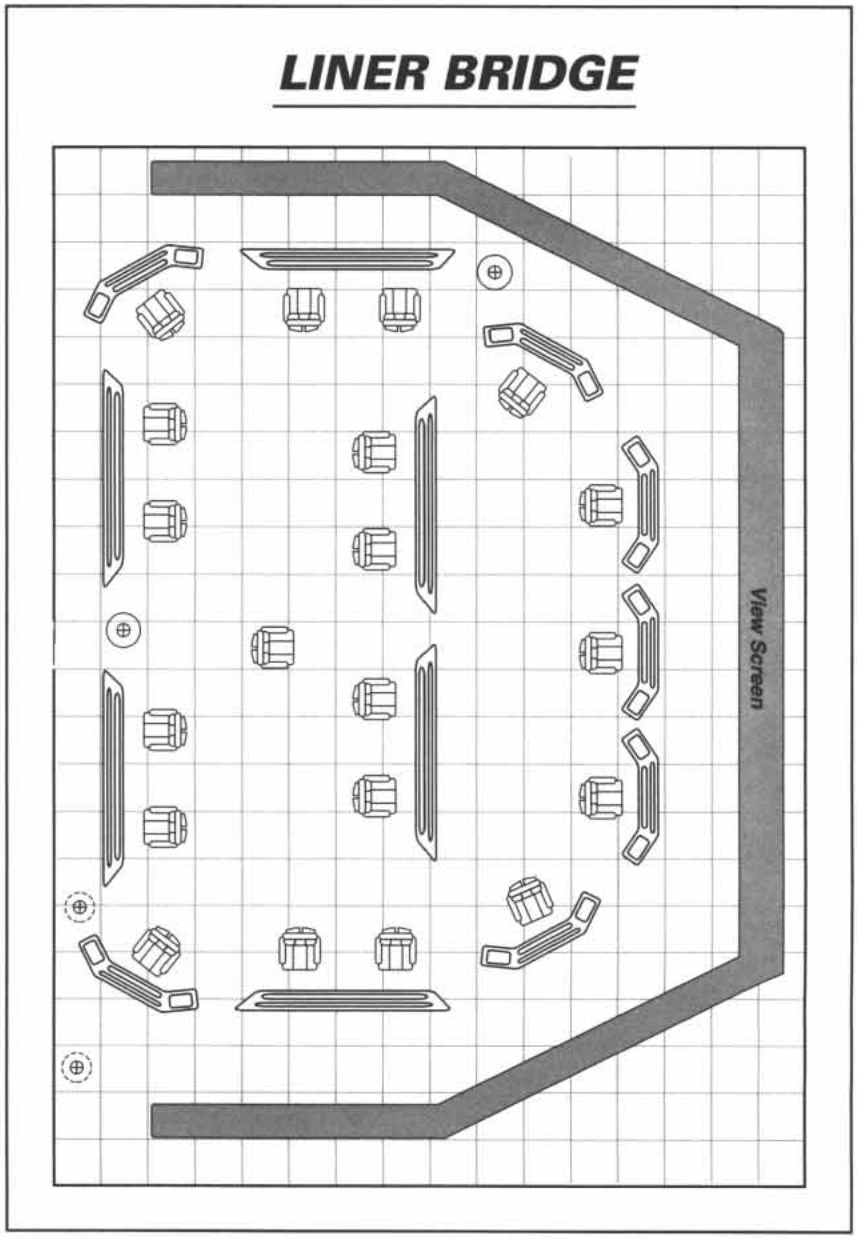
The holo-screen is present. Of course, it is simply not activated when passengers are attendant

Scout Bridge

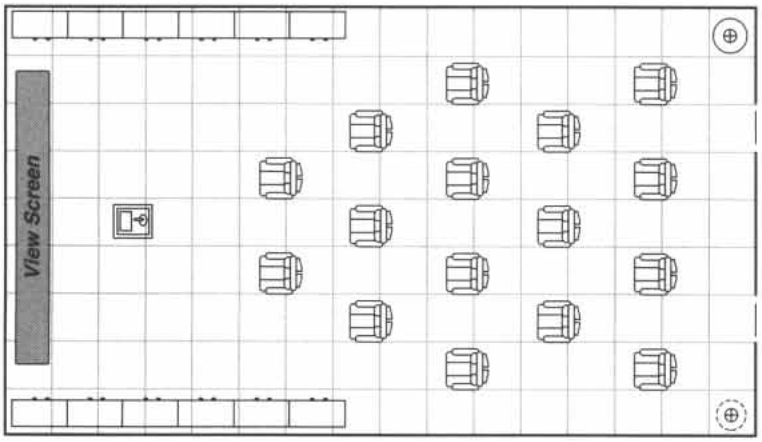
"Lean and mean" best describes the bridge of the interstellar scouts. There is more room here than on the bridges of other small vessels. The sensor array does take up the majority of space, but the massive defense systems are gone. Lightly armed, the scouts' main advantage lies in their tremendous speed and the fact that they can operate for months without service.

These ships are designed to get into an area, gather the required information, then get out. They are capable of sustained operations and can carry up to three passengers when necessary, but this is rare. The same psychological problems found on small ships apply to scouts and couriers.

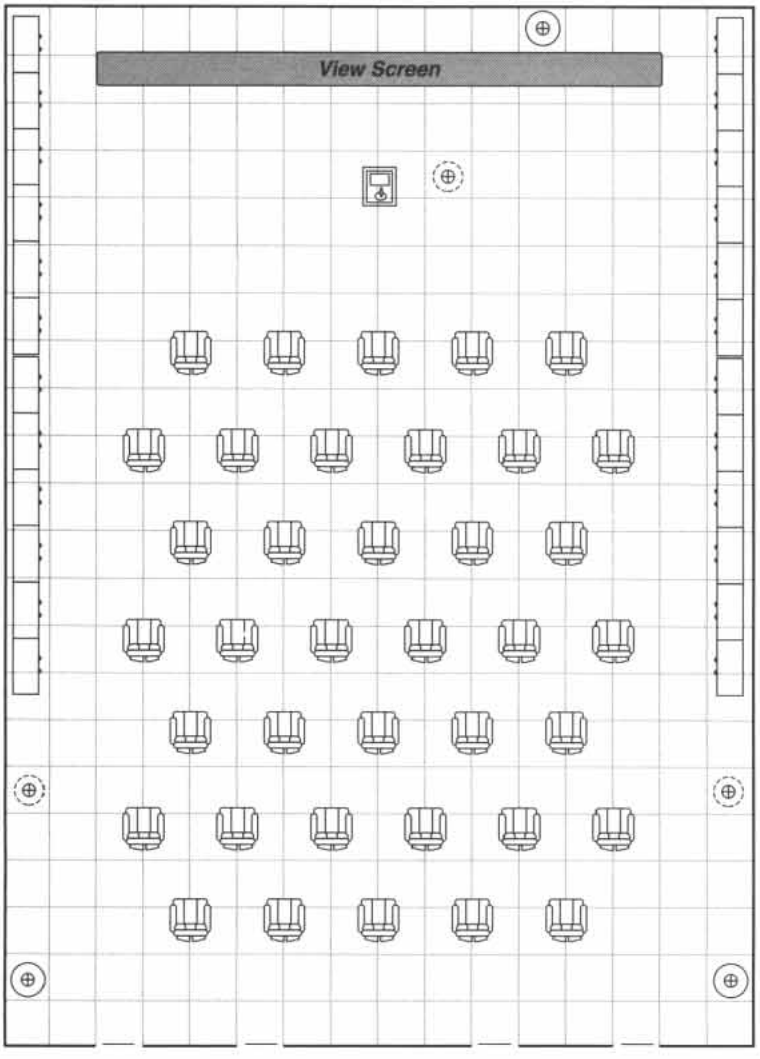




SENIOR BRIEFING ROOM



MILITARY BRIEFING ROOM



Briefing Rooms

Senior Briefing Room

Briefing rooms may be found on any ship, but are more common on larger ships. The layout is simple and always in keeping with the vessels' functions and size. Common features include a table or podium and enough seating for a ship's full complement of officers plus two others. Each chair has before it a small computer display that disappears into the table when the room is used for formal dinning.

On military ships, this is where the captain meets with his officers to review orders, analyze reports, and plan strategy and tactics. Aboard commercial vessels and liners, senior officers frequently use the briefing room as a private lounge.

Military Briefing Room

Military briefing rooms are large, noisy, and efficient. They are usually placed near debarkation or hanger bays and rarely insulated against sound.

A TacScreen (tactical holo-display; top) occupies the entire wall across from the entrance. In front of the screen is a metal podium. On larger troop carriers, speakers are often installed and amplified so the Briefing Officer can be heard above the din of men and machinery. On smaller ships, the BOs shout.

Military briefing rooms are spare — bare metal walls and gray floors. A drab unit flag may hang listlessly from a plain pole.

Like the rooms, seating is utilitarian. Classical, colorless folding chairs lined up in precise rows, with no thought for comfort.

On some ships, briefing rooms double as recreation centers. Gaming tables, which can be folded flat against the walls during tactical sessions, are frequently installed.

More disciplined ships use the rooms for intensive physical training, weight lifting, calisthenics, and even target practice.

Historically, a few architects placed the weapons lockers in briefing rooms. This is not a recommended practice today. The confusion and din of arming troops adding to the ships' background noises tend to create chaos, and the first casualty of chaos is discipline.

Executive Conference Rooms

Small Conference Room

The centerpiece of conference rooms, large and small, is a circular table with a central holo-display. The table is in direct proportion to the size of the room. In small rooms, there are usually only two chairs, although the table will seat four, one for the officer and one for a "guest."

Small conference rooms are sparsely appointed, but decently paneled in synthwood and all have subdued lighting that can be raised to the level required by any situation.

These rooms serve a variety of purposes, from solitary relaxation and study to couples breaking any number of regulations.

Large Conference Room

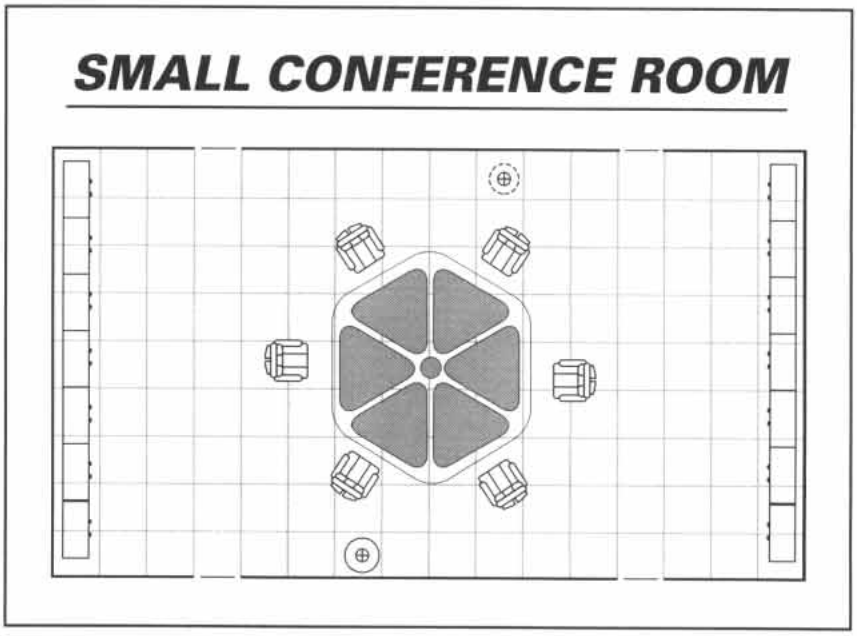
Like its smaller counterpart, the large conference room boasts a central, circular holo-display table. The table here, however, is larger, seating a maximum of six, with four chairs as standard equipment.

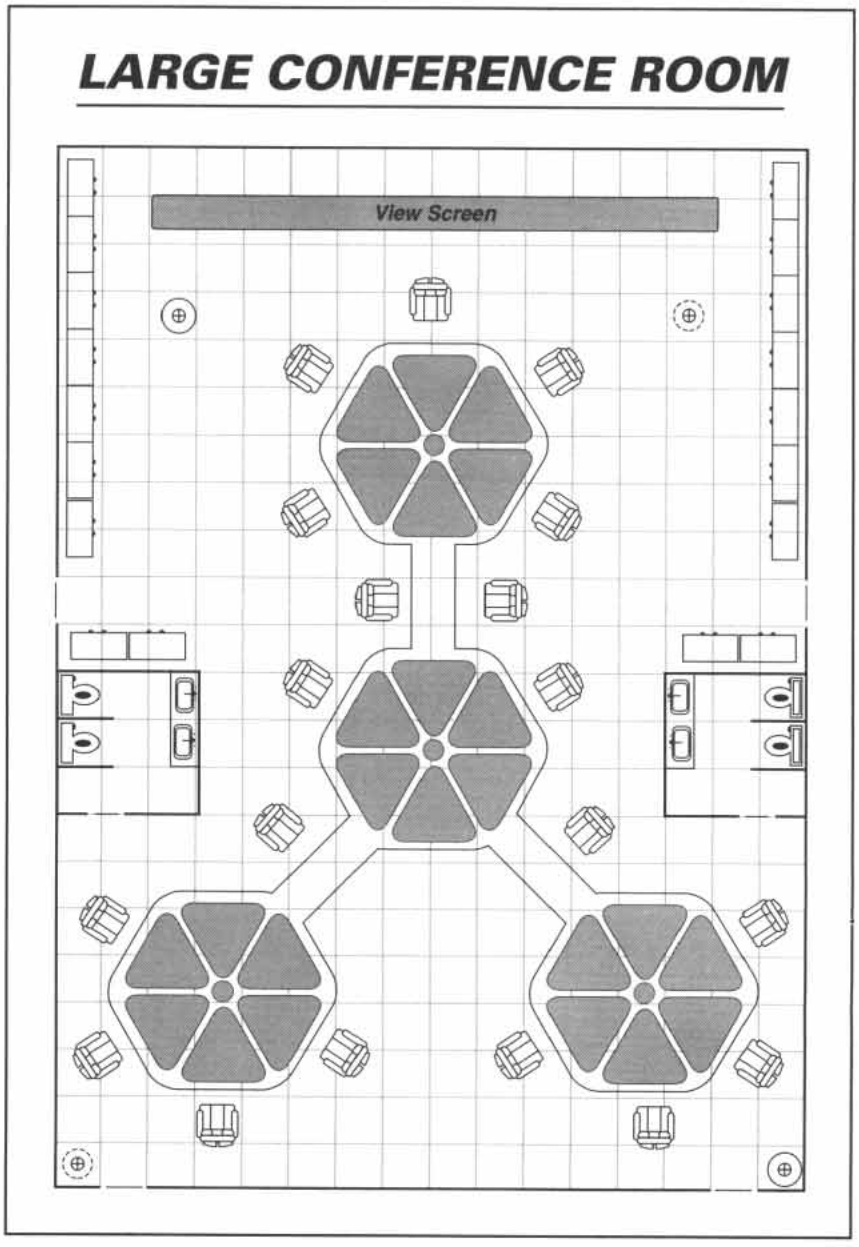
These rooms are better appointed as well, and may be paneled or hold walls covered in a fabric of the captain's choosing. Many even boast direct-view ports looking out into the stars of deep space.

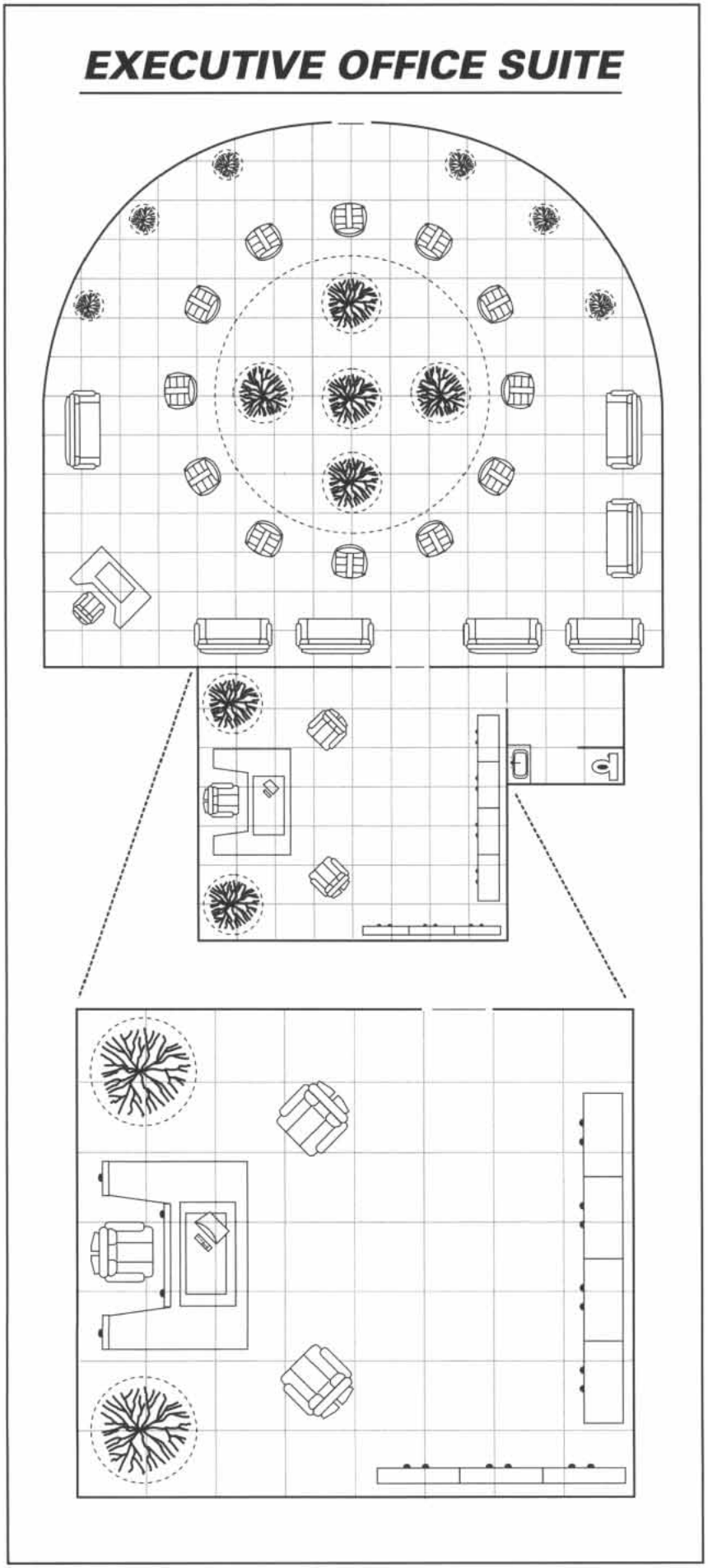
All conference rooms are used for discipline and counseling by captains who take to heart the old adage "condemn in private, commend in public." Ship's counselors and clergy also put these rooms to good use, for the only rule here is "privacy."

Privacy is always a shipboard issue. An officer wishing a few moments of peace and quiet can find it here by ancient tradition. A large brass key hangs on the outer door. If the Key is gone, it signals both occupancy and "do not disturb." The Key is honored to the extent that, except in an emergency, a captain will pass the room by, even if it is occupied by a mere midshipman.

More than once, however, the privilege has been abused and the Key taken by conspirators and mutineers bent on challenging authority.







Captains Offices

Executive Office Suite

Command office suites vary in size according to ship's tonnage and the status of the ranking officer. The largest suites, of course, are found on military flagships and commercial vessels that carry their own management and staff complements.

Ship's purpose, as always, dictates the layout. Military ships' office suites tend to be functional and utilitarian. Vessels commanded by high ranking officers and admirals (or the equivalent) might be less Spartan than those commanded by lower ratings, but all are far more austere than their commercial counterparts.

Commercial vessels with staff onboard differ in construction according to the business to be conducted. A large trader might have translators, accounting supervisors, political advisors, documentation writers (and forgers), psychologists, and telepaths, all requiring their own offices and staff. A mining ship, on the other hand, may only need space for geological engineers, maintenance managers, and, of course, accountants.

The central office, no matter what the function of the ship, is given over to the highest-ranking officer or manager onboard. These spacious quarters bare little resemblance to "offices," although most contain a status-defining desk of some sort. Offices of the Most Senior Rank are all custom appointed, some even tastefully. Most other offices conform to the senior's décor, but trail off into utility as the rating diminishes.

As the length of a ships' tenure in active service increases so does the number of modifications to the office suites. Frequently unused offices are merely walled out of existence, because it's cheaper than completely restructuring an entire deck. As a result, office suites, particularly on commercial ships, tend to warrens of passageways, blind alleys, and dead ends.

Military ships, far from being immune to remodeling syndrome, are frequently the worst offenders. Older ships add masses of cables, discarded robotic gear, and other equipment into the mix, all cleverly hidden.

Weapon Workstations

Turret Accessway

Hatch covers protect all turret accessways. These service entries allow technicians to work on the turret itself and on the anterior portion of the weapon it holds.

Approximately ten feet in height, the interior of the service area is roughly tubular, encompassing the turret base. Floor panels are removable and a steel ladder descends to the lower turret bed. *Normal servicing is not difficult in the close confines, grease nodes and other fittings fall easily to hand and fans provide cooling. Some maintenance men hang tools and supplies from the overhead piping. In battle, however, this practice can constitute a very real threat as the ship lunges in evasive maneuvering.*

Turret Mount Weapon Workstation

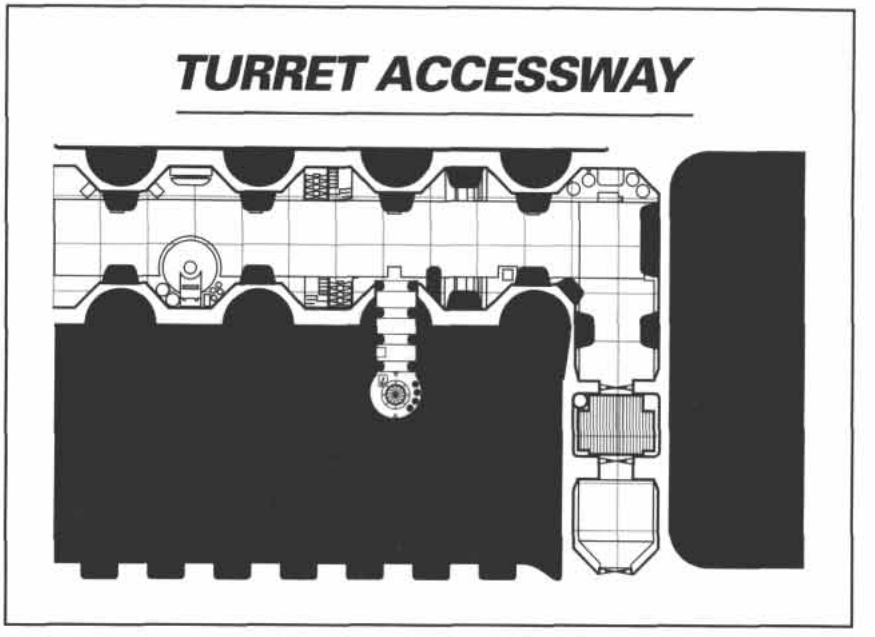
All weapons are tied to several workstations independently, so that in case of damage, the weapon can still be fired and the ship defended. Primary control of all weapons is vested in the command chair first, then, in order of sequence, they are also wired to: Main Weapons Bank, First Officer's Chair, Emergency Bridge, and finally, to the individual weapon station.

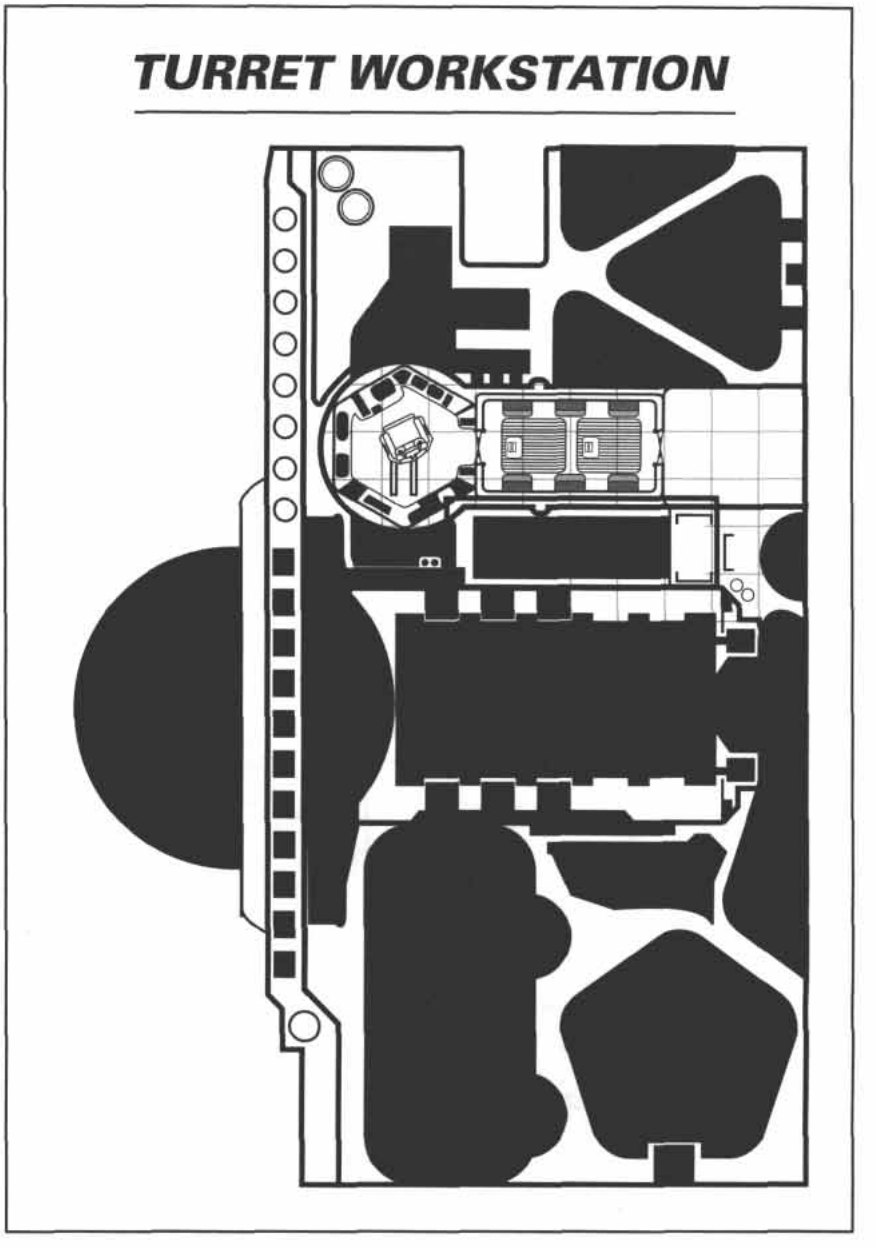
Turret guns actually place the gunner outside the ship, in a glasteel bubble. The bubble permits visual targeting should the computer targeting system go down and the operator forced to switch control to manual.

The "gunnie," or weapon control specialist, is in charge of both normal, routine maintenance and the computer supervision of his weapon in battle.

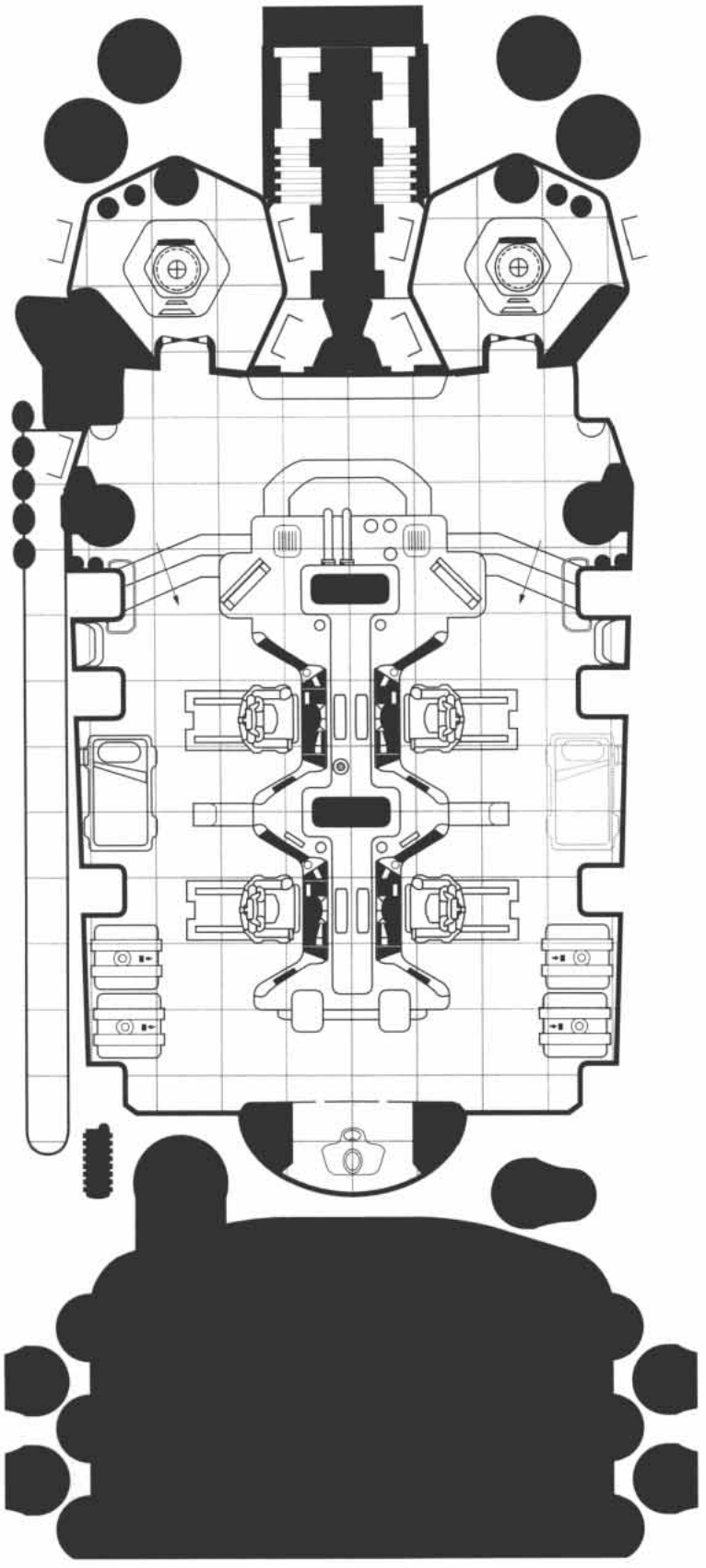
Gunnies are a unique breed and Turret Gunnies are usually the toughest, most fearless men on any ship (even though most of their crewmates think them insane).

Enemy ships like to target the turret bubbles for practice and the life expectancy of a turret gun specialist, from the time his ship engages the enemy until he dies in breathless agony, is about seven minutes. There are very few, although highly decorated, old gunnies.





MISSLE BAY CONTROL ROOM



Bay Mount Weapon Workstation

Located near the center of the ship, but always forward or aft of the spinal mount array, the bay mount workstation controls the weapons on both sides of the center (or "waist") of the ship.

The workstations are uncommonly large, providing plenty of room for the crew to carry out both routine and combat assignments. While the size of the ship does dictate the amount of available space and the size of the crews; however, these stations are critical and allowed as much space as is possible without hampering the spinal station amidships.

The starboard side weapons are controlled from the port side station and the port array from starboard. The two chief operators sit facing each other, although with several tons of equipment, combat readiness screens, and control banks separating them. Technicians who oversee every detail of the weapons' performance service the systems.

On smaller ships, the bay mount station even controls the sandcasters, although this is becoming more rare in architectural practice. Still, it is useful if these positions are near each other in case emergency substitution becomes an issue.

Cross-training crews is time consuming and the custom certainly places limits on final crew efficiency, however, there are no signs that it is about to disappear. Captains prefer to deal with smaller crews and fewer officers, giving over the space to more equipment and more offensive and defensive systems. The command theory being that "one more sandcaster is worth ten more fire-control officers."

Those who serve the ship's weapons form a tight camaraderie that is rarely infringed upon by outsiders. The weapon crews work together and they play together with little interest in the ship's other functions or crews. Their quarters are near their weapons and, even when off-duty, they are rarely found far from their stations.

Spinal Mount Weapon Workstation

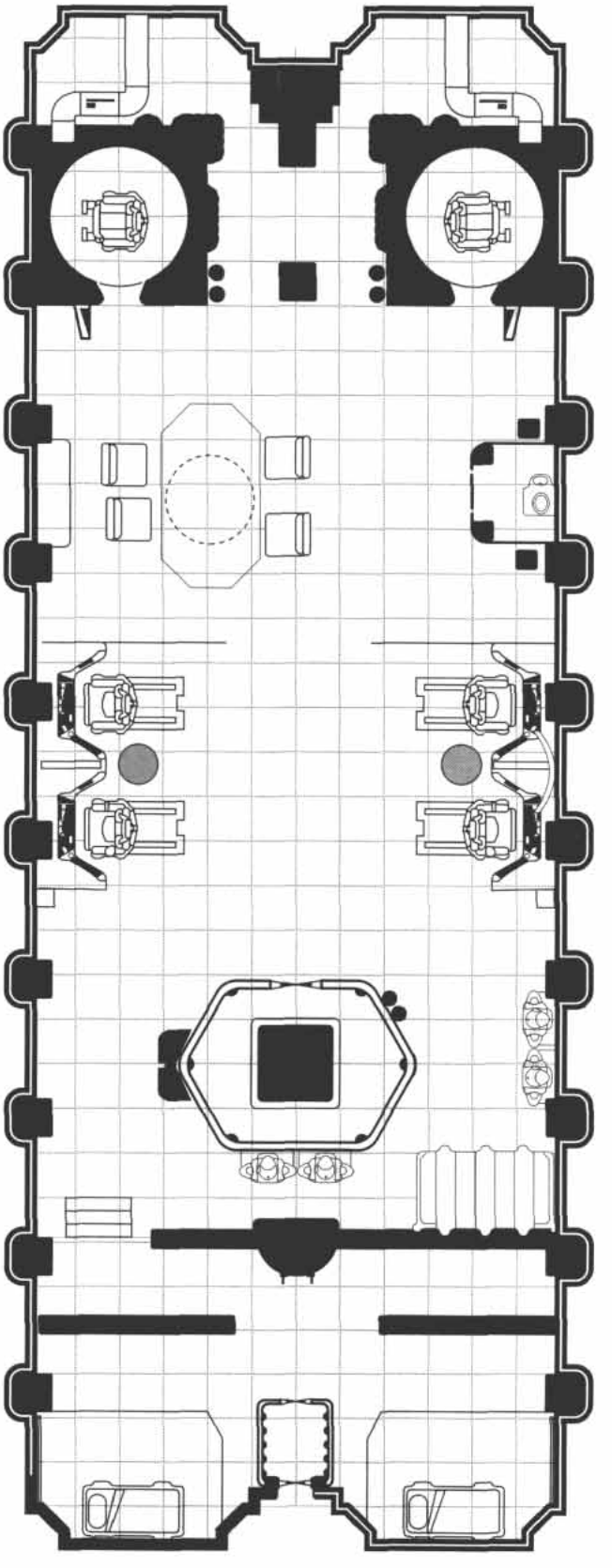
The workstation for the spinal mount weapon controls the armament mounted "top side," near the center of the ship. In smaller vessels, the amidships sandcaster controls are also in this location. While the weapon's operator sits inside the ship, the control station is mounted on a pneumatic swivel chair that is equipped with a "heads-up," holographic display. The operator is strapped and clamped into the chair, and the workstation turns and banks along with the weapon. For this reason, this position has the reputation of being the "wildest ride" in the ship. Care should be taken so that the operator and chair have maximum clearance on all sides.

Two supplemental stations flank the weaponeer's station and are placed just outside the chair's sphere of travel. These workstations monitor all facets of the weapon's performance in combat and alert repair crews to problems, in theory, before they occur. Telemetry also allows them to watch the operator's mental and physical conditions.

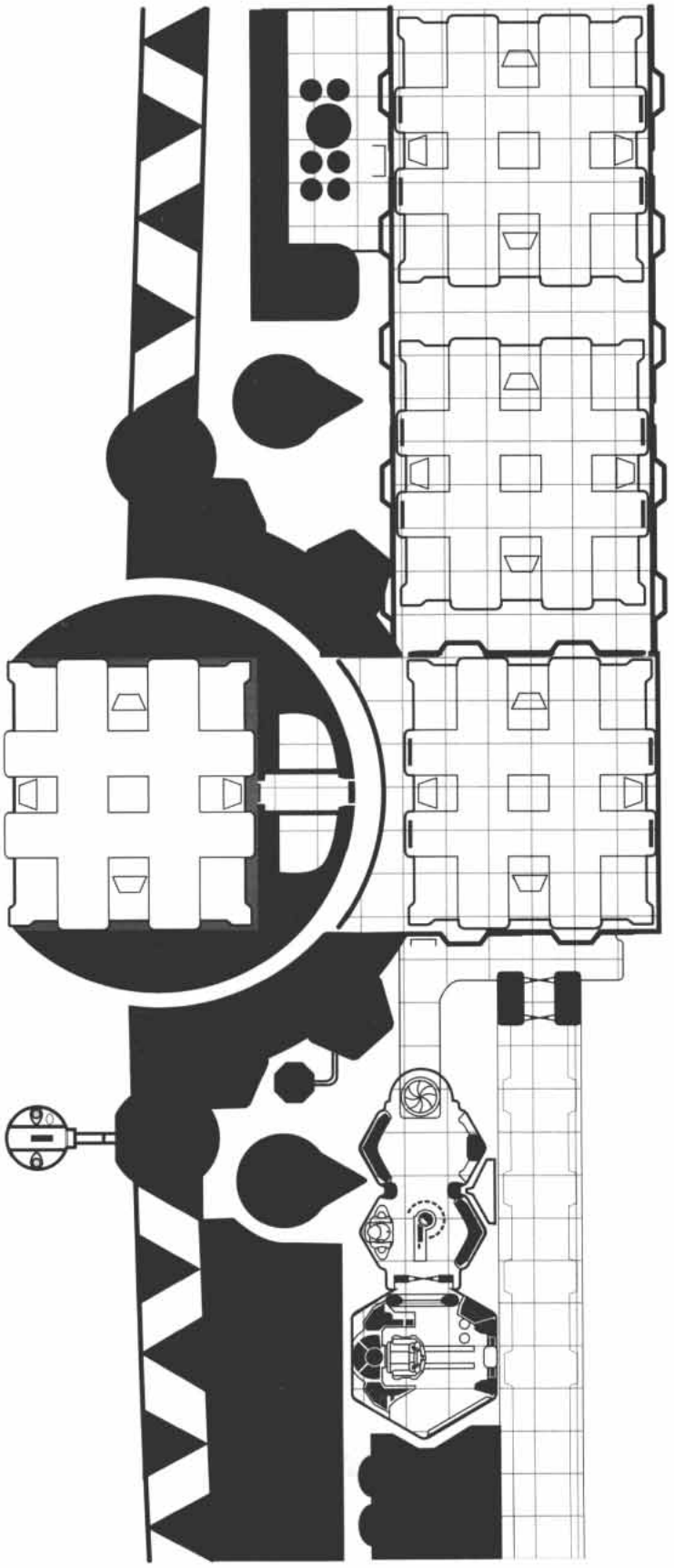
The spinal position also requires more maintenance than most other positions, and hatches should be placed to allow maximum access to the interior of the weapon, the chair, and the pneumatic system. Maintenance lockers, holding tools, replacement parts, and lubrication materials are usually located in the bulkheads, although this is left to the architect's preference.

Like the gunnies who man the turret weapons, it takes a unique person to sit in the control chair for the spinal weapons. The job requires strength, dexterity, and fast reaction time, as well as a highly developed sense of motion and direction. The crewmen who sit at the side stations are usually the next to occupy the weaponeer's chair and are trained to take over the firing position in an emergency.

SPINAL MOUNT CONTROL ROOM



MISSILE BAY AND ACCESS



Missile Launch Bay and Storage

The missile launch bay and storage areas of any ship are usually the largest facilities aboard and models of efficiency. While the actual loading of missiles is automated, a crew of four to six specialists, more on larger warships, is required to ensure maximum effectiveness during combat.

Every control in the launch bay is triplicated and independently wired in case of failure and, in addition, there are standby manual controls and systems for each position. Each member of the launch crew is trained for a primary function and two auxiliary duties. Seated positions with workscreens are provided for the Fire Control Officer, Missile Navigation, and the Auto and Tracking Monitor. Other launch crew selects missiles for launch and observe their loading using hand-held telemetry units. Missile launch bays are reinforced and heavily protected, since they can be a ship's final defense. Padded standby benches allow the crew to sit when not actively engaged.

Missile storage bays are placed aft of the launch bay and take up as much space as can be allotted to them. The missiles are stowed in rotating cylinders, but the number of cylinders and of the missiles contained within each is dependent on the size of the vessel. In actual use, the cylinders bring individual missiles up, advance them along moving rails and onto launch carts. The launch carts are programmed to service specific launch tubes, although such programming can be overridden at the touch of a hand-held control unit during an emergency.

Those select crewmen who tend weapon workstations, regardless of weapon type, crew rank, or position maintained, tend to be a loud, boisterous, and arrogant lot — a defense mechanism that enables them to deal with such demanding and dangerous duties. Other officers are likely to cut them a lot of slack, even when they border on insubordination, for the safety of the ship and all aboard her who depend on those manning her tactical weapons array. And it is of such creatures that Interstellar Legends are made.

Screen Workstations

Defense Coordination Station

The ship's tactical officer in command of this position is responsible for overall battle tactics and weapons management. He relays the command to open fire after the captain's order and constantly reviews the performance data of the various weapons positions. As a consequence, the Defense Coordinator's workscreen is the largest screen on the bridge, after the central holoscreen. The DC's workstation holds repeater screens and controls for every firing position on board. He can enlarge and reduce the repeaters at will and even override the crew stations controls and take physical command of the weapons himself. While this is a rare occurrence in actual combat and no experienced DC would, it is an important security feature. Standard architectural protocols dictate that the captain should have an unobstructed view of this screen, for while the DC is in command of the tactical situation, the captain is responsible for strategic decisions.

The Defense Coordinator is almost always of high rank and is usually the second-in-command. The demands of the post are such that senior officers see the position as training ground for future captains. The job of handling so many tasks simultaneously requires a steady hand under fire and a high level of mental agility. Rare qualities, indeed.

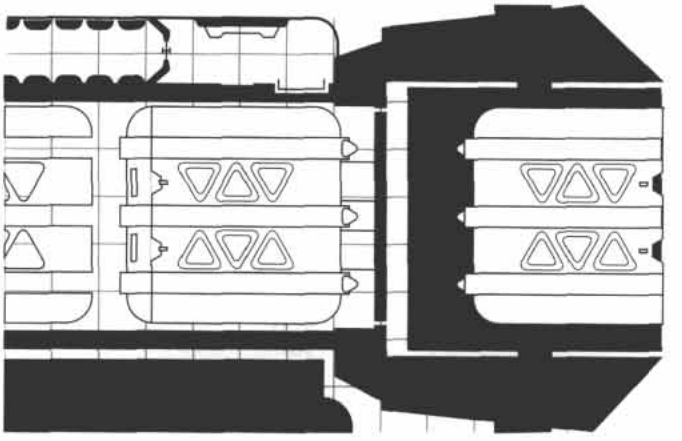
Sandcaster Accessway and Bay

The sandcaster hatchways provide access to routine and emergency maintenance on both the sandcaster dispensers and the field generators. Always ensure that the hatches are unobstructed and large enough to replace any defective or battle-damaged parts.

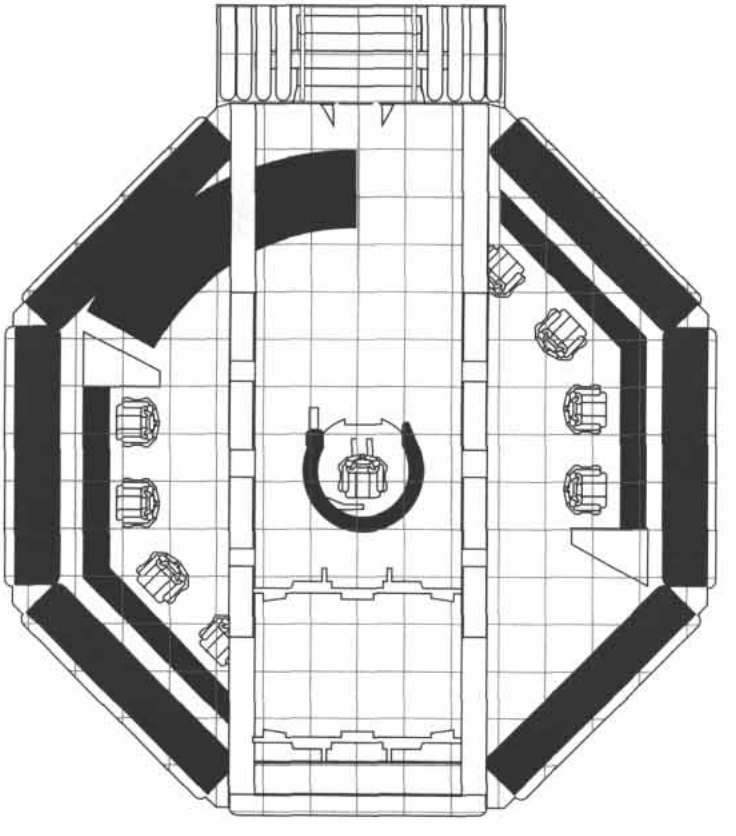
The sand caster bay contains racks of sand canisters, their size and number, or course, depending as usual on the size and purpose of the vessel. While this area is large enough for a tall man to walk upright, the confines are generally quite narrow.

On many vessels, crewmen assigned here are rarely scheduled for promotion. Some captains use the job as a punishment for troublemakers. Sandcaster locations are, therefore, known collectively as The Hole.

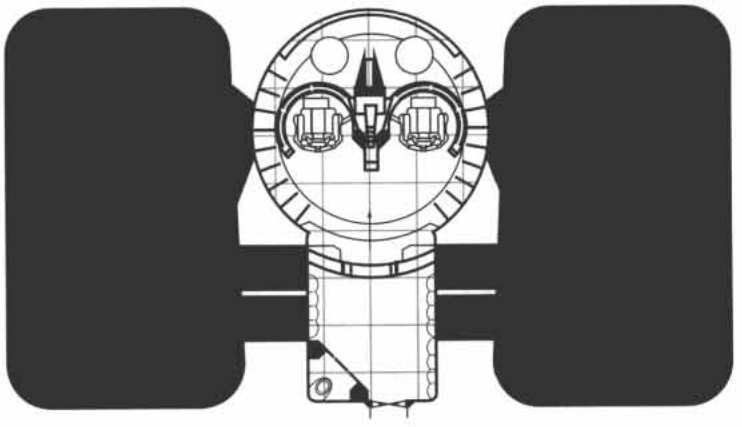
SANDCASTER BAY



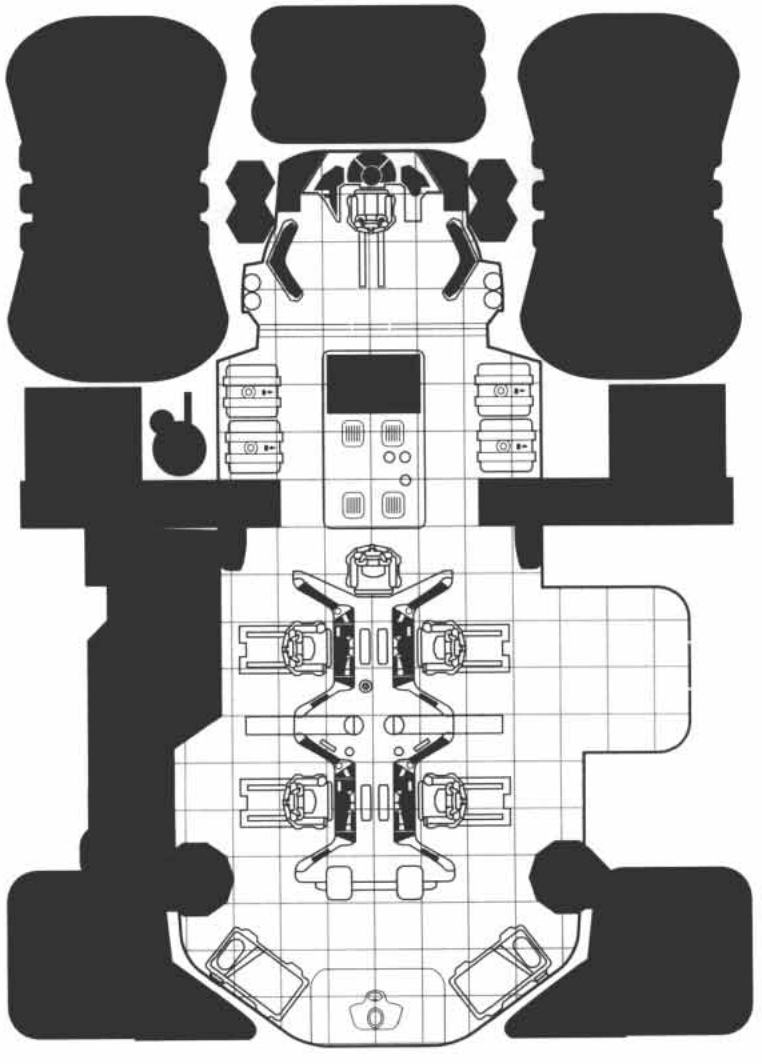
DEFENSE COORDINATION STATION



BLACK GLOBE WORKSTATION



MESON SCREEN WORKSTATION



Black Globe Workstation

It is a rare vessel in any navy that possesses one of these ancient artifacts, which is included here only for the sake of completeness. The black globe station consists of a single circular screen and an access hatch leading to the capacitors. Its placement should be in the geographical center of the ship, since the energy-absorbing field it creates is centered on the station.

These weapons are extremely rare and treated with a mixture of awe and fear. The nameless elder race that developed them vanished eons before mankind ever took to the stars. The few that turn up are beyond price and flagships commandeer most of them.

Meson Screen Workstation

Meson weapons require very detailed workstations, combining separate targeting and navigational screens in one location as well as a smaller Decay Estimate Display, or DED. The operator must coordinate the trajectory, distance, and time to target all at relativistic speeds, while trying to place mesons at the point of decay within the hull of an enemy vessel. This is a mentally demanding position and consideration should be given to the operator's comfort. In practice, many experienced architects place soundproof walls around the station and its operator believing that privacy induces concentration — this is not possible on small vessels. This is the only position that the Defense Coordinator cannot override.

An officer usually mans the meson station, but occasionally specially trained crewmembers with an aptitude for controlled thinking are given this assignment. The control of the meson tunnels and judging the amount of energy put through them requires a high degree of mathematical talent, dexterity, and creative thinking. Those assigned to this duty are usually the ship's intellectuals and chess players, maverick thinkers with excellent coordination skills. A good Meson Control Chief generally enjoys a great measure of independence and off duty prerogatives than other crewmembers and is expected to spend duty time honing his skills.

Security and Brigs

Holding Cell, Cramped

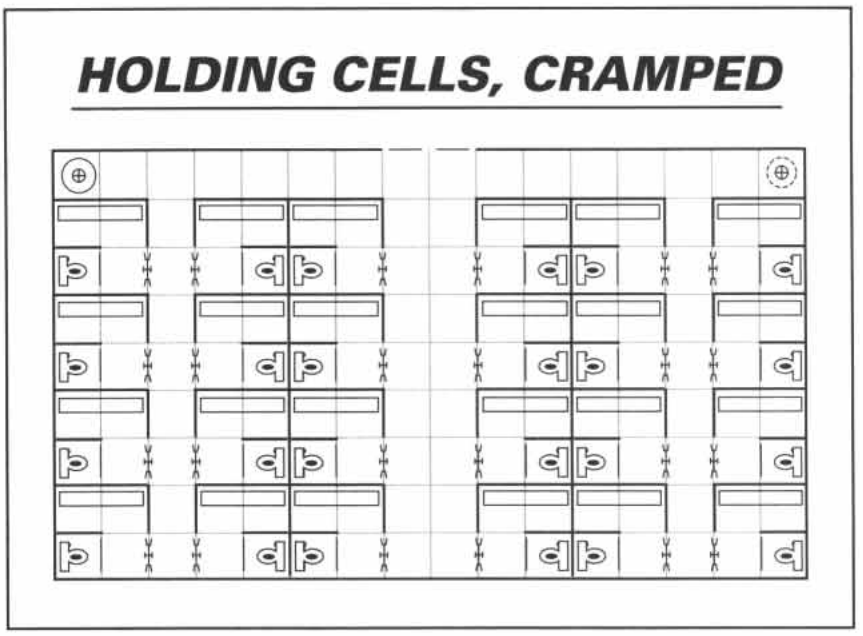
Nearly every ship, commercial or military, with more than four crewmen contains at least a small holding cell somewhere within its interior. Cramped holding cells are more common on smaller ships where space is at a premium. While the actual size and contents of these tiny brigs are left to the architect, there are common features: a toilet, no shower, and a single bunk that tend to be short — 5 to 5 1/2 feet in length. The entire area is under watch by surveillance cameras linking directly to the bridge's security screens.

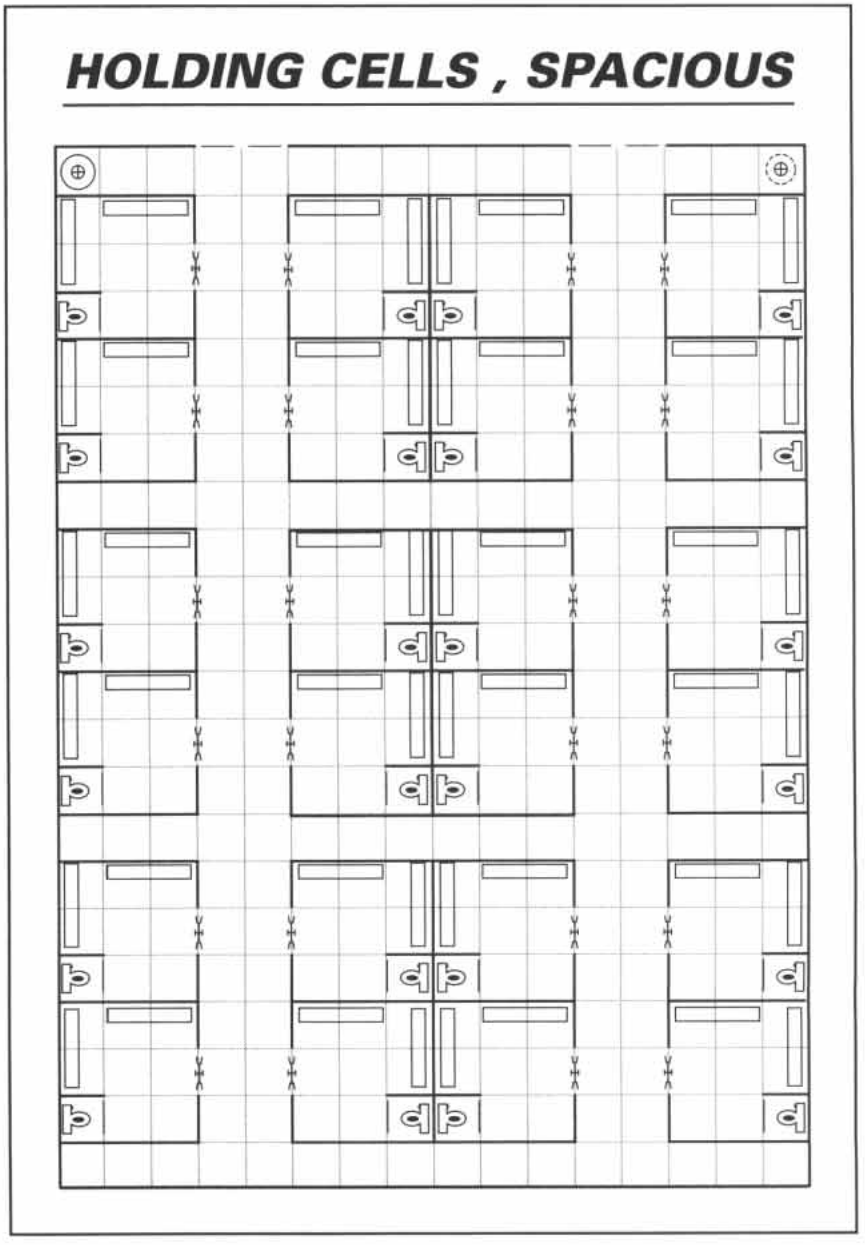
There is a truism along the spaceways: "The smaller the ship, the worse the brig." Crewmembers consigned to the brig are headed for Court Marshal.

Holding Cell, Spacious

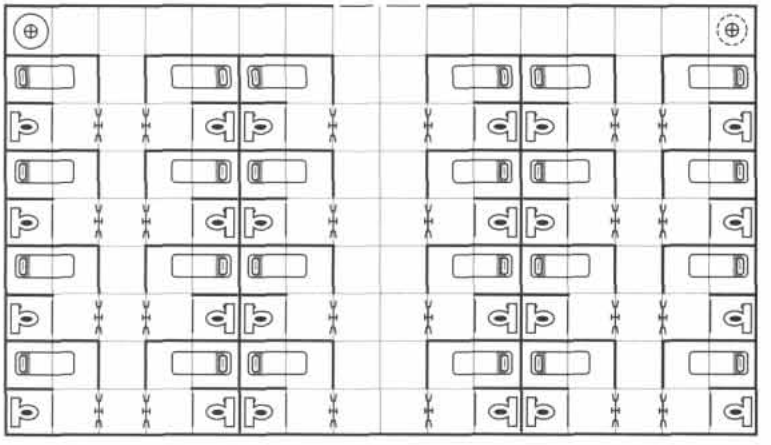
A larger holding cell is an option for larger vessels, but conditions remain Spartan. Since the cells almost never see the presence of an officer —officers are generally confined to quarters—and little thought is given to the ratings, comfort is never a consideration. The fixtures in these accommodations are utilitarian at best; a toilet without seat or lid, constant camera surveillance, and harsh light is the lot of those confined here. The only advantage for a prisoner in a spacious holding cell is that it is large enough for simple physical exercises. Placement, by custom, is always in the least populated area of the ship to ensure isolation and to prevent crew contact with the felon.

An order to the brig is never handed down lightly, although there are captains who abuse the privilege. Any number of disciplinary actions can be taken without resorting to actual arrest and imprisonment. The brig is reserved for the most serious infractions of military conduct — striking an officer or noncommissioned officer, dereliction of duty resulting in the death of a comrade, and cowardice in combat. Confinement is usually the first step before Courts Marshal and conviction, for merely to be held is considered proof of guilt.

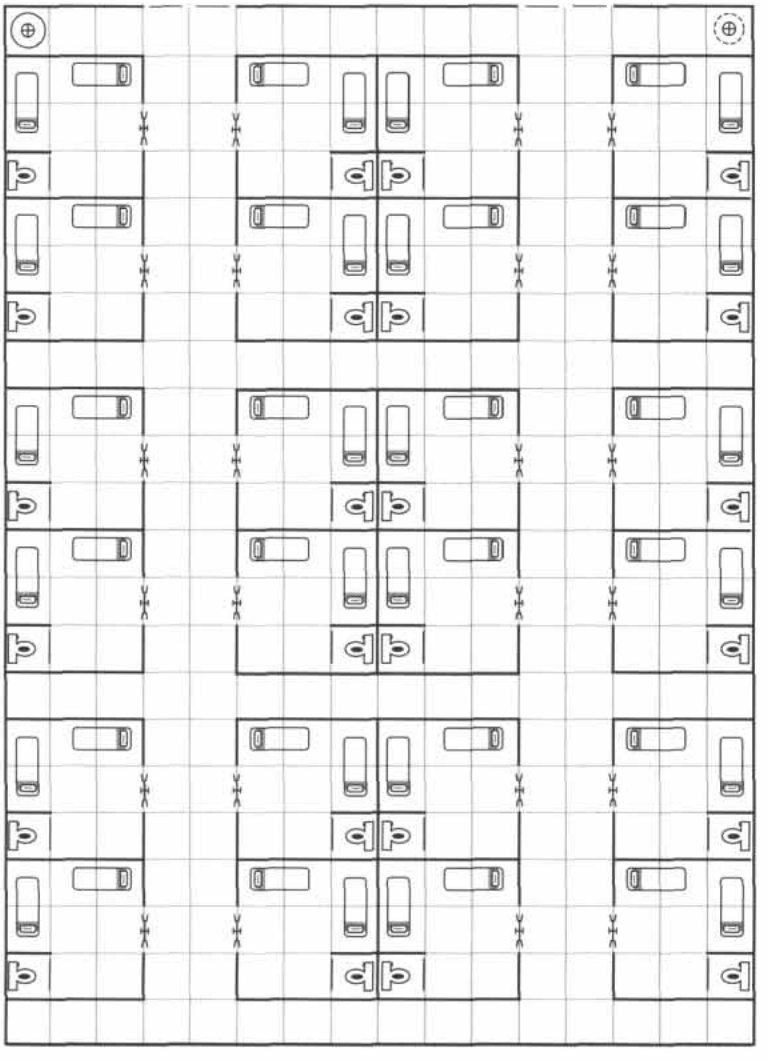




STANDARD CELLS, CRAMPED



STANDARD CELLS , SPACIOUS



Standard Cell, Cramped

Standard cells are normally found on medium to large vessels. These cells all fit a conventional pattern and, where holding cells are built to fit an existing space, standard cells of this configuration measure a meager domain of 10 by 10 by 10 feet. Toilet facilities and a small basin are regulation, both rising on stalks from the floor. These cells are usually found in pairs, at least. The construction is of traditional metal bars, although most have solid walls separating each cell from the adjoining cubicles.

Larger ships tend to have more disciplinary problems than smaller ones, but the presence of these facilities should imply their commonality.

Standard Cell, Spacious

These cells are larger than their cramped cousins by a full 5 feet. There is enough room for exercise and if comfort may be found in a jail cell, this is it. These units are usually multiple and built as a block. There is a small shelf bolted to the cell wall for the limited personal effects that may be permitted to a prisoner. Books and non-sensitive information may be requested from the ship's computer and are displayed on a small screen built into the aft wall of the bunk. Prisoners who are crewmen are allowed limited, censored e-mail services, others are not.

Ships containing blocks of these cells are frequently engaged in planet-side garrison duty and often required to police civilian populations. It is not uncommon for these cells to hold captured military and civilian executives, a few sordid types who violate imposed curfews, and a crewmember or two. Guards "patrol" the cells through video cameras and food service is automated. There is little physical contact with prisoners except to move the showers or a summary court.

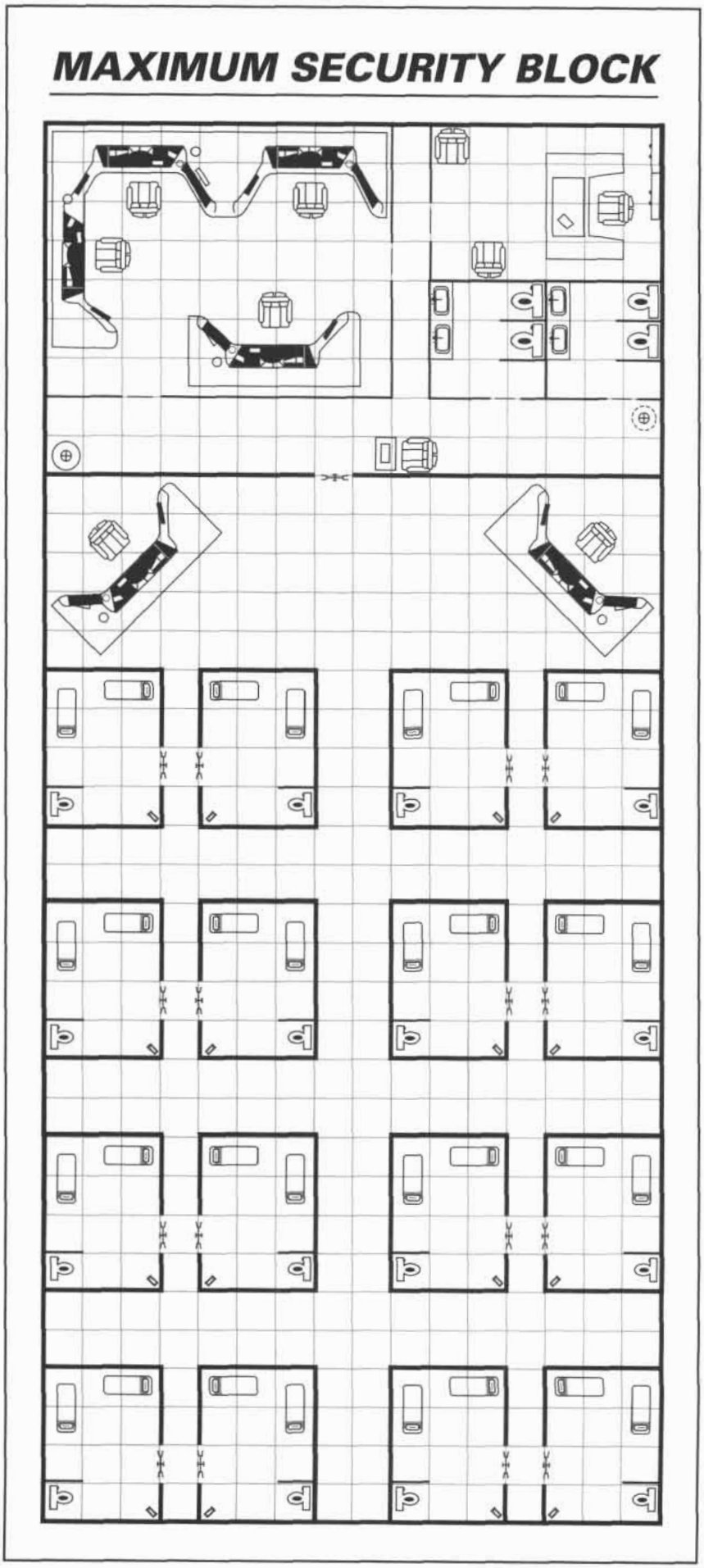
On larger ships, even liners and other commercial vessels, cells are used to punish lesser breaches of conduct. This is normally done on a demerit system, each 15 demerits equaling one day in a cell.

Maximum Security Block

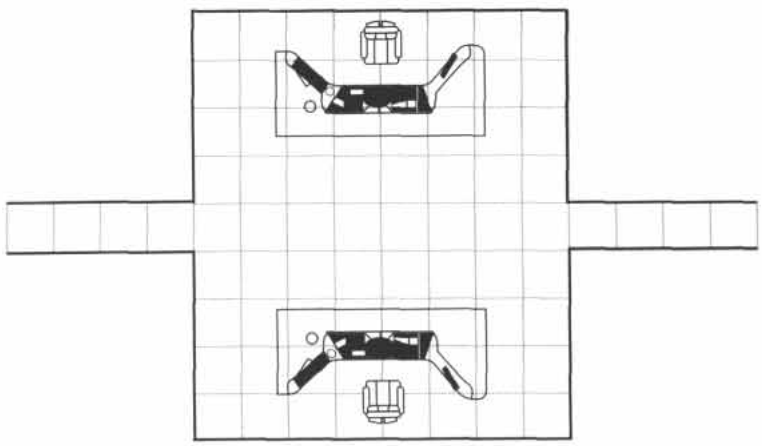
A maximum-security block is usually found only on garrison ships in planetary orbit. In maximum security, design is critical and the architect must pay strict attention to detail. While it is difficult if not impossible to escape from anything larger than a "spacious" holding cell, escape from maximum security should be impossible. While the shape is left to the architect, the area itself must be isolated, controlled, and constantly guarded. A few designers have had good results lately with a circular form that places the cells in a circumference around a central, enclosed guard station manned with heavy weapons. The standard fixtures apply here, but sluice showers are added along with run-off troughs. This feature eliminates the need to take prisoners out of their cells. Computer access screens are available in the cells, but content is controlled through the guard station.

The prisoners in maximum security are the most dangerous individuals in known space. Many are professional killers, spies, and assassins skilled in stealth and escape techniques that make them hard to hold anywhere else. Genocide, rape, and slavery are just a few of the crimes that result in confinement in maximum security. It is not uncommon for a life sentence to be served aboard ship with a maximum-security facility and some are even known as "prison ships," although their primary duties are the same as other vessels in their class.

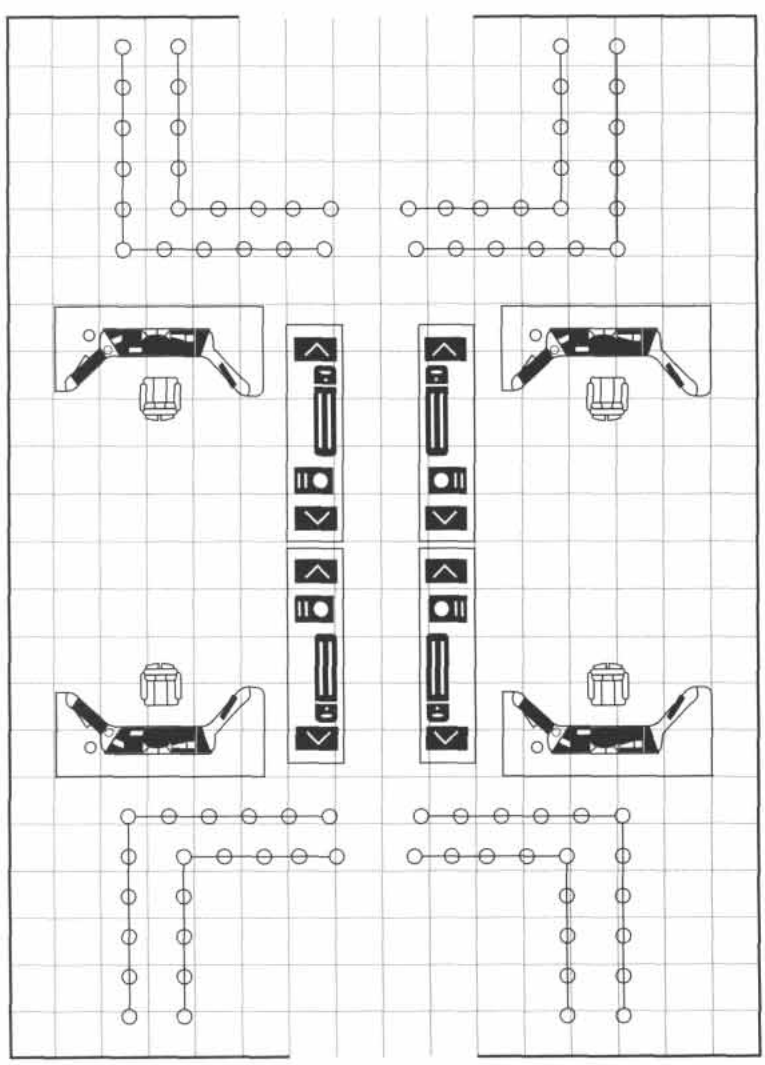
Guard duty in maximum-security areas is highly specialized and pays respectable "hazardous duty bonuses," although such pay is really meant to keep the guards immune from prisoners' offers. The job requires fast reaction times, above-average strength, skill in small arms of all types, and at least average intelligence. Boredom is always a factor and the guards change every four hours. A normal duty shift is four on, four off, four on, eight off.



SECURITY CHECKPOINT, STANDARD



SECURITY CHECKPOINT, IMPROVED



Security Checkpoint, Standard

The principles of the security check point, whether on aboard or planet-side, remain the same. An enclosed booth with scanning devices checks the authenticity of persons entering high-security zones. The standard checkpoint has a worktable, a screen concealed from the view of those to be identified, and two chairs. Checkpoints are placed at the entrances of secure locations and equipped with barriers to ensure that none pass without an ID check.

Most check point duty is boring and routine. Some officers use this responsibility as light punishment for minor infractions or to place crewmembers incapable of more intellectually demanding duty.

Security Checkpoint, Improved

Over the past few years, security checkpoints have undergone revisions to add both creature comforts and firepower. The improved station is larger, containing both toilet facilities and an entertainment screen to relive the monotony of the duty. Seating is more relaxed and small food/beverage preparation units are available. The practical changes, however, are the important ones. The small ID screen remains in its shrouded position, but two larger screens are added. The new screens detect perimeter movement and life-signs within a controlled radius (one mile on the ground, appropriate settings on ship premise). The weapons for these stations are state-of-the-art for their technology level.

In addition, staffing protocols are changing. Officers are now less likely to use checkpoint duty as a dumping ground and more inclined to assign personnel with the proper training and experience. Of course, these changes did not occur in a vacuum, but were in response to a colonial incident. Primitive tribesmen overran three perimeter checkpoints on Shaitel, killed the guards, and swarmed the ship. Ship's troopers, of course, defeated them, but the Imperium decided to make changes and other navies followed suit —but only after the captain was cashiered for "negligence."

Security Station, Cramped

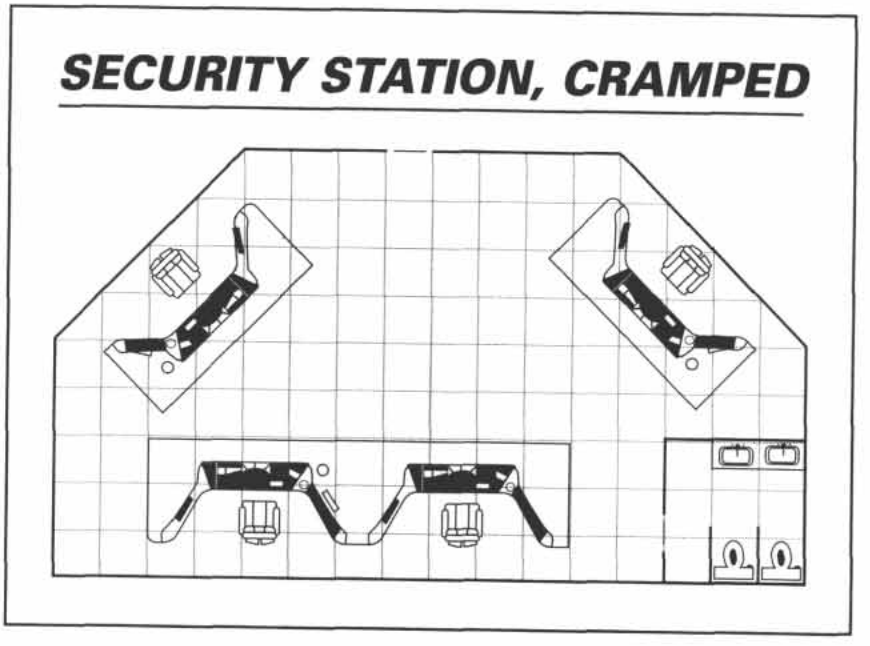
Small security stations can be installed anywhere aboard where extra security is needed. Cargo bays in ships carrying valuable goods, any locations where experimental equipment might be vulnerable to sabotage or espionage, and the purser's vaults on liners are all likely to require a security station. There is room for a single chair and a small monitoring screen, and the circular booth is open all around for both sight inspections and clear targeting.

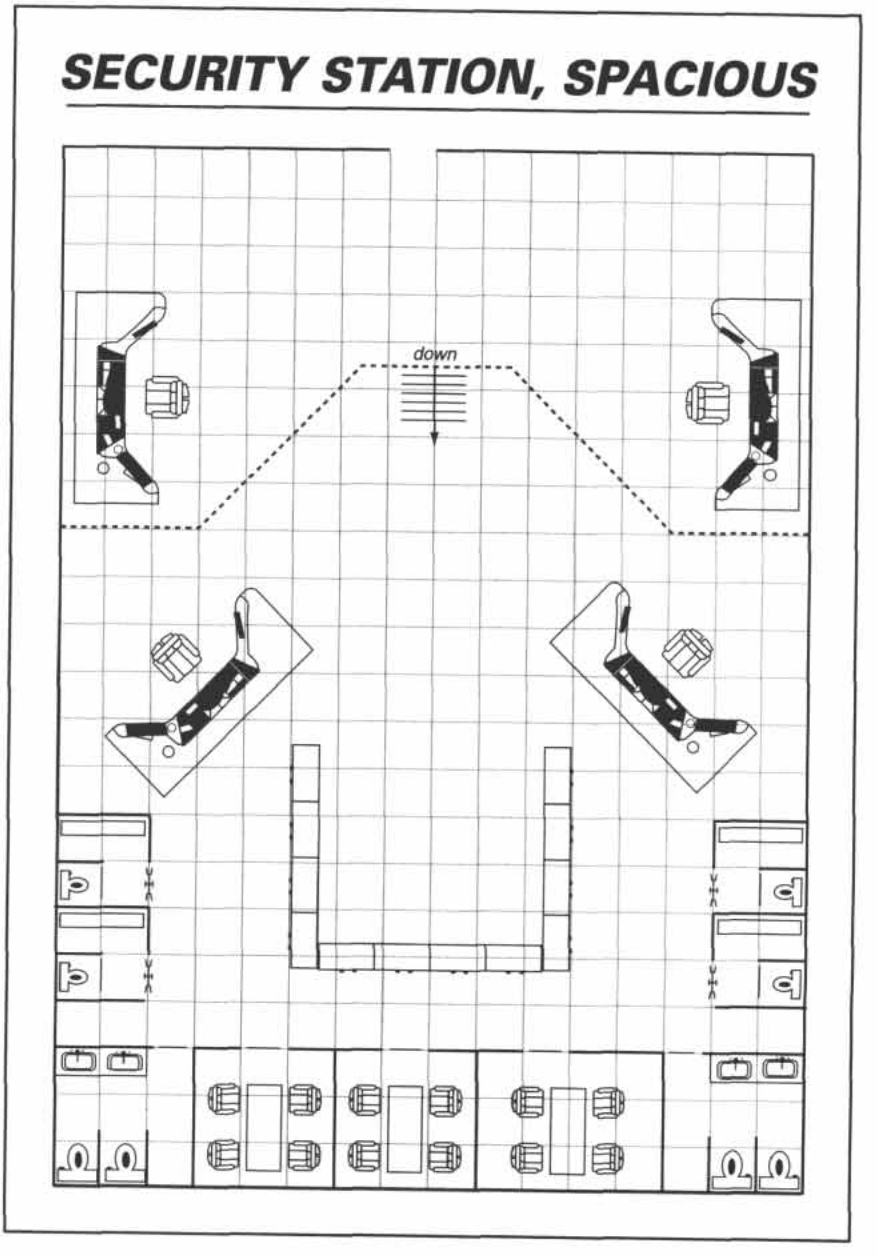
Service in a security station can be very dangerous duty. More than one liner has been hit by thieves masquerading as passengers. Military vessels are not immune from attack by their own crewmembers.

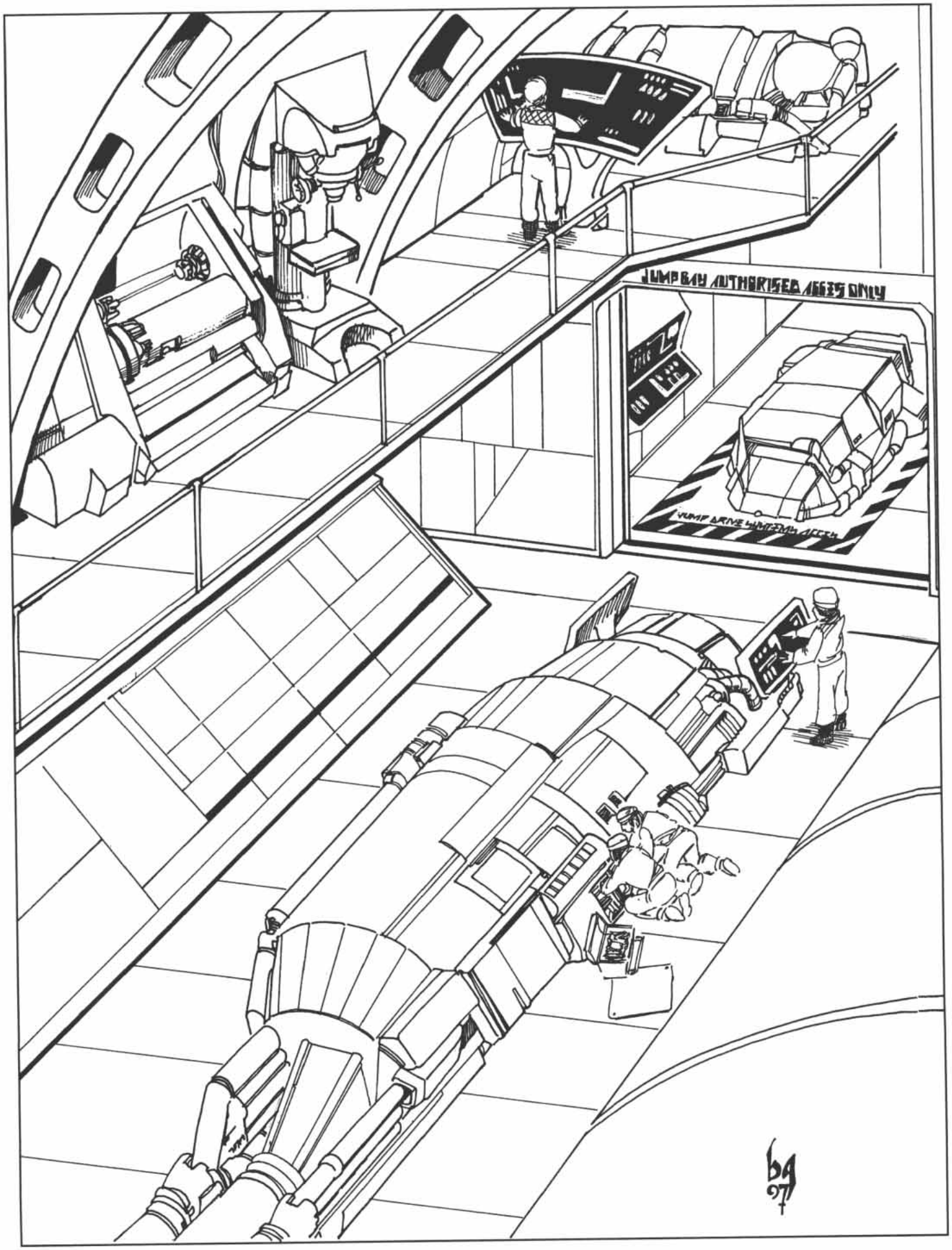
Security Station, Spacious

This larger security station performs the same function as the cramped model, but is used for Very High Security. The open booth is intended for two security men charged with constant vigilance — there are no chairs. At roughly waist level, the guards survey a full, circular bank of screens that keep watch over every nook and cranny of available space. Sensors report movement and any telltale life-signs that are out of place. Those who stand duty here are armed, with weapons at-the-ready at all times. Standing orders are to shoot first, then inquire.

This dangerous duty is very well compensated. The guards who fulfill these functions must be young, beyond reproach, preferably with family ties to the service in which they have sworn their allegiance. It is common for ambitious junior officers to serve time in Security. Still, no one is immune to temptation, as Juvanel wrote, "Quis custodiet ipsos custodes?" (But who guards the guardians?) To deal with this potential, spy cameras are installed that report directly to the bridge. Still, this assignment is considered "light duty," for no one spends more than two hours at a stretch as an active sentry does.






JUMP BAY AUTHORISED
JUMP DRIVE

Engineering

Jump Drive Control Room

The jump drive control room is the heart of the engineering section on any ship. The size of the control room is in direct proportion to the size of the engines and the amount of monitoring equipment required.

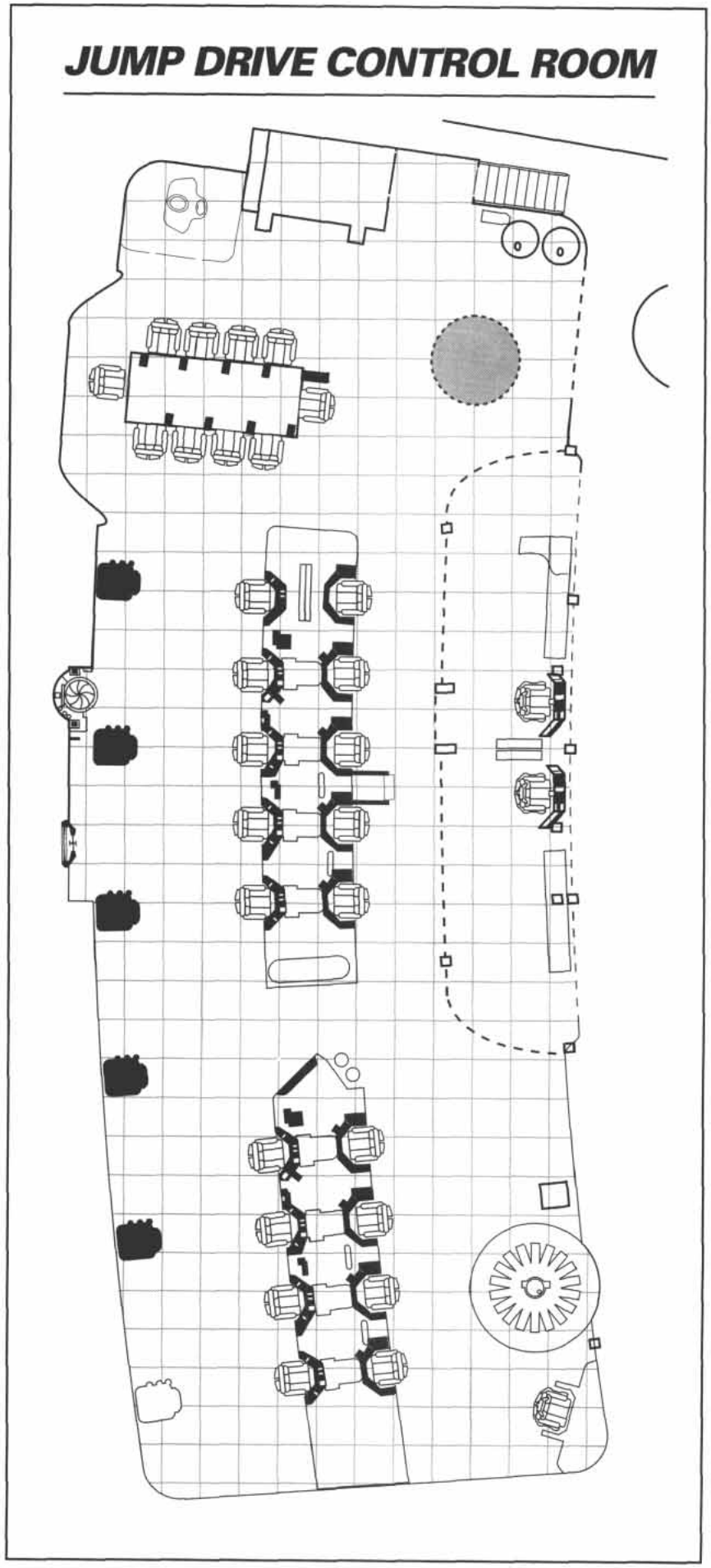
Ships with fewer than four crewmen rarely have a separate control room. All jump drive engineering controls, in that case, are routed to the bridge.

In any engineering control room, certain workstations are mandatory. The workstations can be arrayed to focus on a single operator in smaller ships or set as the individual stations common to liners, large cargo vessels, and heavy warships. The required stations are:

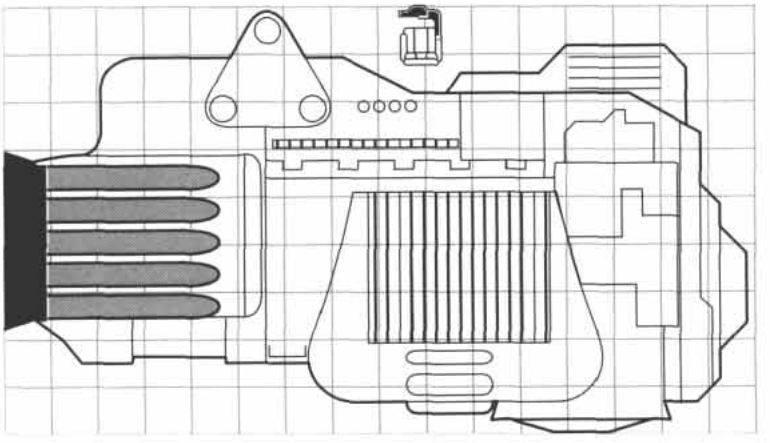
- Chief Engineer's Station. Includes repeater screens for all engineering stations; centrally located.
- Jump Drive Monitoring Station. Reports engine-state factors displayed on three screens.
- Liquid Hydrogen Monitoring Station. This position monitors fuel flow, level, and temperature.
- Lanthanum Hull Grid Station. Monitors exterior hull and Grid environments.
- Surge Tank Station. Reports status of the size and condition of the hydrogen envelope and surge tank levels.

Engineers are a tough lot, and very well trained. These jobs demand people who are physically fit, mentally alert, and fearless in a crisis. There are those who have never seen an engineering crew handle a full jump drive failure emergency and think of engineering as cushy job. It's not. While the atmosphere in most engineering sections is relaxed and cordial under most conditions, in an emergency the crew functions as part of a single urgent machine.

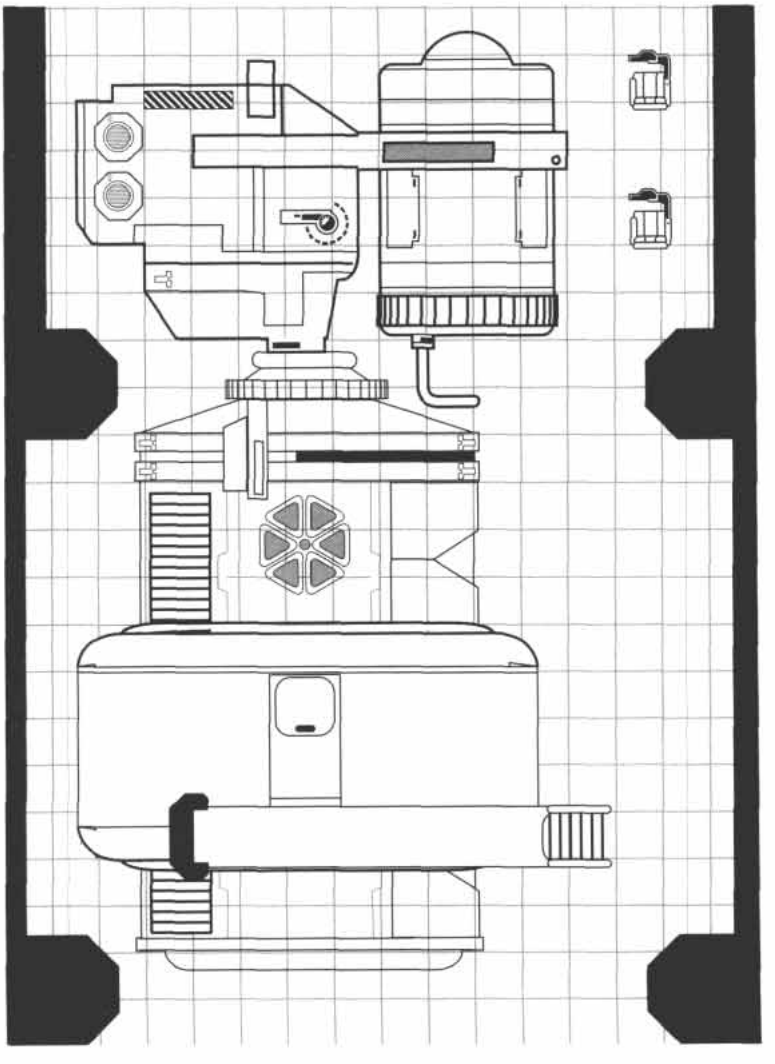
Chief Engineers usually rotate their crews through each station every four months or so in order to keep skills and training current and to prevent routine jobs from developing into negligence. As a result, individual stations are interchangeable with any engineering crew that has seen more than two years of service.



SMALL JUMP DRIVE



JUMP DRIVE, LARGE



Jump Drive, Small

The small jump drive displayed here is an example of the type used in lighter ships. The drive must be connected directly to the lanthanum hull grid (shown at top), the liquid hydrogen fuel tanks (the four injectors at the left), and the ship's primary electrical power plant (through cables not shown). Note that anything that can go wrong will. Storage for replacement parts and tools should be in the same bay as the drive.

The engineer in command of the drive has a dangerous job, one mistake and the ship is lost. Steady nerves and facile problem solving skills are required.

Jump Drive, Large

The jump drive is at the core of interstellar travel, without it distant stars would remain lamps in the sky. The drives are sized according to the gross tonnage of the vehicle in which they are to be installed, and the example given here is for a heavy vessel. All connectors to the grids, the fuel storage tanks, and electrical conduits are hidden in this view. Access hatches provide entry and work space to every section of the drive, and care should be taken to make the spaces large enough to replace damaged or malfunctioning equipment. The intake modules and injection chambers are required by the massive bulk of the vessel. The drive is controlled at two stations; each with duplicates of the controls.

In normal practice, one station monitors the drive and the energy inputs, the other controls the surge tank and oversees the condition of the jump bubble. Engineers usually switch duties every couple of hours to relive monotony, for, truth be told, there is not much to do when the drive in operation. The command to "go to jumpspace," however, always provides a tense moment. In a small percentage of cases, the tunnel to jumpspace fails to open or collapses upon opening, and the ship is totally destroyed.

Jump Drive Workstation

The numbers of jump drive workstations increase in direct proportion to the size and power capacity of drives. All include the following: Officers Positions —up to four; Monitoring Stations —up to six, duplicated; Light Storage Lockers — up to eight. The supplemental monitoring stations are manned by crewmembers who sit on stools rising up from the floor when required. Build according to the letter of the contract.

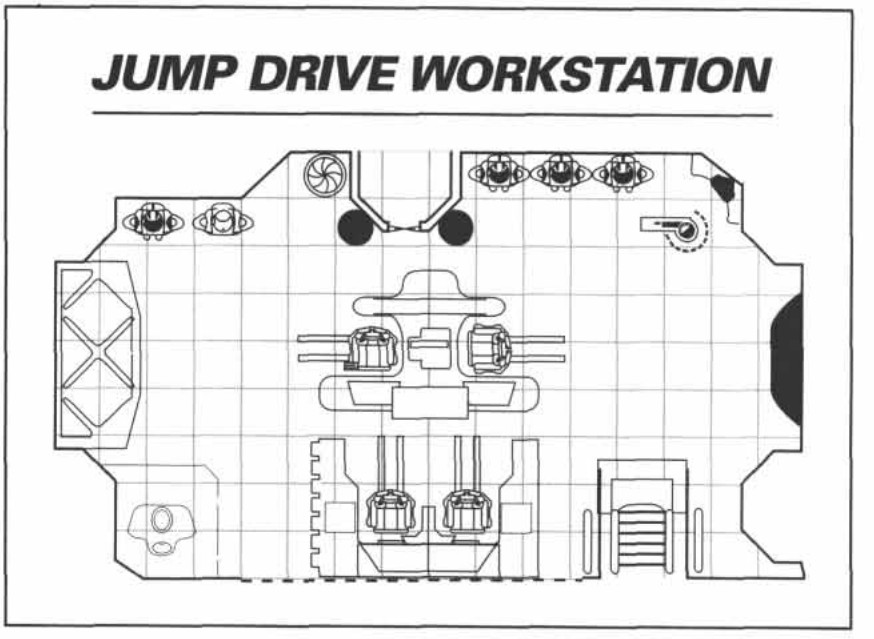
The larger facility is rarely required, but some owners (and some noble admirals, for that matter) feel more secure in jumpspace when every component of drive, fuel, and grid are closely watched.

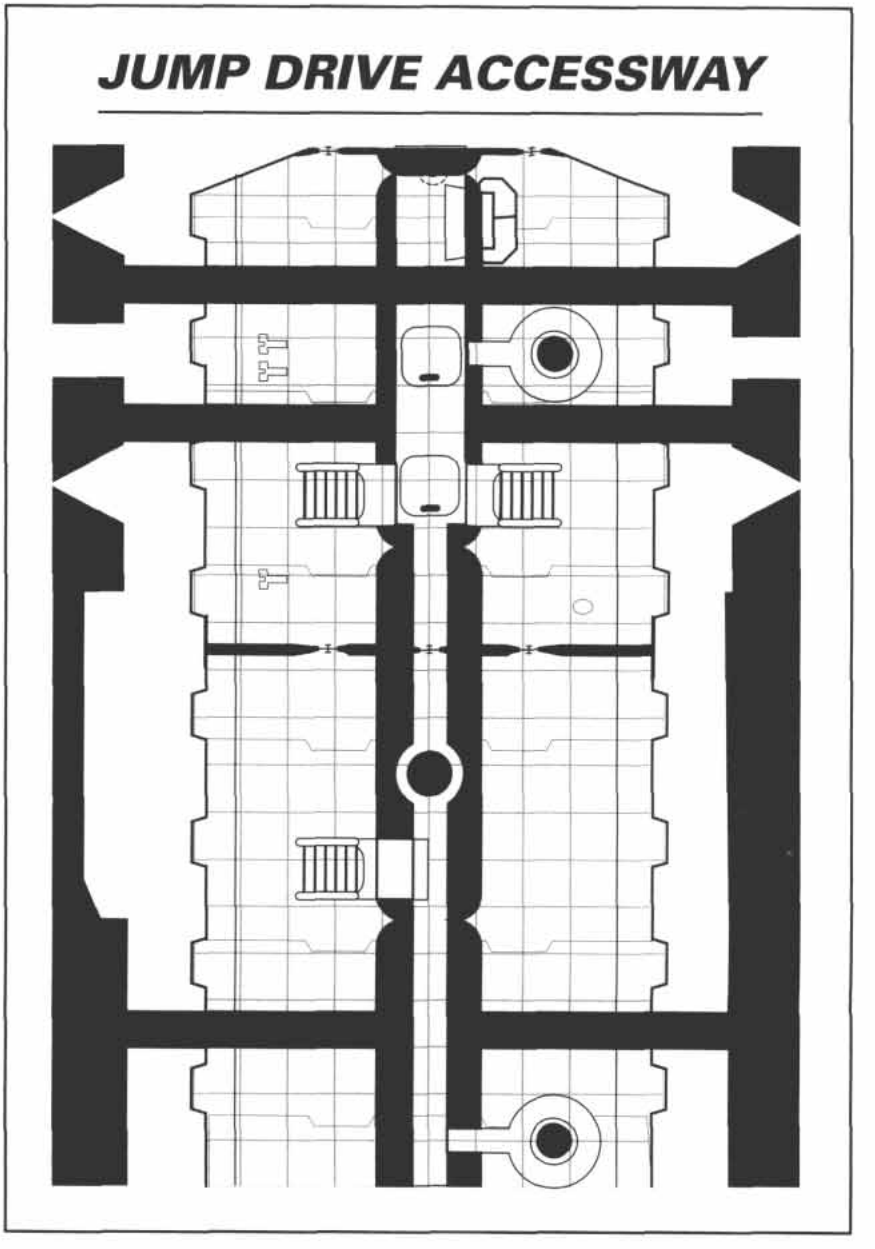
Jump Drive Accessway

It cannot be repeated too often that "space is a function of size." The accessways shown here are for a large drive, but the principles apply to all. Access and storage must be given to every aspect of the drive's three components, no matter how large, no matter how small. It is said that Caleb Mining Corporation's ship *Stardigger* was lost because an energy transmission relay switch, a cheap, common part, could not be located. An architect who looses a ship due to a design flaw will end his career emptying garbage buckets at a planetside watering hole.

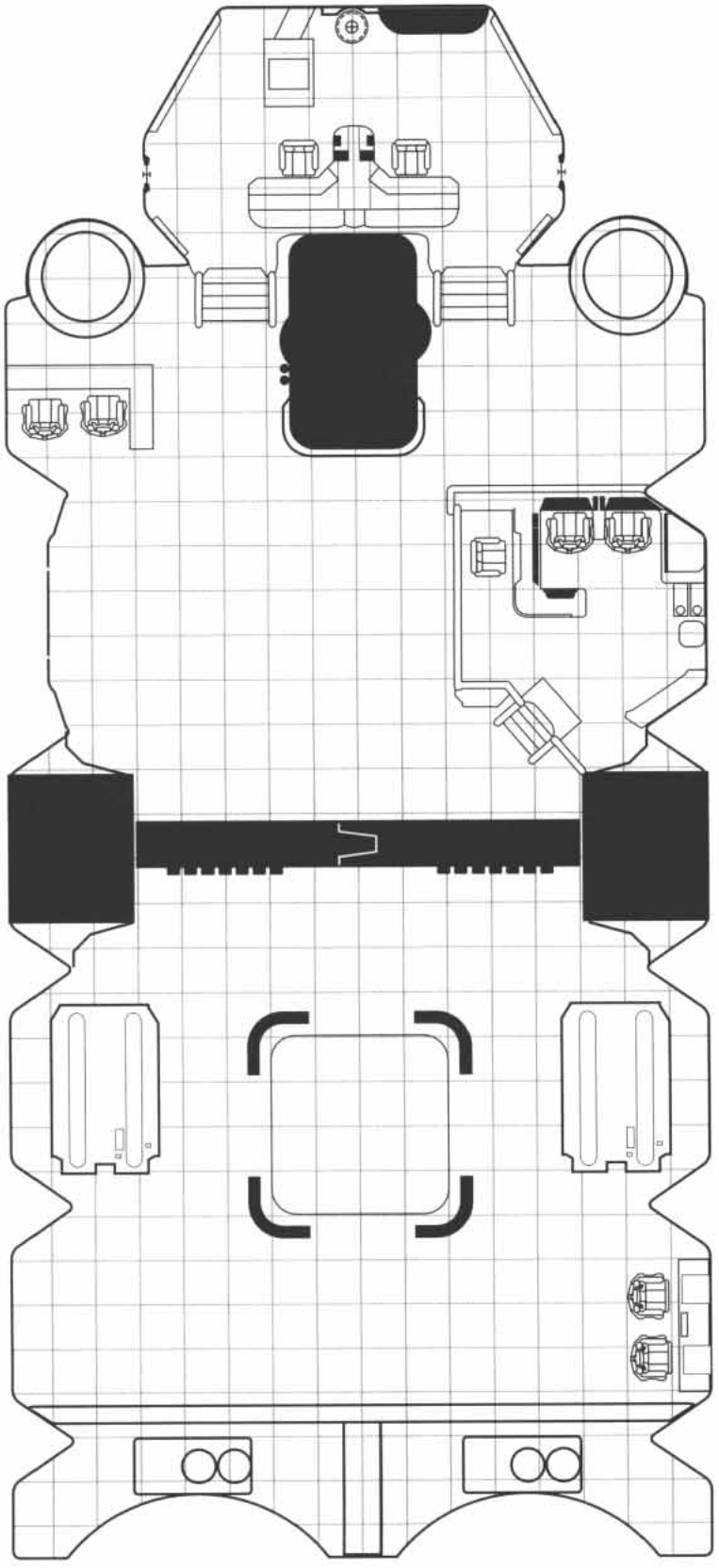
The black areas in the example are storage lockers that contain at least one replacement part for every relay, conduit, pump, stabilizer, injector, and every other conceivable engine part, including indicator filament bulbs. All are labeled and filed according to their position on or in the drive system.

Crewmembers who work here are well paid, but will never retire to private estates, unless some other form of enterprise is available. The accessways frequently double as storage compartments for illicit goods, unlawful weapons, and even stowaways who have paid for the privilege. Since officers only rarely visit these areas, the risk is small, the rewards great.





MANUVER DRIVE CONTROL ROOM



Maneuver Drive Control Room

The high efficiency plasma recombustion drive, or HEPlaR, uses a large control room that, at first glance, appears to be larger than required. However, its appearance is deceiving, and the architect should consider that the main control station (at top) governs both the heat exchanger and the liquid hydrogen fuel chamber. The large storage bay behind the work console contains tools and spare parts. Access to the heat exchanger and fuels storage lies beneath the large flooring area.

The lower control room manages the recombustion chamber where the heated hydrogen is converted to plasma. All readouts redline far lower than they need to in order to build in a safety factor and time to reach the emergency manual workstation aft. Two heavy blast doors protect the crew from plasma blowback, and open onto a direct access hatch to the recombustion chamber. Dampener bottles of carbon anti-flow mix lie within easy reach on both sides of the hatch; they are used with forced pressure hoses in emergencies to manually extinguish the drive.

The plasma vents directly into space through the exhaust ports aft. Two controlled nozzles create directional control. These are also monitored in the lower control room and can be accessed through the hatches just forward of the ports.

Plasma blow-back is a very real danger, and more than one ship has been crippled or destroyed when the interior chamber dampening controls reversed themselves and flooded the main control rooms with plasma or backfired into the heat exchanger, then to the fuel cells and tore a ship apart. In spite of the hazardous duty pay, crewmembers who volunteer for this service are considered to be quite mad by their shipmates. Still, the percentage of failure is rather low, and the pay exceeds every duty except gunnie positions. "Plasma jockeys" consider themselves lucky.

Gravitics Control and Maintenance

The gravitics control and maintenance room is a model of simplicity, as it should be, for this is a relatively simple system. Repair facilities and workstations are on the left as is the primary gravitics control station. Next to that station is a large, holo-projected gravity field analyzer. At the bottom (left) are part storage bays. In the center, a large, robotic radial arm is placed to remove large heavy parts and equipment to the workbenches. On the right is the gravitics power unit itself and the stations to the left of it are diagnostic screens and tools. The cleanest of the maneuvering drive systems, gravitics is cheap and easy to operate.

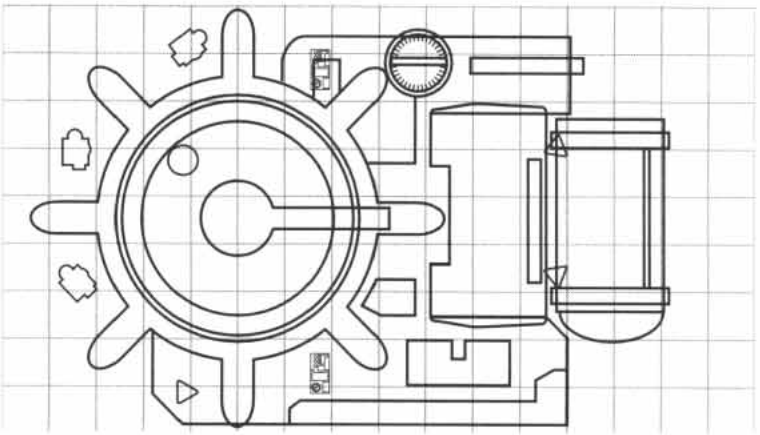
The biggest problem with gravitics as a propulsion system is that it requires a gravity well in order to operate. As a result, the drive becomes weaker the farther a ship travels toward the edge of a star system. Once outside a planetary system, it becomes useless. Most system ships carry secondary drives, like fusion plants, to power the ship when the grav engines are out of range. Interstellar vessels use grav drives when they come out of jump space and many carry an additional drive "just in case."

Power Plant, Fusion

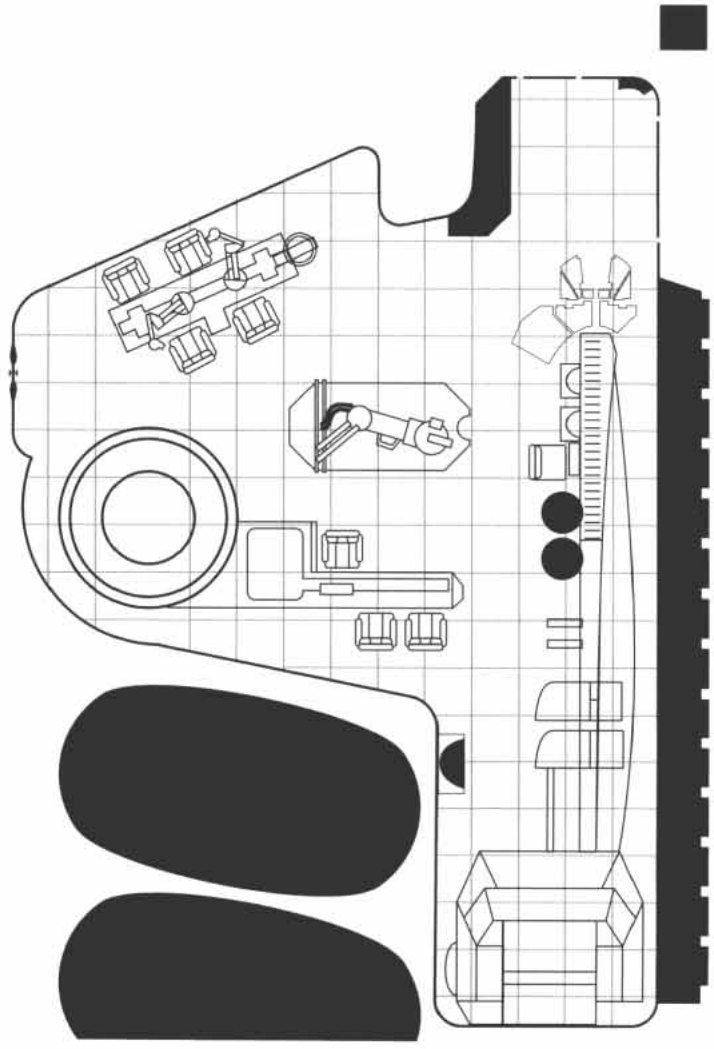
The example given here is of the plant itself. At left of center, a telescoping control arm takes a nuclear pellet from the storage bunker and drops them into the reaction chamber. At the top is an emergency shutdown relay. On the right is the entrance to the reactor and its core, containing radiation suits, emergency damning rods that can be inserted manually, and a first aid kit detailed for radiation exposure.

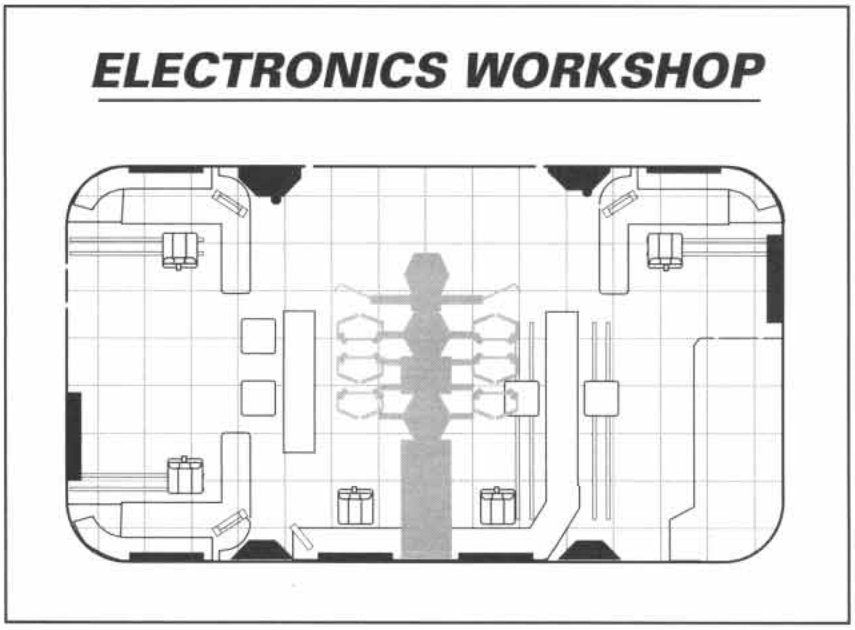
The use of fusion drives, perhaps the most complex and dangerous of all the in-system drive classifications, should not be encouraged.

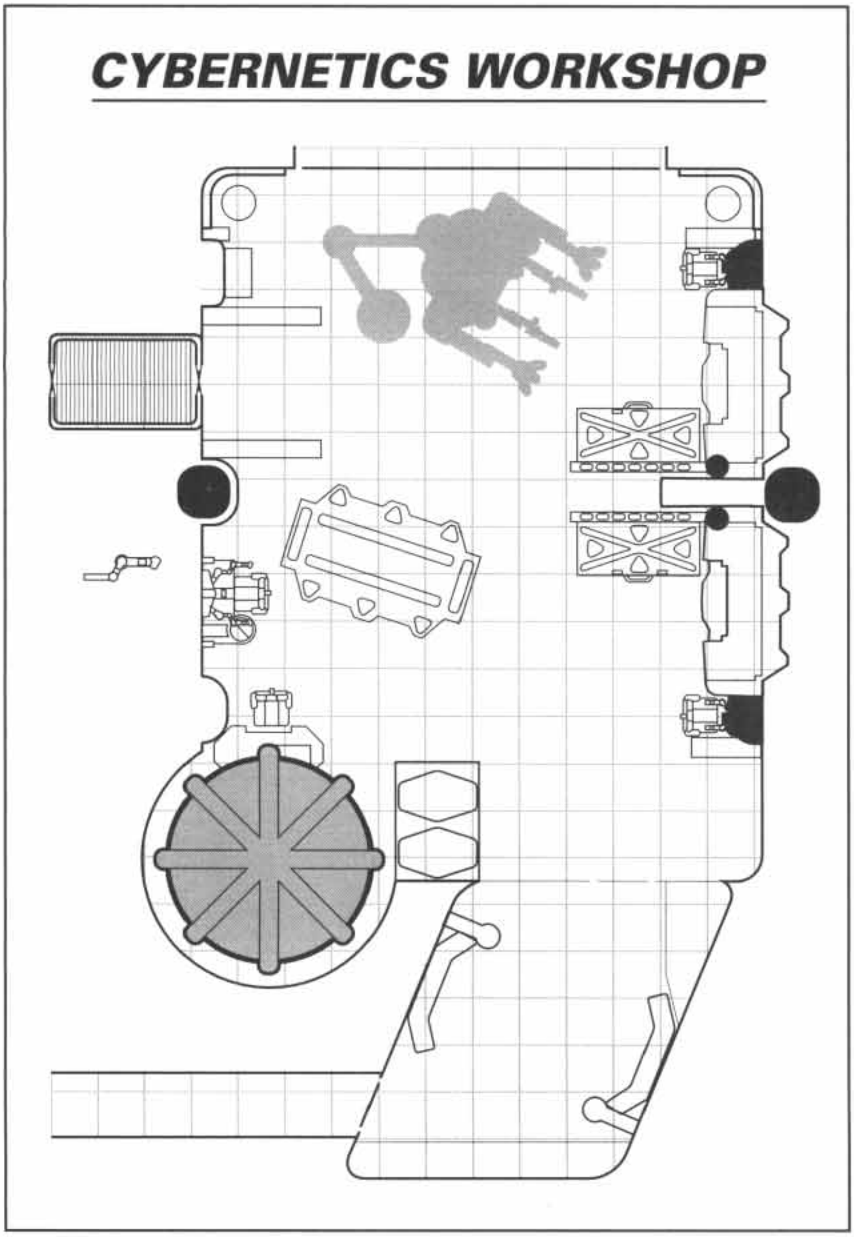
FUSION POWER PLANT



GRAVITICS CONTROL AND REPAIR







Maintenance

Cybernetic/Robot Repair Shop

Anyone entering this area is greeted by a large sign that reads: "THIS IS A CLEAN ROOM." No one enters without sterile garb and a facemask. The main doors, when necessary, bring in large units for repair. When these doors are used, the entire bay must be swept again and degaussed. Most units and people use the entryway at the left, through the anti-static, anti-dust doorway. Bulky workbots, mounted on overhead rails, position units to be repaired. The beds at center right receive units for diagnosis. Micromanipulators can be placed on automatic or controlled manually through "waldos" at the discretion of the repair chief. For larger units, a robotic grav gurney (center, left) receives, diagnoses, and guides damaged 'bots through the repair process. The "wheel" at the lower left is the center for powerplant repair, with an active workstation above the unit. Brain monitoring and repair, as well as component storage and the body bank, are located near the bottom.

Cyber Chiefs like to say that they have "nothing to do, the 'bots do it all." This is not quite accurate. While machines can be programmed to perform most repair services, every job has special requirements. Most chiefs are cyber-brain specialists, for this is the one area that no machine has ever been successfully programmed to do.

Electronics Shop

The electronics shop repairs electronic applications other than cyber units. The shop foreman's work station (top left) and the diagnostic station (top right) run their tests through the automated multi-tester bed in the center. Parts are then given a repair order and assigned to a technician's workbench, located at the bottom. Parts storage bins are located at the bottom right. This is also a clean room, although the rules are less strict.

The technicians working here are highly trained individuals who can strip, repair, and reassemble a workstation control unit in the dark.

Machine Shop

Vessels engaged in deep space assignments may not see a space station's repair bay for months, even years. Still, repair work has to be done, parts fabricated, and updates acquired. Most of these ships contain a machine shop that is often as well equipped as a base station. The example shown is for a large commercial or military ship. The main repair bay (top) can accommodate even the largest jump drive component. Overhead cranes and lifting modules position the part as required.

The center manufacturing bay has two large robotic units and enough space to reproduce everything from bulkheads to thruster plates and drive units.

The lower bay is a micro machine shop for the repair, manufacture, or growth of any component. Organic biocomputer parts, chips for personal entertainment units, and nanites can be fixed or created in this combination lab and shop.

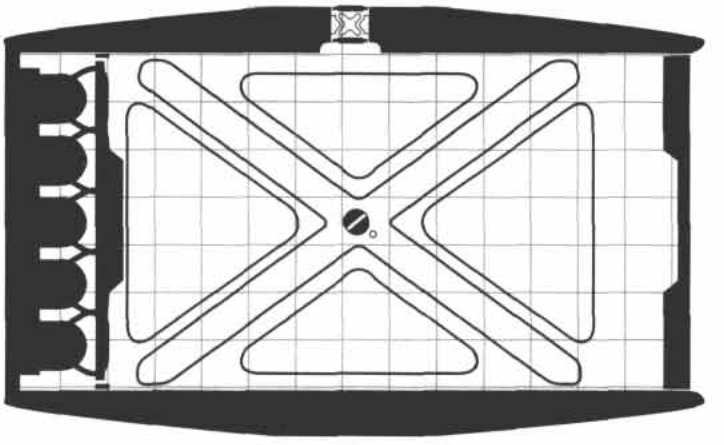
"Machine shop" is another term that is more historical than accurate. In reality, Chief Machinists and their crew can literally create anything short of life. Because actual ship-work is sporadic, the machine shop personnel often take on repair tasks for crewmembers. And they have seen some strange requests — dancing nanites (a bar scam), biotech "life partners," robotic parrots, even "mother-simulacrums" for homesick recruits.

Garbage Masher

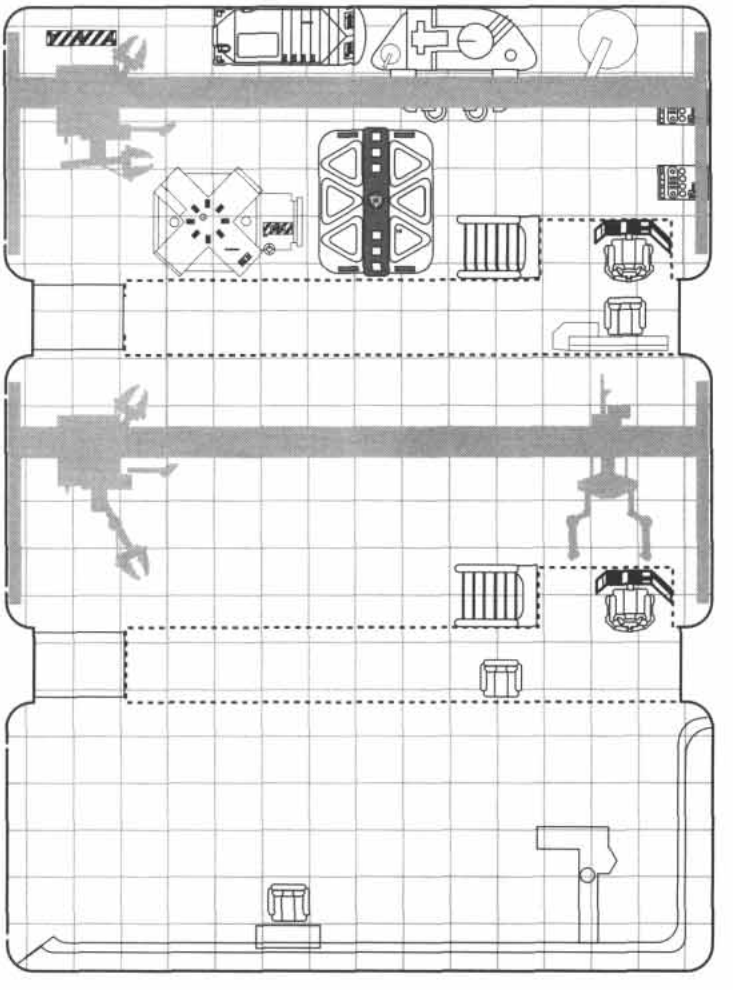
All space vessels must deal with crew waste. Paper products, plastics, and other debris must be disposed of somehow. The garbage masher is a compression unit that compacts waste into solid cubes and ejects it, preferably into a stellar mass. The topmost portion pushes down vertically on the mass, as it returns to the ready, the grav modules (right) pull the stuff into a rough square, lower the exterior space door, and fire the stuff into the dark.

Garbage men are never appreciated, and spacefaring trash-folk are no exception. The lowest job on any ship, it is frequently used as "light punishment" for minor infractions of regulations.

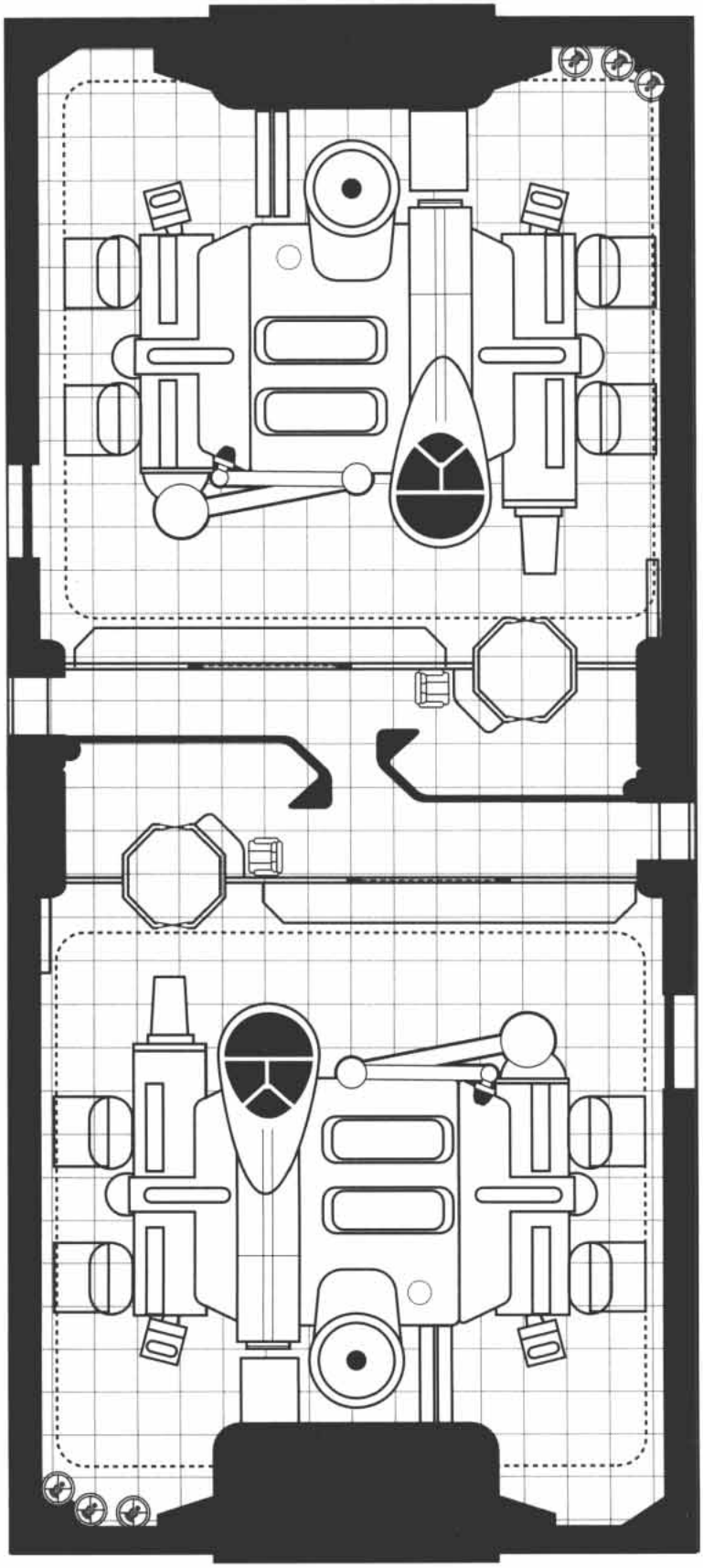
GARBAGE MASHER



MACHINE SHOP



MAINTENANCE VEHICLE BAY



Vehicle Maintenance Bay

This large, mirrored facility is responsible for the repair and maintenance of all ship's vehicles. Fightercraft, shuttles, and sightseeing boats all eventually wind up here. Shown are the double bays, each with a vehicle (emergency skiffs in this case) in a state of repair. The hex areas shown are airlocks. In an emergency, suited crewmembers can exit the main ship to tether and guide a crippled vehicle home. Much of the work here is automated, directed by maintenance specialists who control the robotic work. The large black areas are stowage for tools and parts. As always, "function dictates size," and these facilities are apportioned by both expected need and the architect's contractual agreements.

Since each class of auxiliary vehicle has different demands, the repair bay stocks commonly damaged parts, but its massive elevators reach directly to the machine shop.

Crews pride themselves on their combat return speed, especially on warships — some are so quick at refitting, the pilot never has to leave the cockpit unless disabled. Even on civilian ships, returning a damaged transport or shuttle to service in the shortest possible time, is a matter of pride. When military vessels are engaged as a fleet, competitions (with high-stake wagering) soon break out. Crews compete, not just for speed, but quality of workmanship. A ship returned to battle is worth four points, a repaired ship coming in for a second refit is counted as a minus three deduction — even if the pilot is at fault.

Liners on the same "runs" compete as well. If two ships have excursion boats out and one fails, the neglectful crew pays the price. On mining vessels such wagers are ignored. Mining crews tend to bet on the timing of the next big strike and the size of the resulting bonuses.

Sciences

Biological Laboratory

Large biolabs are primarily installed on research vessels. Any one of the modules shown could be an entire lab by itself or coupled with a one or more other units, depending on purpose and mission. The unit at the top has live facilities. The cages at the right are stocked with animals for experimental or research needs. Beneath the cages are lockers containing appropriate feeds. At the top are the first aid station, sinks and lockers. The larger area contains experimental workstations with electron microscope terminals along the walls. In the center, beside the workstations of the manager and assistant, are dissection tables.

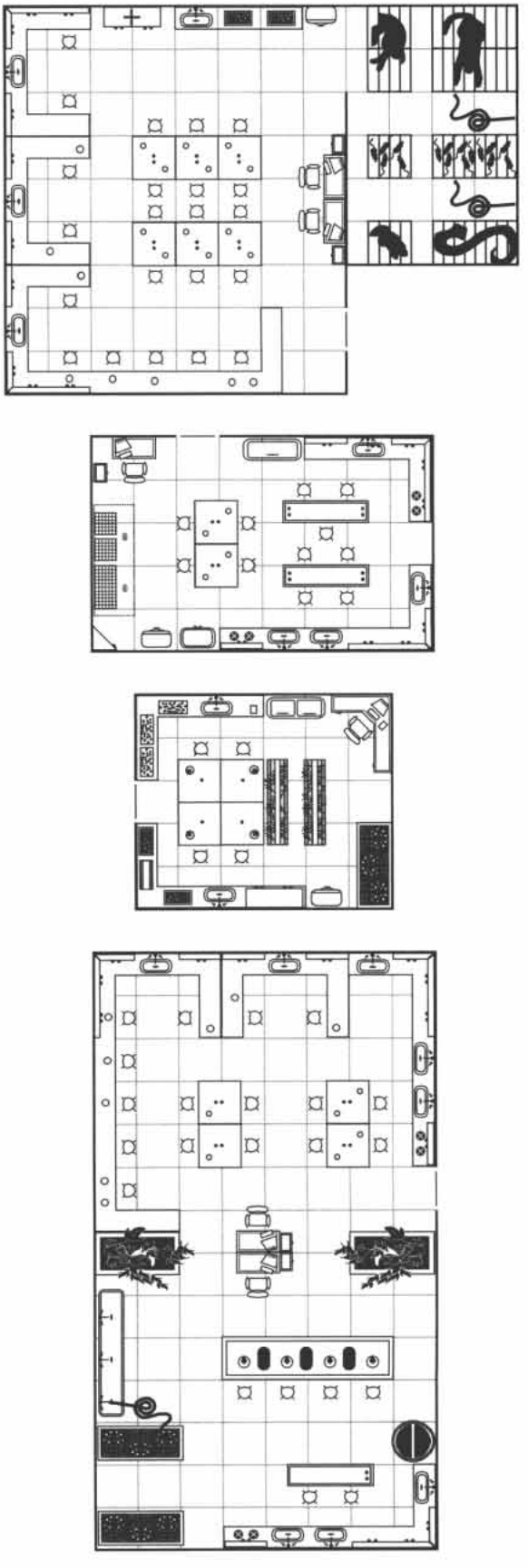
The next module contains an autoclave (left), storage cabinets for specimens, microscope stations, and refrigeration units. This type of facility is used for microbiology and medical study.

Botany and marine biology research are conducted in the third module, equipped with terrariums (left) and a large aquarium (bottom, right). The larger workstations here are for chemical analysis and the dissection of aquatic flora and fauna.

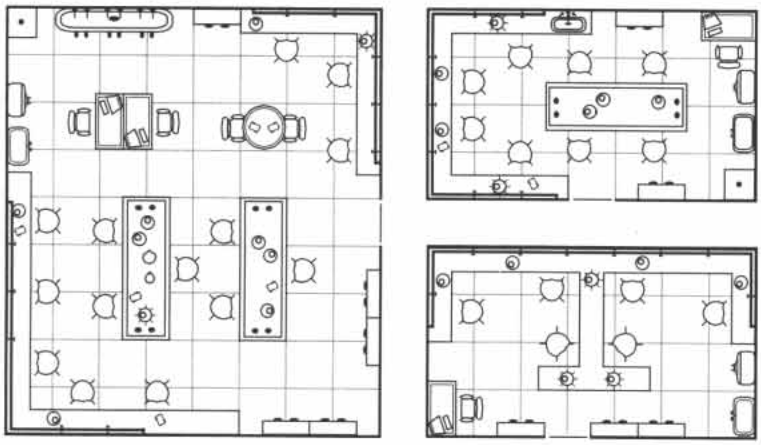
The final unit is a combination microbiology lab and botanical research facility, designed to work primarily with minute and microscopic organisms. The sinks in all four of these units flush directly into space under high pressure so the waste does not adhere to the hull.

Biohazards onboard ships are a constant concern. There are labs, especially those dedicated to working with the most extreme hazards, which can be sealed and blown into space from the captain's command seat — unknown, of course, to the technicians who operate the lab. Not all biohazards are microscopic, either. The study of alien species has always been controversial due to a few "incidents" that, while unfortunate, still produced valid studies of the effects of acidic circulatory systems.

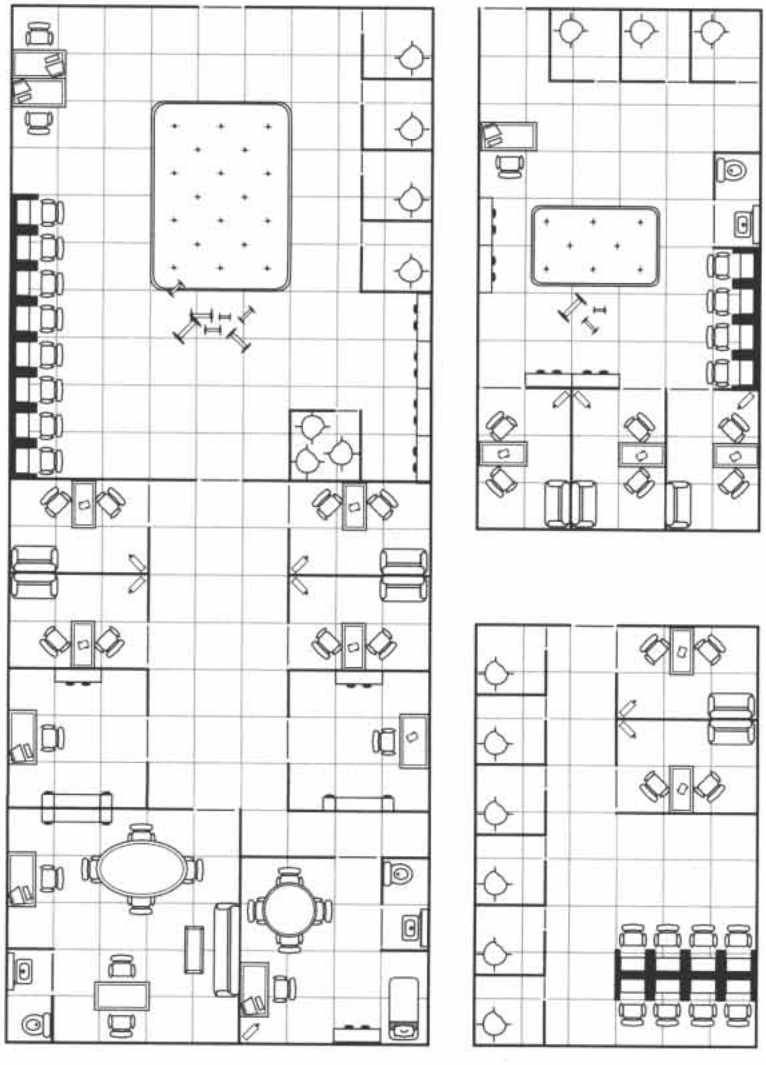
BIOLOGICAL LABORATORY



CHEMICAL LABORATORY



PSIONIC LAB



Chemical Laboratory

The three labs shown here serve different function. The largest (left), is a fossil fuel lab complete with test tube stations, a fluidic analyzer, and a centrifuge used to separate different viscosity of fluids. Top right is an atmospheric lab used to study the amount and condition of pollutants in any planetary biosphere. The final lab is a general purpose, pure research facility able to handle any substance sent to it for investigation.

Chem labs also serve a variety of purposes. Each lab needs to be designed with its primary function in mind, but the architect should note that ships change assignments and even ownership. Single purpose labs are less desirable than flexible units.

Psionic Laboratory

Space is an ideal environment in which to research psionics. There is little interference or static and while labs can be proofed against noise, the cost is less in space than in a crowded city, with less danger from the anti-psionic extremists. The labs shown here test various psionic abilities, train new adepts, and conduct research into the mechanism of the talent. How does it operate? There are at least seven theories, ranging from the ridiculous (it's the gift of an evil force) to the sublime (the proposed "psion" as a subatomic particle carrying information). This laboratory complex studies each idea while testing and examining individuals for specific talents. The rooms are soundproofed and intended to create states of intense relaxation in the subjects. In the two rooms at the top left and right, telekinesis is the primary focus. Subjects are tested and trainees are taught to levitate items from the floor to a table. The smaller rooms are used in the service of other abilities, notably telepathy, using cards and objects as visual keys to test or train mental projection.

Psionics labs are rather rare. Many governments ignore the subject and the Imperium maintains its silence on the matter. These facilities, however, can be found on almost any type of vessel, space allotted under contractual lease. Most of these operations are run by the Psionic Institutes.

Physics Laboratory

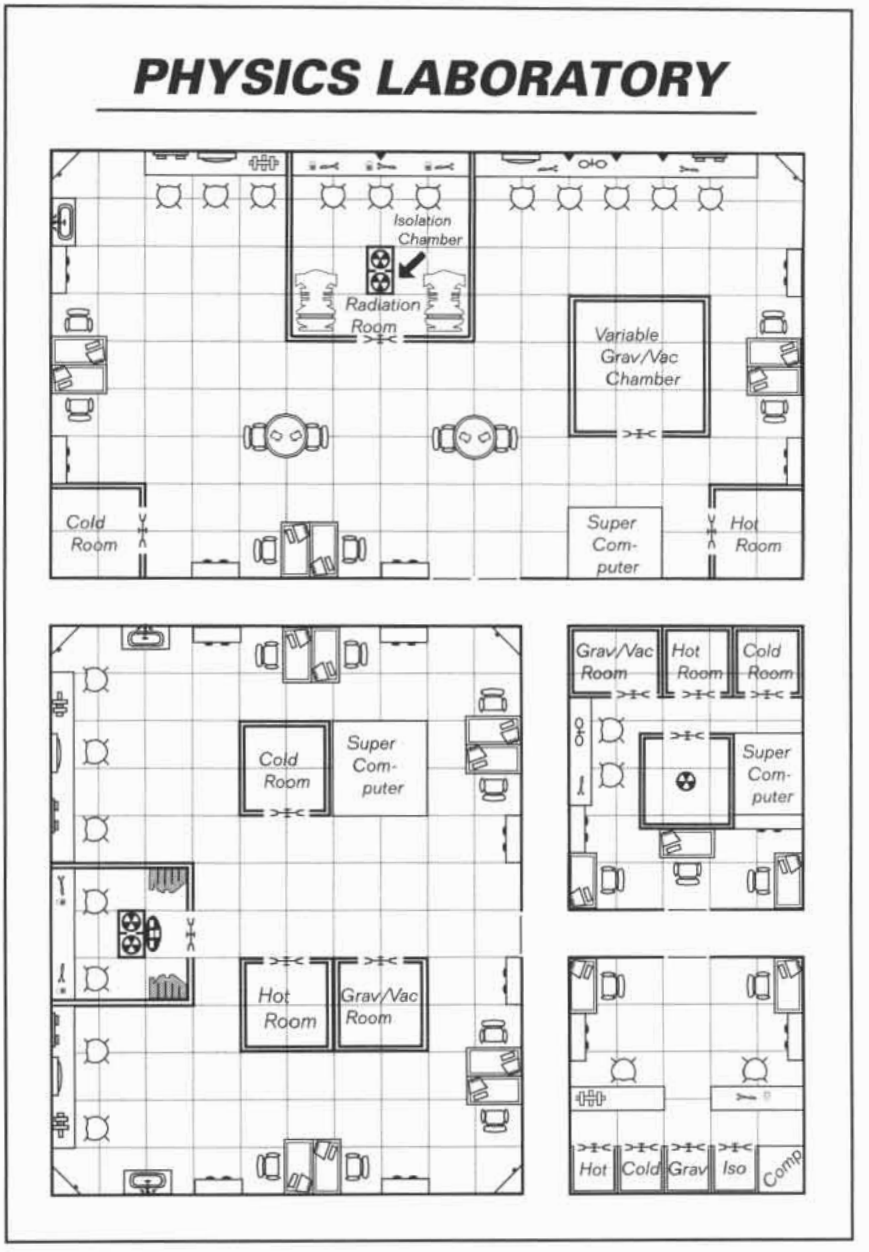
Four different lab sizes are shown here, the size is dependent on ship size and also on the size of the pocketbook funding the research. The large lab show at the top is an example of a well-funded, general physics lab that might be found in a research vessel. Regardless of size, however, each floor plan contains much the same setup: a radiation room with an isolation closet for the study of radioactive effects, a dual purpose gravity and vacuum chamber, a hot room, a cold room, and a supercomputer. Some of these labs could be allotted office space, but most contain only equipment and workstations.

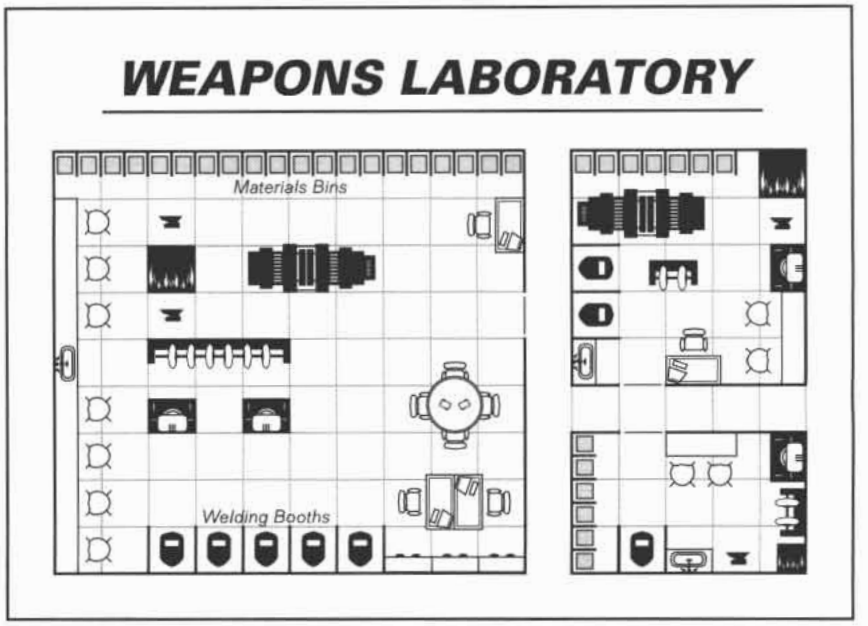
Physicists love plying their trade in deep space. Why study particle physics planetside, for example, where the atmospheric conditions could affect readings and data? Much better to do it in space where collectors can be positioned outside the ship to pull in even the most shy and stubborn bits. Applied weightlessness is also a boon for certain areas of study. But the biggest single allure of research in space is the ability to study black holes, nebula mechanics, and the results of supernovas "up close and personal."

Weapons Laboratory

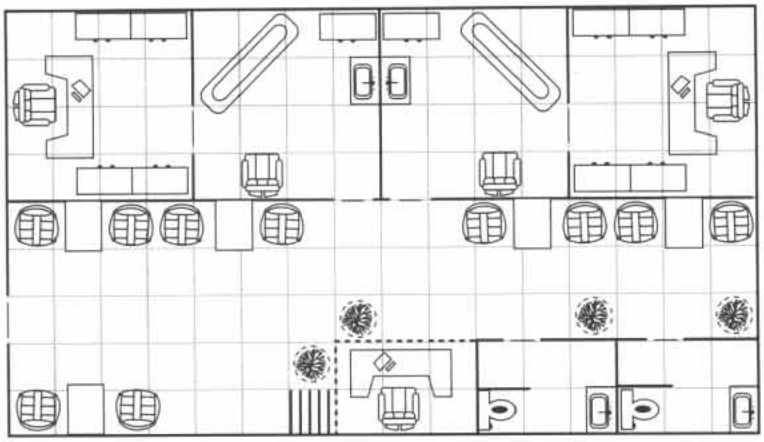
Three examples are shown here. Each has a high volume heat furnace, injection molders, material bins and welding booths. A holoscreen displays schematic prints that can be altered by the operator. When the final version is complete, the schematic is sent to the computer, which assigns materials, staff, and establishes the project's deadline. After that the weapon is created and sent to a weapons bay for testing.

Weapons research labs are found on many great warships. This provides a perfect testing platform as well as removing experimental weapons from populated areas. Raw research may or may not be conducted onboard, but the first hard manufacture of a theoretical weapon is done in space.

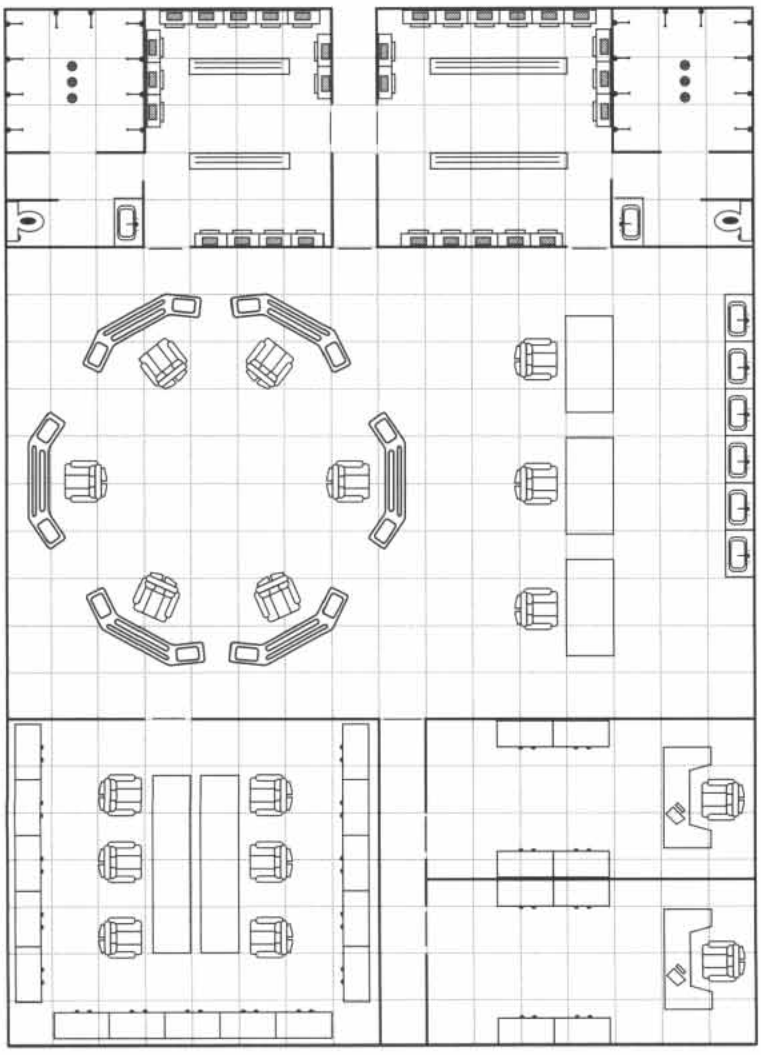




MEDICAL OFFICES



MEDICAL LABORATORY



Medical

Medical Offices

In this model of a shipboard medical office room, there are facilities for two practitioners using two examination rooms. The waiting area is out in front (bottom) with an elevated reception/nurses station at the center, plus restrooms for patient use. A simple but effective treatment of this area.

While naval regulations call for all medical facilities to be in "close proximity to one another," it is this architect's opinion that medical units should all be located on the same deck and interconnected with corridors and doorways. In an emergency, a patient should not have to wait while the healers are trying to flag down an elevator.

Medical Laboratory

At the top of this facility are locker rooms and showers. In the center are computer modeling analysis stations, each one has sampling screens, an electron microscope platform coupled to the main 'scope and processor, plus the usual array of test tubes, filters, and petri dishes. Each station also has a Panic Button that sets off alarms in the lab manager's office, the Chief Surgeon's office, and the security posts. "Hands-on" workstations (right) with traditional equipment are used in preliminary studies. A line of sinks that flush into deep space is provided for specimen disposal. The offices of the lab manager and assistant manager (bottom right) are across the hall from the central research file areas (bottom, left). This room can double as a conference room.

This kind of facility was formerly found on special purpose research vessels, but given outbreaks of Bacafever and Renzler's Scaly over the past two decades, small facilities of this type are being added or refitted to liners and military vessels. In fact, the Emergency Alert (panic button) switch was added to the computer modeling stations amid much derision. After Bacafever wiped out an entire Cunard Liner, the laughing stopped.

Medical Supply Room

In one form or another, there is a medical supply room on all ships. On small vessels that carry no medical personnel, it may only be a drawer or a small locker to which only the captain has a key. Larger ships have supply rooms designed to fit their needs. This large medical reserve locker is typical of those found on liners and warships. A guard station (top) controls entry and only medical officers are allowed to enter. When a drug or a special device is needed, the Chief Medical Officer writes out a (legible) prescription and hands it to the Procurement Officer of the Day (or "Gofer"). That officer presents the authorization to the armed guard on duty who does a retinal scan to identify the officer and then scans the document for authenticity. Once both are verified, the Gofer is given a Null-Card, which cancels the pressure alarms in the floor of the medical depository. Without the card, a maddening array of bells, sirens, whistles and flashing lights assault the intruder until canceled by the Security Office.

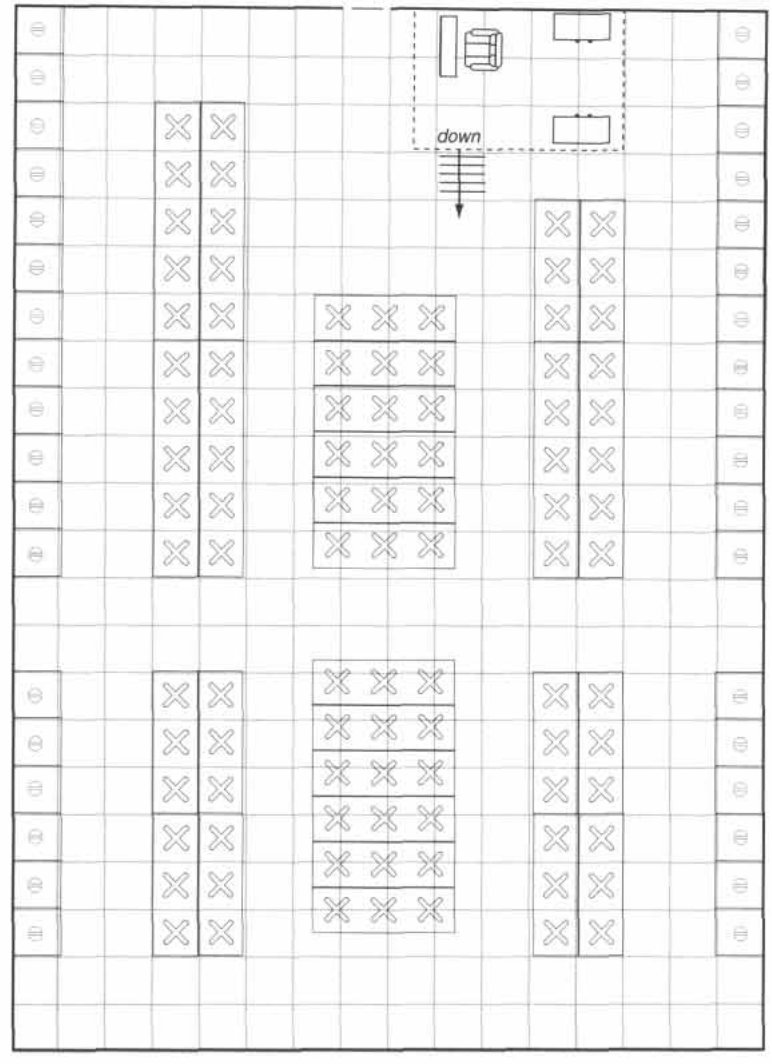
Dangerous drugs and viral cultures are stowed in here along with crutches, heart and lung replacement units, and wheelchairs. Drug cartels and governments have been known to use medical supplies as raw materials for profit or for warfare. The system is almost foolproof, but given a set of grav boots. . .

Doctor's Office

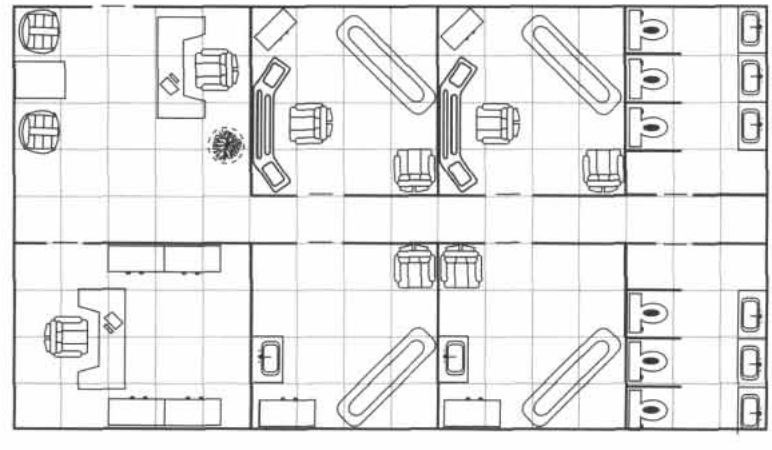
This is an example of an office leased to a shipboard doctor in private practice. The small waiting room (upper left) has a nurse/receptionist station, two chairs and a table. The doctor's office (below) has a desk and hard file cabinets for patient records. Two digital analysis rooms (top) allow complete medical scans of patients for diagnostic purposes. The lower rooms are traditional examination rooms used to check the progress of those under current treatment.

There are doctors in private practice with offices on the largest liners. Some are wanderers, some are trying to forget a planet-side emotional trauma, and some are just space junkies.

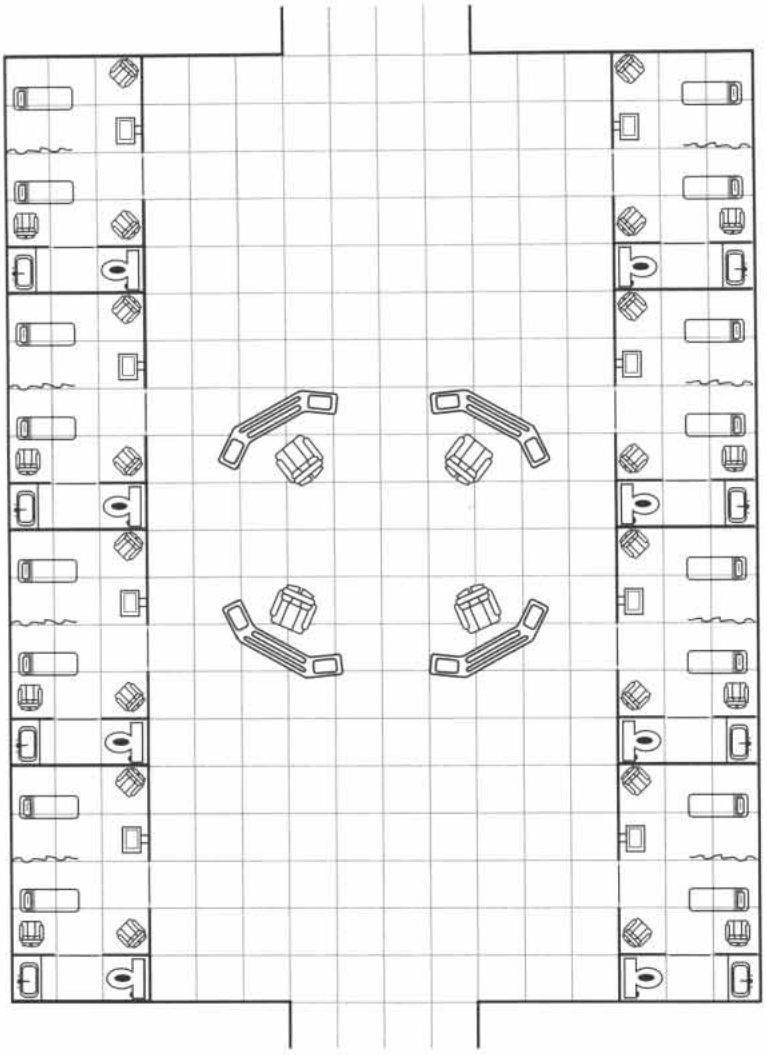
MEDICAL SUPPLY ROOM



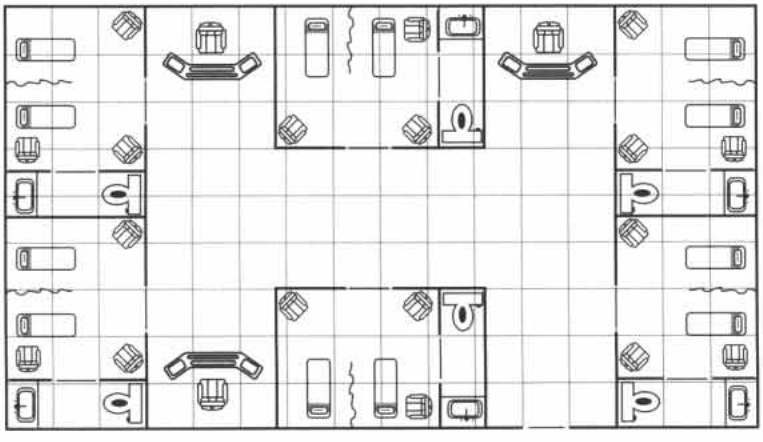
DOCTOR'S OFFICE



SICK BAYS, SPACIOUS



SICK BAYS, CRAMPED



Sickbays, Spacious

Every liner is equipped with at least a small hospital facility. It is simply a fact of life that travelers get sick or injured, and medical needs must be met. The grand nursing bay in the example shown here is typical of those found on larger liners and even on military vessels. Each set of two beds occupies one room, although there is a curtain that may be drawn for privacy, with a full bathroom. The nursing station set in the center has four workstations, each with a full bank of monitoring screens. The large center area is used for special medical equipment when necessary, and physical therapy apparatus. It may also be used for overflow during an emergency.

These facilities can handle almost any emergency, and the few they are not prepared to deal with belong to people who shouldn't be travelling in the first place. The nursing staff is young, recently graduated caregivers who see starship service as a stepping stone to greater things. Many of the junior medical personnel are working on advanced degrees while they travel and tend to be a serious and dedicated lot.

Sickbays, Cramped

Smaller sick bays should be designed with the same attention to multipurpose space and utility as larger medical facilities. Of course, the architect must work with the space at hand, but the model shown here depicts what can be done. There are two beds per room and each shares a full bath. The reduced utility area shows an efficient use of space. The nursing stations are separate; each is in charge of four patients.

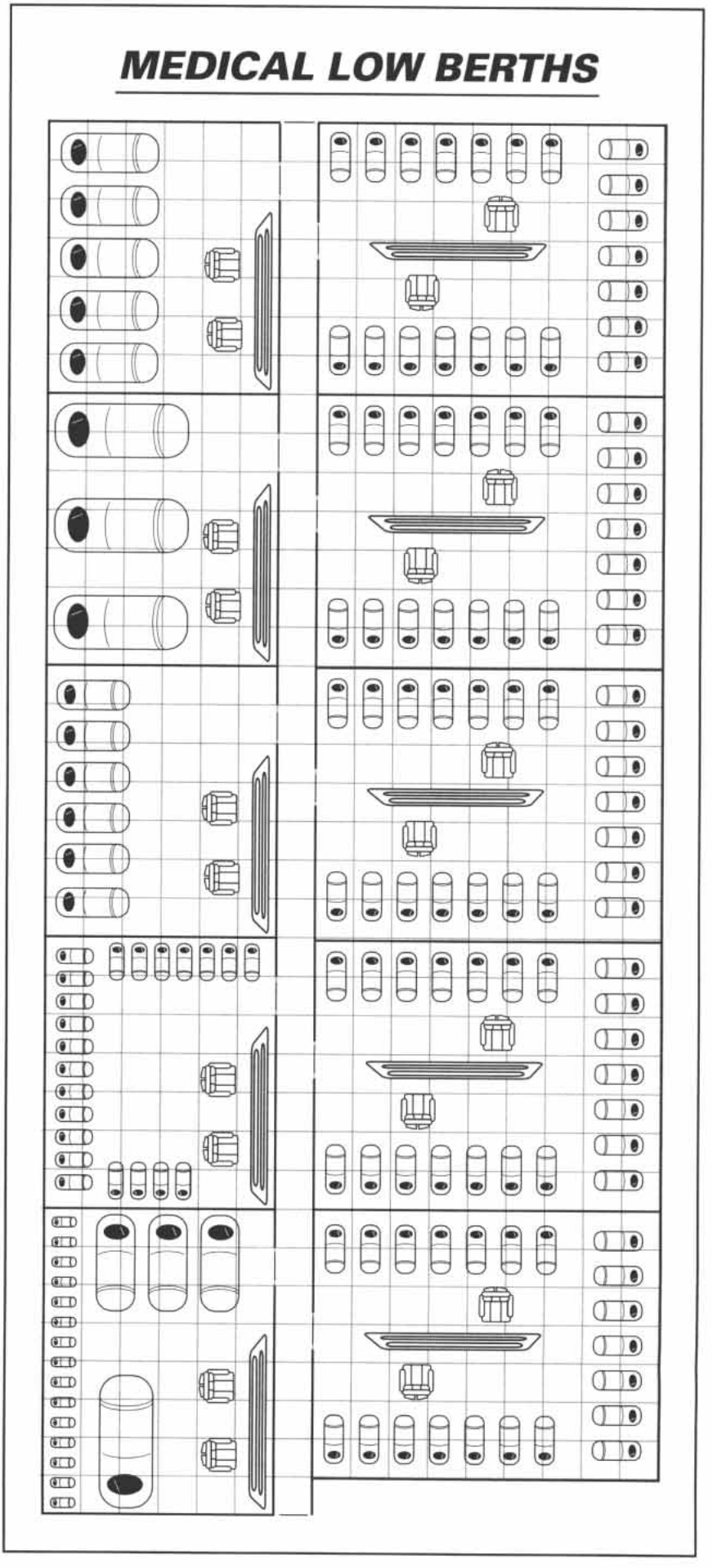
The first duty station of a career medical officer who wants to stay in shipboard service is often a sick bay just like this one. The theory is that, if they can handle it here, they can handle it anywhere.

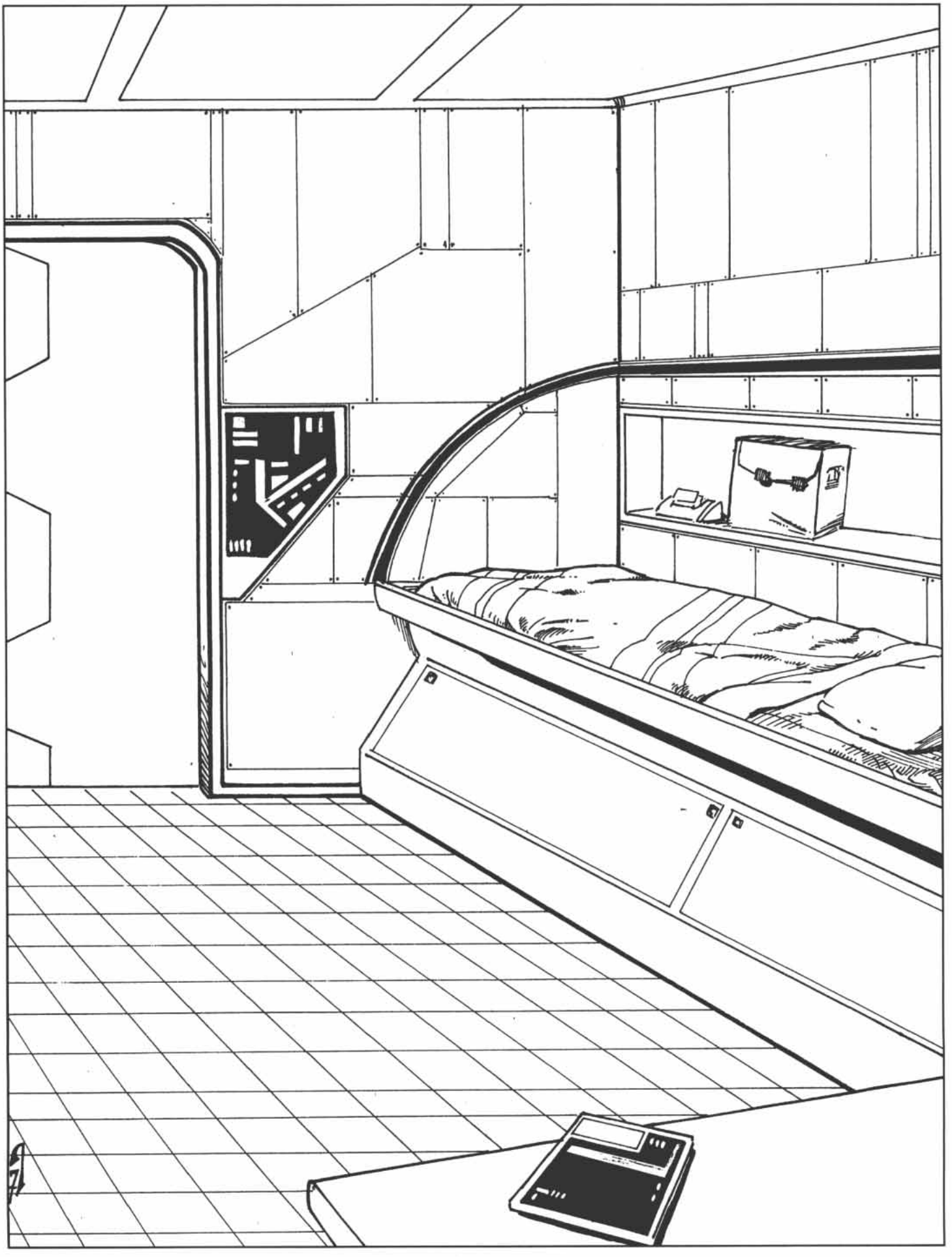
Medical Low Berths

It is not fair to suggest that physical conditions and diseases are treated here, when in fact they are not. These berths hold those already in cryosleep and travelling on to the next treatment center, the next portal of hope. A few of these people have been in cold sleep for a half-dozen generations or more, suffering from incurable diseases. Their descendants, and in a few cases, the doctors who inherited them, have paid for passage to yet another world with yet another possible cure. Rare and happily, from time to time things do occur, as a doctor, shaman, or healer somewhere actually does cure a sleeping patient, but then the universe is never more strange than in its diversity.

There is a nursing staff on duty here, but they are usually people who are about to retire, or those whose competence leaves questions permanently blazoned on their record. The staff's only real duty here is to report "flatliners," folks whose telltales finally shift from blue to gray to black. Cryodeath occurs in these patients at an ever-increasing rate. Those who have been under for nine thousand or more hours begin to die off at the rate of 10% for every additional thousand hours. Again, there are exceptions on both side of the equation.

Not unexpectedly, there are those who oppose cryosleep. While the preponderance of medical evidence is on the other side, these people charge that cold sleep is an immoral practice. Some are religious fanatics, but others are well-reasoned ethicists concerned about the outcome. In fact, one of their campaign tales tells of a hoary ice folk being revived, waking and blinking her eyes. She is then claimed to have said, "End the dream . . . please" before she died. The truth may remain unknown.





Crew Staterooms

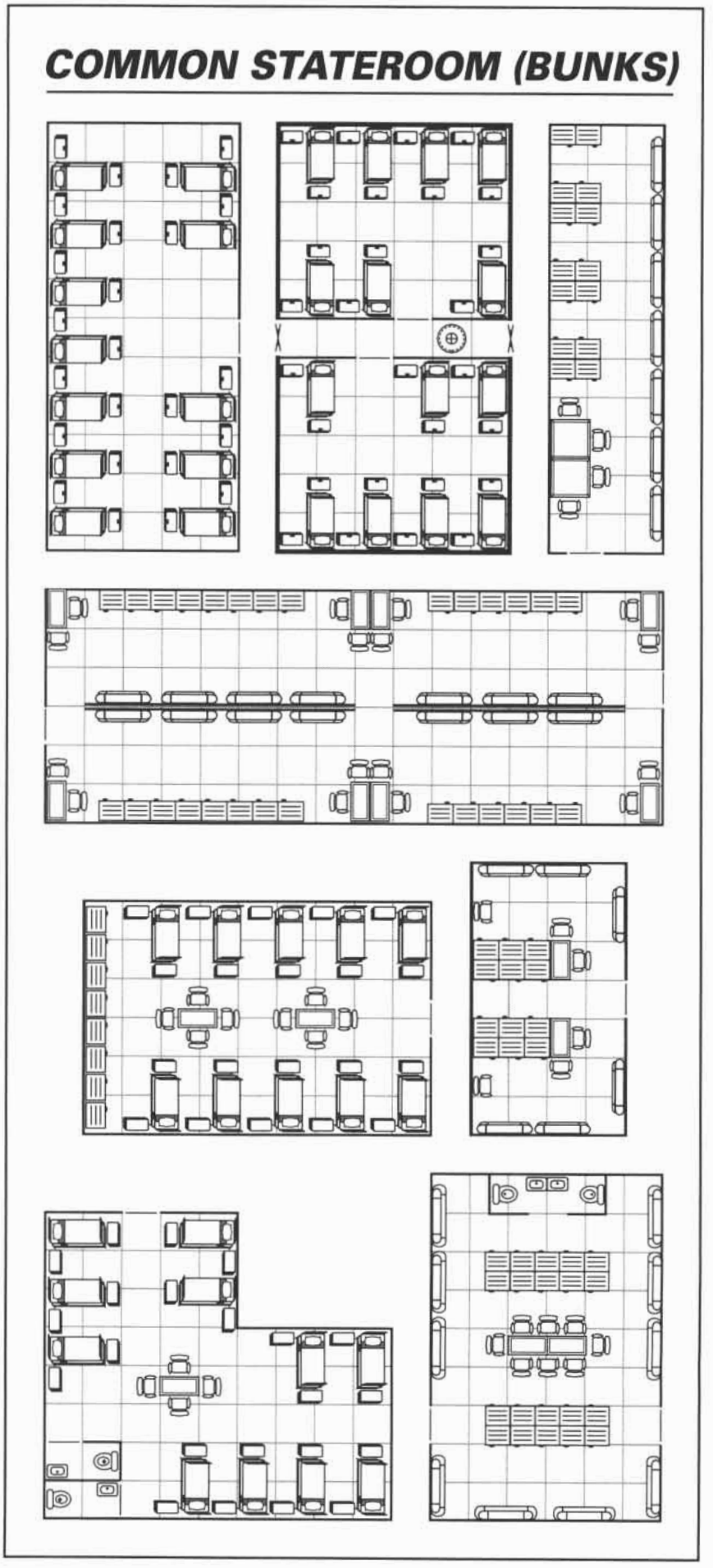
Common Stateroom

Found primarily on troop transports and mining ships when planetary conditions dictate manual digging, these facilities are never comfortable and rarely appreciated by those forced to live in them. The area assigned for the facility is as large as possible, given the size of the ship and its primary duties. The spacing is designed to be flexible, with the extra room serving other purposes when a chamber is not fully occupied. The open rooms contain as many bunks as are required for the mission, stacked in blocks all the way to the ceiling if necessary. Tradition and procurement officers with an eye to costs have conspired to supply rope ladders for access to the upper bunks. Small stowage lockers are welded to sides of the bunks for the safekeeping of personal articles.

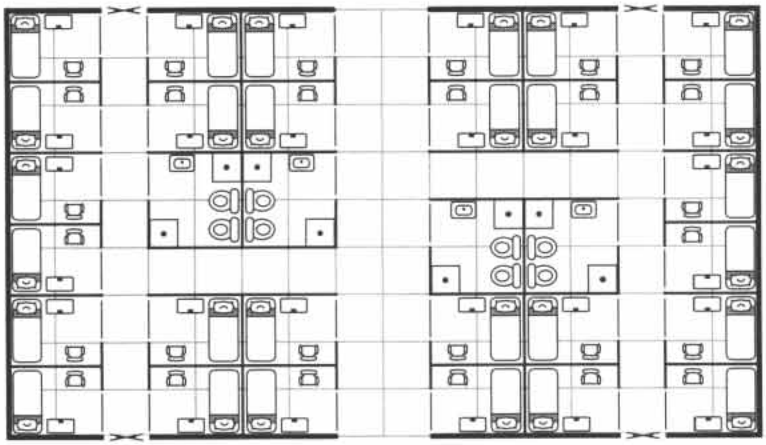
The head for these quarters is also massive and even less private. No thought can be given to the number of users for the facility, because it is never a constant, so the standard default is twenty-five open-door commodes and fifteen showers.

"Common staterooms" is navyspeak for bunking quarters. Regulations call for five non-commissioned officers (foremen in the case of civilian vessels) per 100 men, but the actual ratio is more like 1 to 150. The "States," as they are called by officers —they are "body bays" to the crew—are smelly, loud, and frequently brutal. The personnel quartered here have no shipboard duties and constant training is not usually an option. Ships containing mass staterooms also tend to have cellblocks, for this type of facility is a brawl waiting to break out.

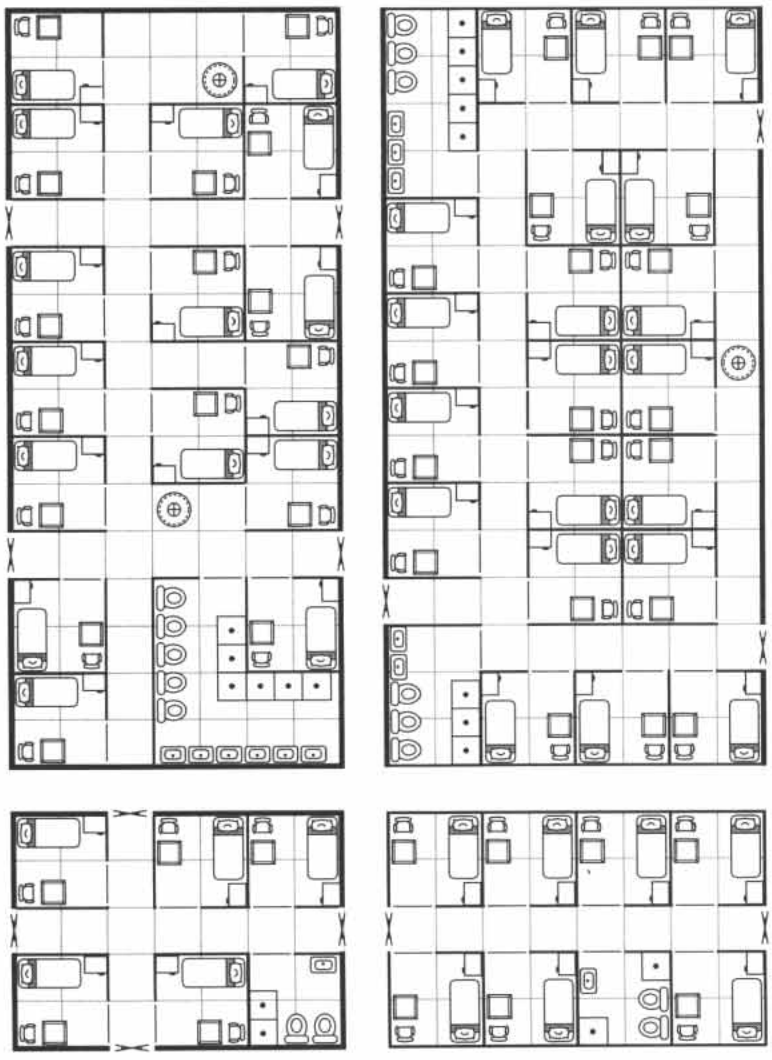
A canny architect might want to build in an entertainment center to alleviate tension and boredom. Gambling and games of chance occur anyhow, and some skill-based games may improve morale.



ENLISTED STATEROOM, CRAMPED



ENLISTED STATEROOM, SPACIOUS



Enlisted Stateroom, Cramped

Even these small quarters are superior to the "Body Bays." Each of these cell-sized rooms contains a comfortable bed, a storage locker that doubles as a desk, a chair, and, most importantly, privacy. Although the doorways are open, crewmembers respect each other's privacy and individual quarters are almost never entered except by invitation. As an architectural rule of thumb, each 5 to 7 units share a bathroom with two showers, two commodes and a large double sink.

While privacy is respected, theft does occur. When it does, everyone is under suspicion, if not by the officers, then by their shipmates — and woe to the thief caught by his fellows.

Enlisted Stateroom, Spacious

Larger quarters for enlisted personnel are commonly found on liners and large commercial and military vessels. These rooms are larger than the cramped version and are better appointed. The beds are the same, but gone is the dual function footlocker. In its place is a single purpose locker and a separate desk. While the doors are open, most captains recognize the value of solitude in an open environment and allow crewmembers to install curtains if they wish. With so many different cultures represented, the architect is wise to leave interior decoration to individual crewman. Slap a coat of neutral paint on the walls; it will change anyway, but let it go at that.

By naval custom, these quarters are considered to be the temporary property of the assigned crewmember. The stateroom may be decorated and furnished in any manner the "owner" sees fit, and the only forbidden items are animals kept as pets. So strict is the privacy convention that, unless specific evidence exists to indicate a possession of contraband, no search of quarters can be conducted without the captain's written authorization. This has led to a proliferation of false bottom stowage chests, secret doors, and floor lamps with rather suspicious, bulbous bases.

Junior Officer Stateroom

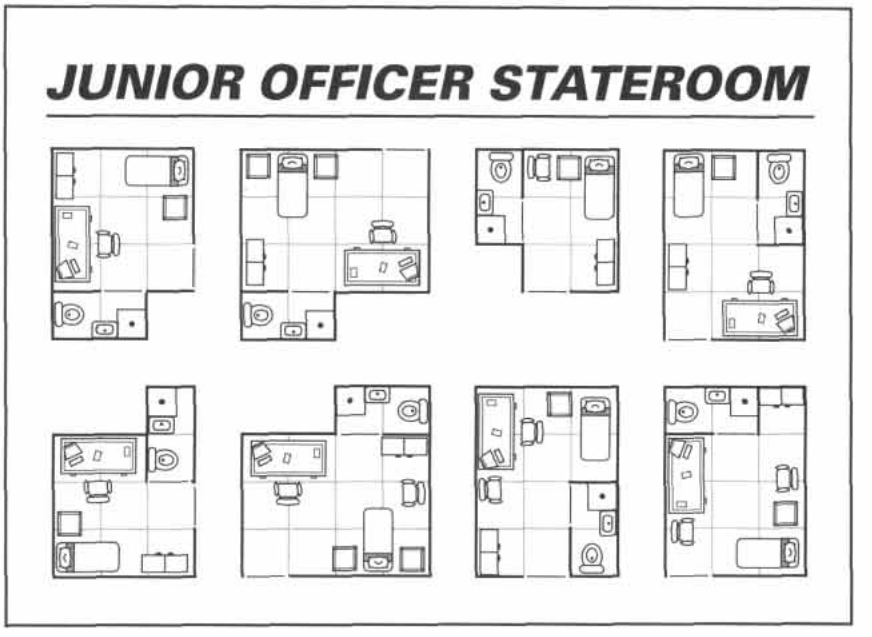
Junior officers' staterooms are usually located in a block. The rooms are naturally larger than the rooms of enlisted personnel, with doors to boot. Each has a private shower/bathroom, a large desk with a private workstation computer, and chairs.

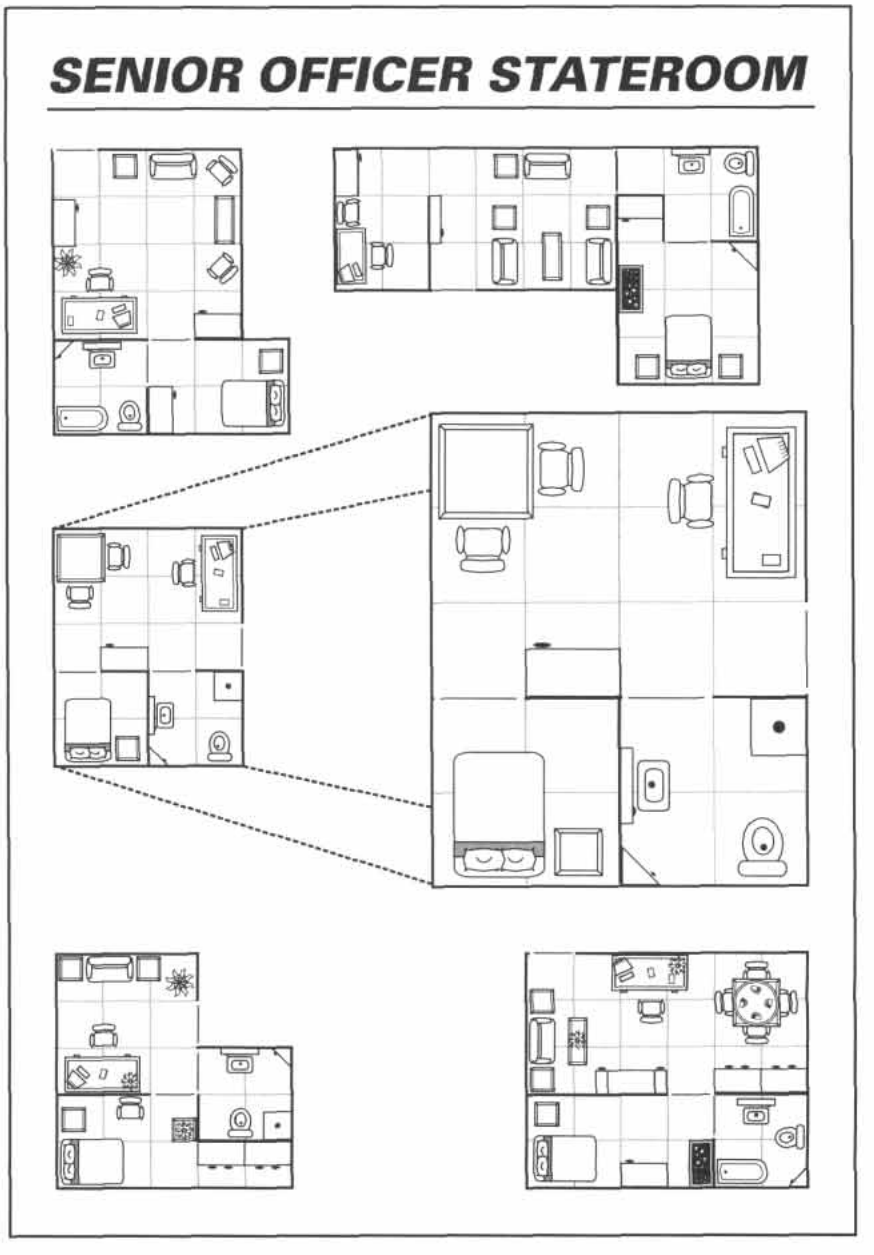
All officers have the same "decorating privileges" as do enlisted crewmembers, but the larger space and greater prerogatives of officers mean that more attention is paid to detail. Mementos home and of places visited and battles fought are frequently displayed, and a good architect makes allowances in the form of shelving and the occasional display case.

Senior Officer Stateroom

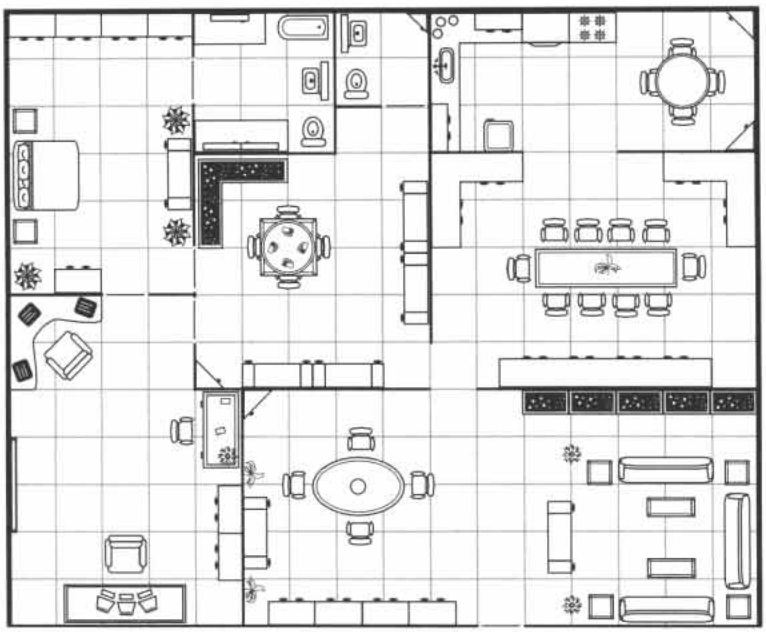
Senior officers' quarters are usually found in or near the ship's main office block and close to the bridge. "Rank hath its privileges" in all centuries, and it is the wise architect who keeps that mind. Separate rooms are provided for sleeping, work, and relaxation. The workspace consists of a large desk, a computer linked to the officer's normal workstation on the bridge, and several chairs. The computer is also a recreational tool, because officers at this level have unrestricted access to the central computer banks. Some officers add a dinning table and other individual features. Displays of awards, honors, certificates of achievement, and the officers' commissions often hang on the walls.

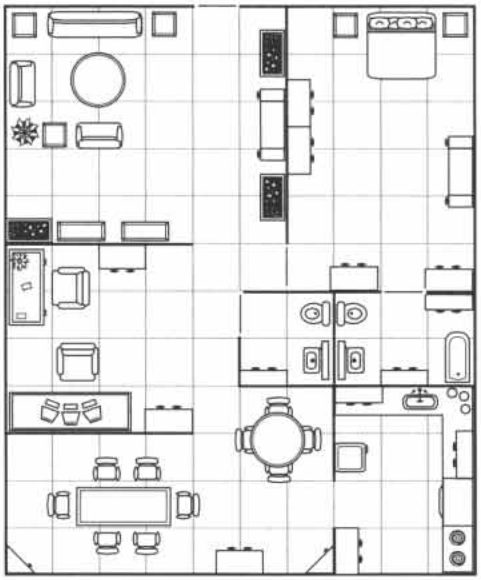
A refuge and a defense against the realities of bridge life, an officer's quarters provide brief periods of peace and quiet in an atmosphere than most come to consider as home. No one enters without permission, which is rarely granted even to fellow bridge officers, let alone junior officers or enlisted personnel. Although the Captain and First Officer warrant the addition of a room meant for an office in their quarters, few hold meetings in them. Some officers even acquire reputations as off-duty hermits, but then, most have earned the right.

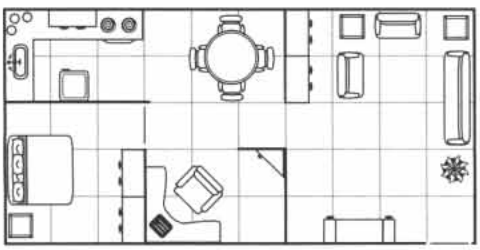




NOBLE SENIOR OFFICER STATEROOM







Noble Senior Officer Stateroom

Nobles are accustomed to luxury; their quarters aboard ship reflect just that. These quarters boast three to five rooms, depending on the size of the ship, plus a full bath (a tub instead of a shower) and separate half-bath. Lounging and dinning areas are standard features, while conference rooms, private galleys, and personal offices are certainly not uncommon. Military quarters for nobles may be luxurious, but normally follow standard naval requirements. In civilian vessels, the details and appointments should be discussed with the noble who is to occupy the space. This cuts down on redesign work (for which the architect is never compensated) and develops a reputation for the designer as a "team player" among those with the capital to invest in ships outfitted in this fashion. The architect is also warned against inquiring to deeply into the purposes of certain rooms that may seem unusual. Many of the nobility view life and its pleasures differently than we, and it is not your job to question a client too closely.

The uses to which many of these rooms are put do not bear much investigation. Rumors of torture, mutilation, and arcane religious/scientific practices are rife throughout the spaceways. Of course, they may only be the usual accusations about the "haves" that the "have-nots" spread in every culture. Still, an ancient saying common to many cultures points out that "where there is smog, there is also a tall smokestack." There are a few cases in Imperial Law that lends truth to these tales. In one, a noble captain engaged in colonial service tortured and murdered three sons and five daughters of several planetary government leaders. Justice was served, however, when his received a full five-year sentence in a medium security Imperial prison. Crewmembers aboard ships commanded by the nobility are warned.

Crew Low Berths

Low Berths Area, Small

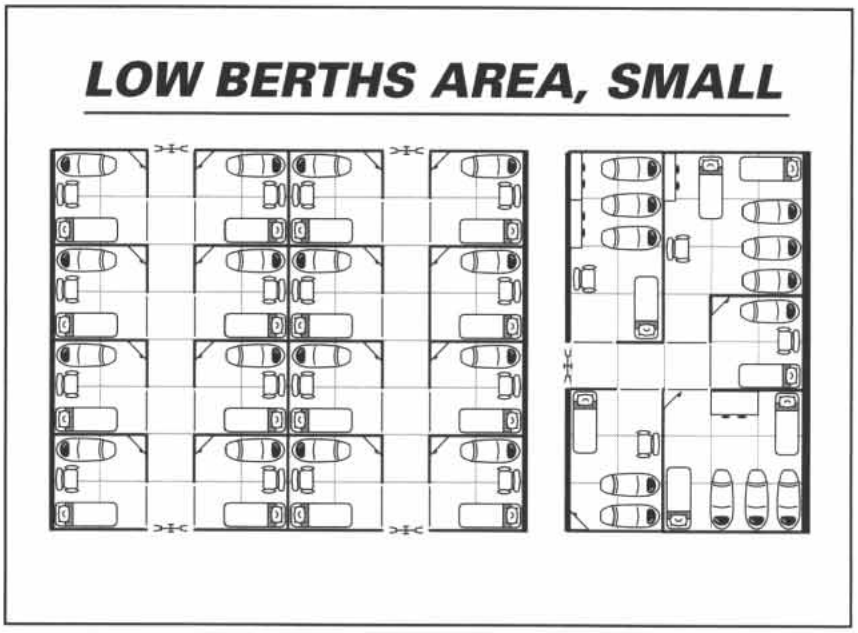
The number of crew low berth facilities depends on the distance to be traveled and the duration of the operation. In this small example, each crewmember has a room equipped with both a cryogenic tank and a recovery bed. In ships with low passage berths, an emergency low berth recovery room is always adjacent to the long sleep quarters.

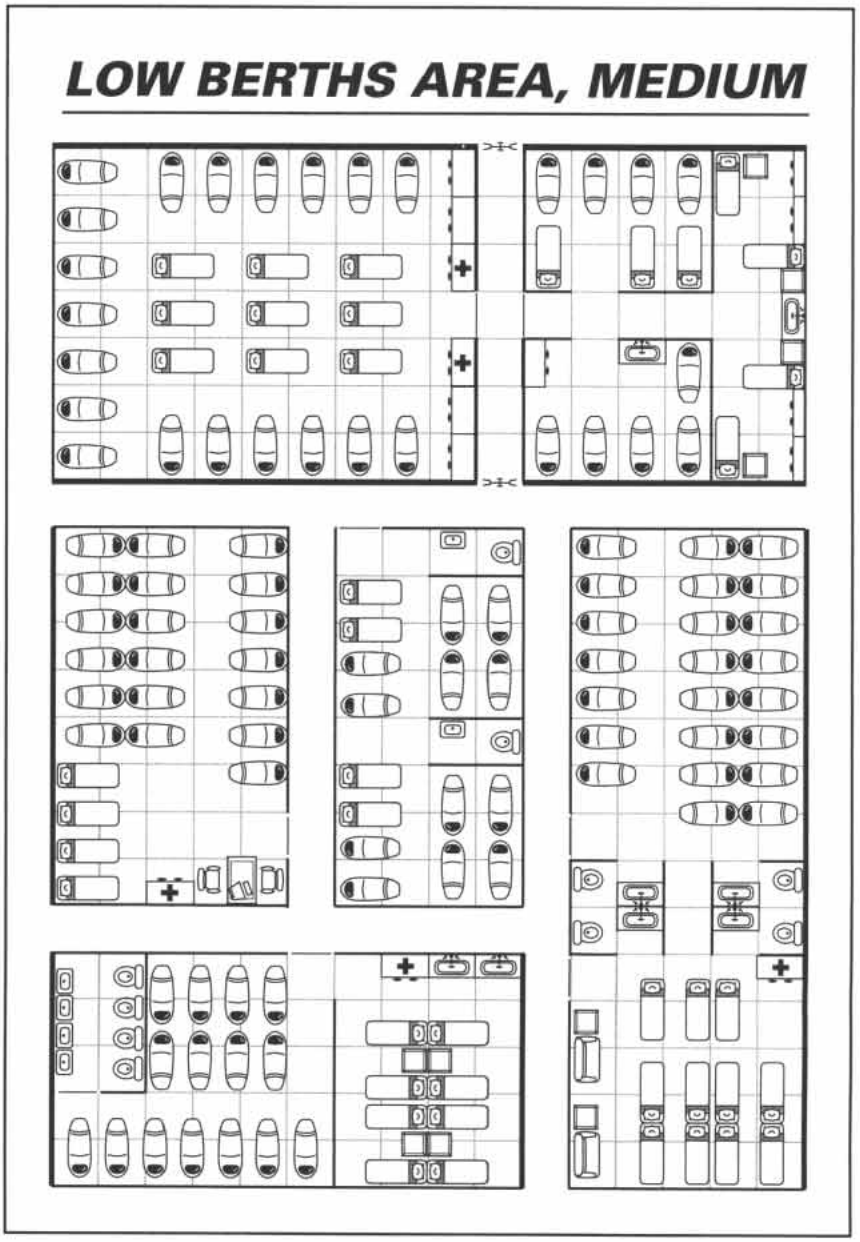
Ships engaged in long range, deep space missions frequently resort to low berth facilities. Sleeping troopers and crewmembers can't get in fights, don't breathe atmosphere, and need not be fed or cleaned up after. From the crew's point of view, they don't age, either.

Low Berths Area, Medium

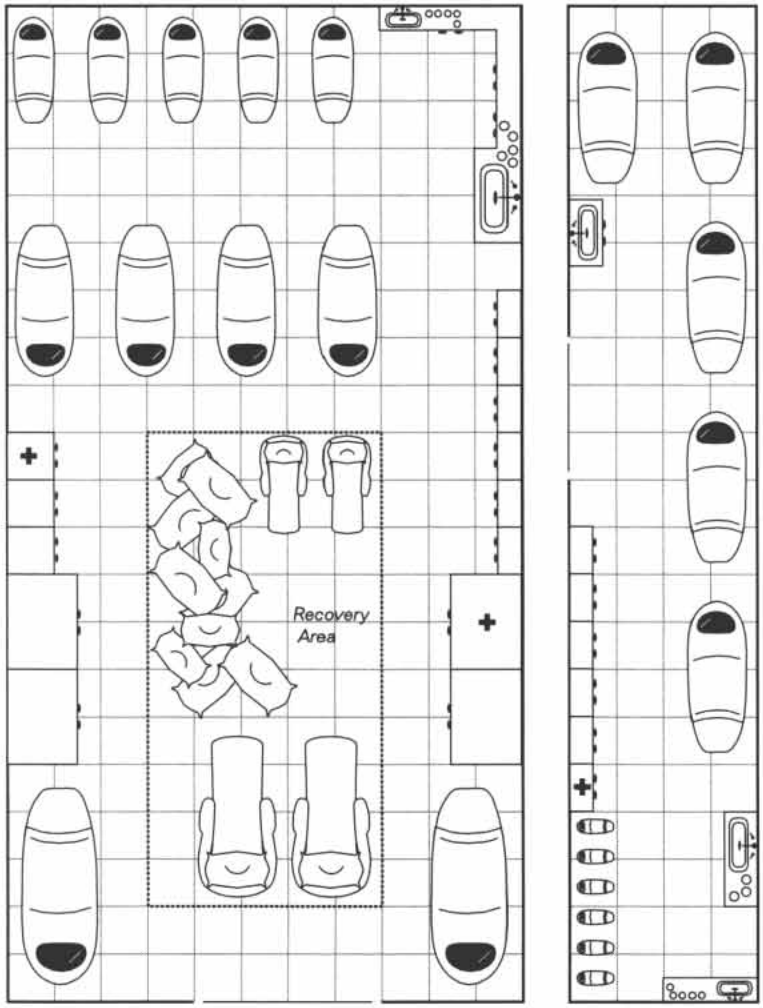
This greater chamber is found on military transports and larger commercial vessels. The quarters are barracks in style, but each "coffin" has a corresponding recovery bed (although not all of them are shown). First aid stations equipped with cryonics-specific resuscitation devices and drugs are positioned in every room. Toilet facilities are placed wherever space allows since, through most of the voyage, they are unnecessary. If there is an emergency resuscitation facility aboard, it should be located next to this complex.

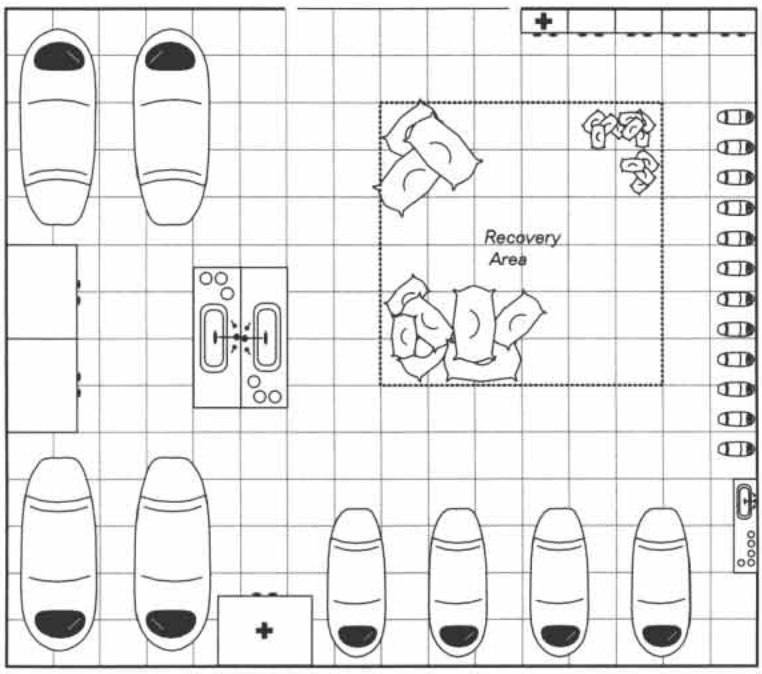
Of all the vessels equipped with cryo bays, troop transports have the greatest rates of failure (up to another 5% of the normal rate). To date, no one has ever given a satisfactory explanation for this phenomenon. Several theories exist, from pre-sleep diet deficiencies to "human contact depravation." Whatever the cause, it is a concern and navy medics are determined to ferret out the answer. Commercial vessels do not seem to experience any higher rates of "Ice Rot," even though their missions are frequently as long and as far-flung. This is a mystery waiting to be solved. There are those who believe that at least some of the incidents were intentional murders, but no solid evidence supports this theory.





NON-HUMAN LOW BERTHS





Non-Human Low Berths

There is a myth rampant in all navies that non-humans require extraordinary quarters. The rumors claim that such berths, even for ratings, are large, comfortable, and well appointed. This is partially true for certain species, but wrong in the main. In general, cryotanks must be large enough to accommodate the largest creatures likely to occupy them. They may indeed be roomy for "alien brothers" (what human ratings call "Albs") of small stature, but the abundance of space vanishes when the occupant is not of the race for whom the unit was designed. In addition, many races require specific facilities for resuscitation, and upon awakening for elimination of body wastes, hygiene, and grooming. Those who are not oxygen/nitrogen breathers may need special respiration systems installed at the recovery bedside. And remember, not all species sleep lying down — in fact, not all creatures normally sleep. A properly equipped first aid station is always in or near the non-human low berth areas, and a staff medic with xenobiology expertise is always on standby alert. Successful naval architects make allowances for every contingency.

Non-human crewmembers aboard human ships are usually there for a specific purpose. Standard naval practice is to assign non-humans to ships whose crew complements are of the same race, or at least with similar physical requirements, whenever possible. This has less to do with any fears of conflict than the sake of convenience and expense.

Liners and commercial vessels may carry mixed non-humans, but the practice is often expensive. Still, there are races who possess skills and talents that humans do not and their service is actively sought.

A human crew's interaction with non-human shipmates will vary according to race or races onboard, cultural background, and the positions of responsibility given to non-humans. Tensions cannot help but rise if a human sees a non-human performing a task that the human crewmember sees as rightfully belonging to him. Wise officers do not replace humans with non-humans.

Crew Commons and Mess

Enlisted Persons' Common Area

The size and components of a crew's relaxation and communal area varies according to the size and class of the vessel. "Commons" are found on all vessels with more than four crewmembers and operate as off-duty gathering places. On the simplest level, there are tables and chairs and a tridee screen. Larger commons may include pool and ping-pong tables, a refreshment center stocked with snack food and beverages, and a locker full of games.

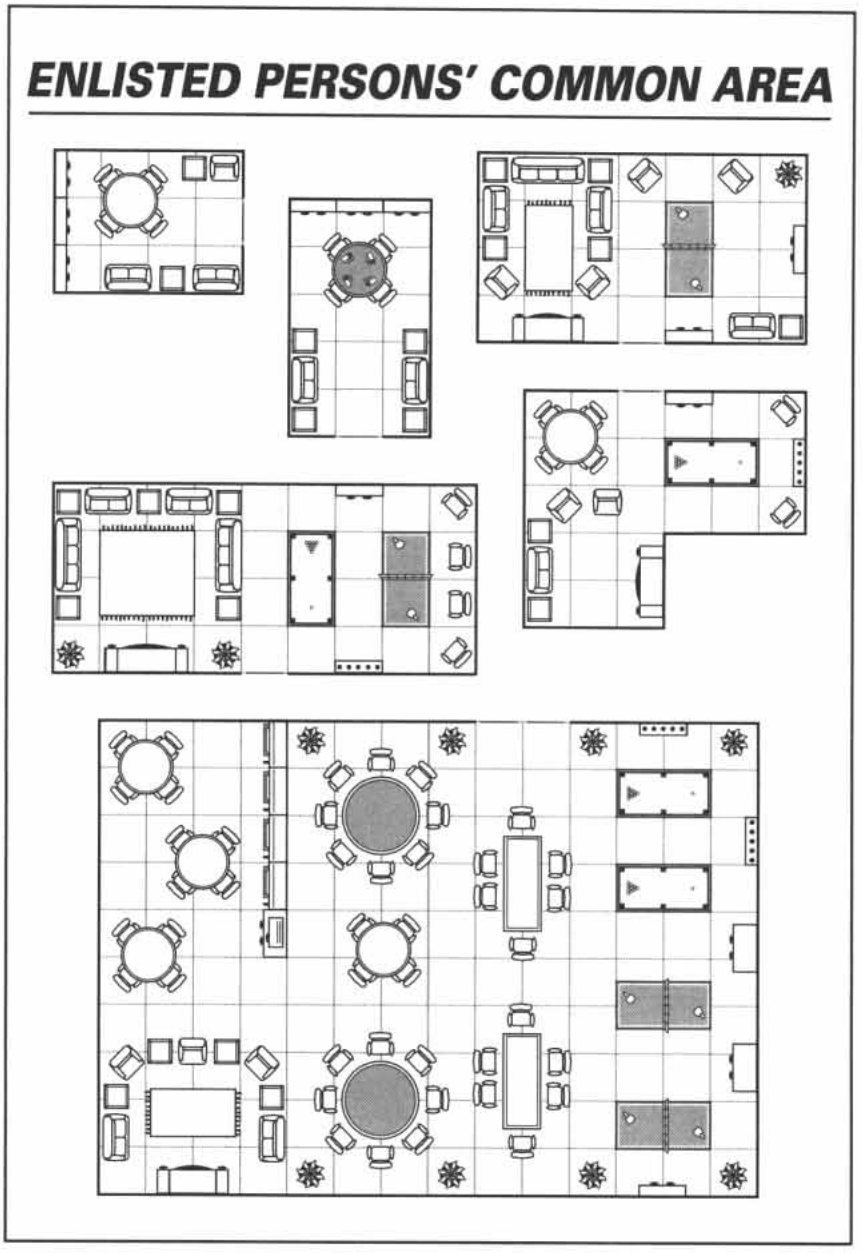
Intended as both relaxation and stress relief hubs, the commons stay constantly in use. Soft music, just at the minimum range of human hearing is piped in. On some ships, especially military vessels, subliminal messages underlie the musical scores with messages like, "obey your officers, don't steal," and "loyalty is its own reward." Most crewmembers are well aware of the subliminal propaganda, however, and small personal disc players are common. In reality, many crews use the commons for gambling activities and the commons on some ships also run a brisk trade in illicit goods.

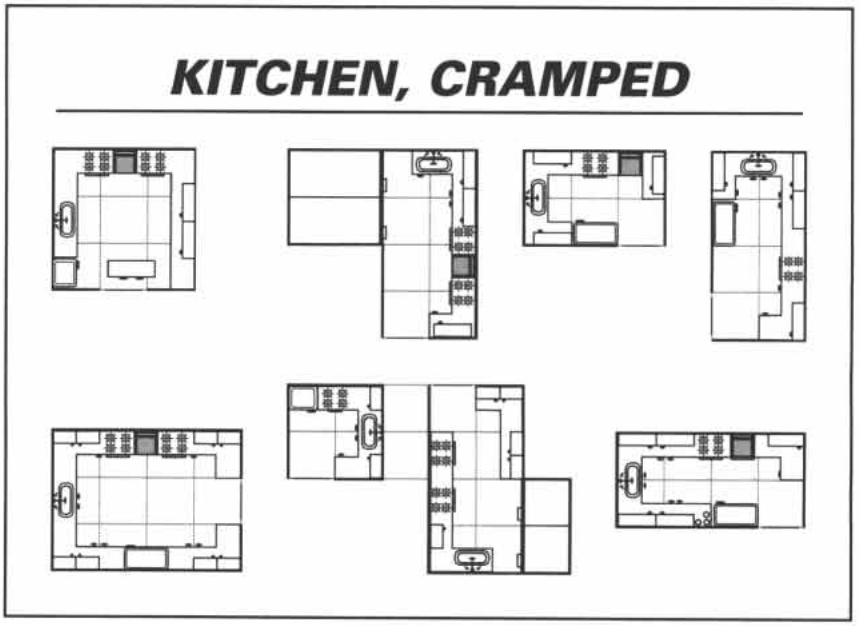
Captains and first officers frequently have security officers install "bugs" in the commons to eavesdrop and spot check conversations among crewmembers at ease. While no navy, corporation, or commercial trust will admit to it, more than one mutiny began with idle chatter in a ship's recreation center.

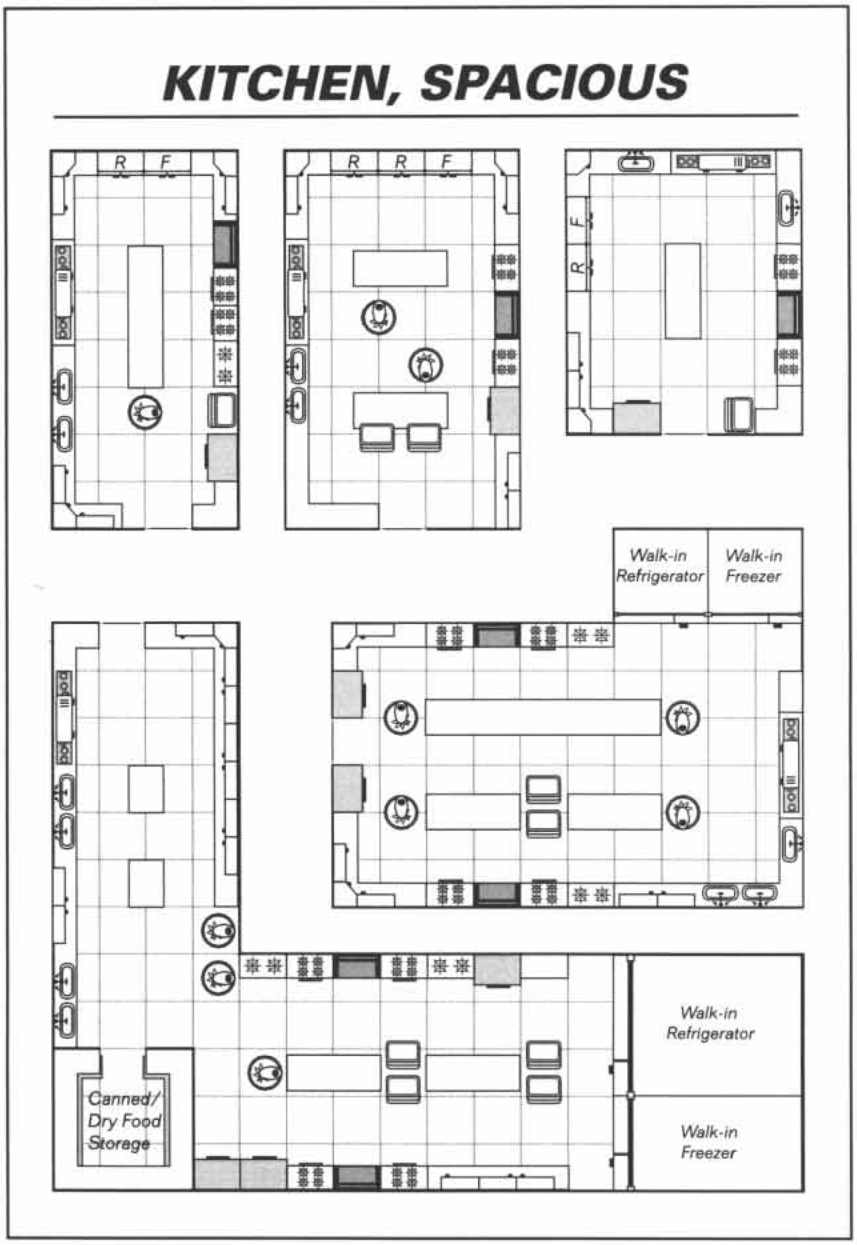
Kitchen, Cramped

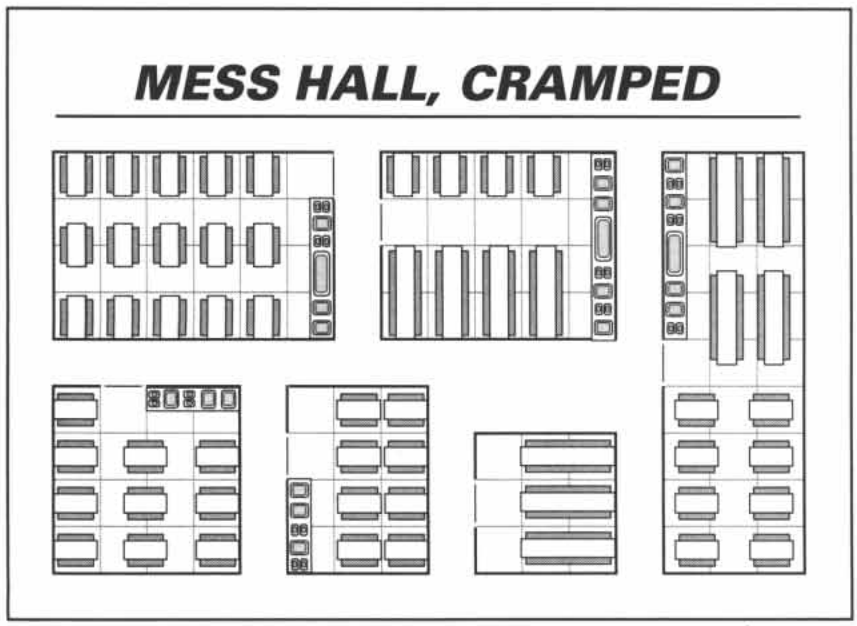
Every ship requires a kitchen of some sort. The precise layout is up to the architect, and some samples are shown here. A ship's galley should have an adequate number of heating units, refrigeration for perishables, sinks, food preparation counters, and stowage for dry and canned products.

On some smaller ships, the kitchen area also serves as the commons, a place to relax off-duty, grab a bite to eat, and "kick back." One of the lockers usually contains more games than food, and impromptu card and dice games frequently start in the kitchen.









Kitchen, Spacious

Spacious kitchens are found on liners, some commercial vessels, and those naval ships with large complements of officers. It is here that meals for the officers and passengers are prepared, and this type of kitchen requires a large professional staff. Separate preparation counters should be included for greens (salads and vegetarian meals), meats, and deserts. An extra station for creating specialty cuisine is useful. Large walk-in coolers and freezers are required, as are both flame and closed burners. An automatic dishwasher and plenty of sinks are also recommended. While the size and number of these items vary from ship to ship, the wise architect knows that ships, like armies, travel on their stomachs.

On military ships, as elsewhere, good chefs are hard to find. The best are rewarded with promotions and extra privileges, and they maintain loyalty. It is not uncommon for ship chefs, like the legendary Commander Dunbar D'Uberville, to retire and create empires of 5-star restaurants, or to publish enough cookbooks to keep them in brandy and truffles for the rest of their lives. Conspirators with vials of poison cannot suborn chefs, as there is too much at stake. There has never been a single documented case of intentional poisoning traced to a ship's chef.

Mess Hall, Cramped

Facilities for lower ratings are rarely elegant. However, when space is at a premium, the architect should be aware of the source of the commission. Since the crew often eats in shifts, divide the standard complement of the vessel by three and add one extra table. Nine meter tables can seat ten with a place setting at each end. A coat of pastel paint should relive tensions.

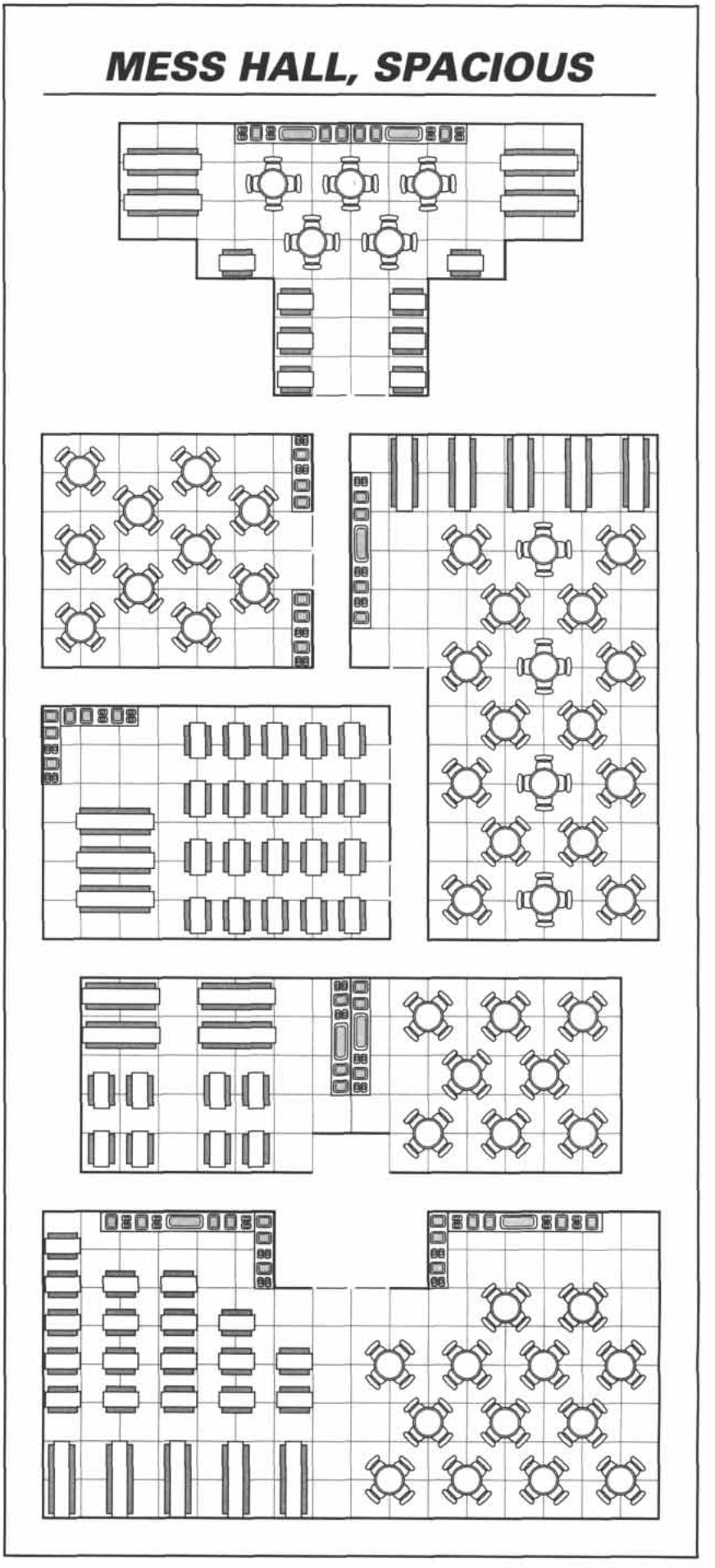
Food is a primary concern of crewmembers and a well-fed crew will put up with almost thing. Cooks should not be considered "chefs," although many of them aspire to that status. Navies are aware of the value of nutrition, and even cramped mess halls serve quality, if inexpensive, meals.

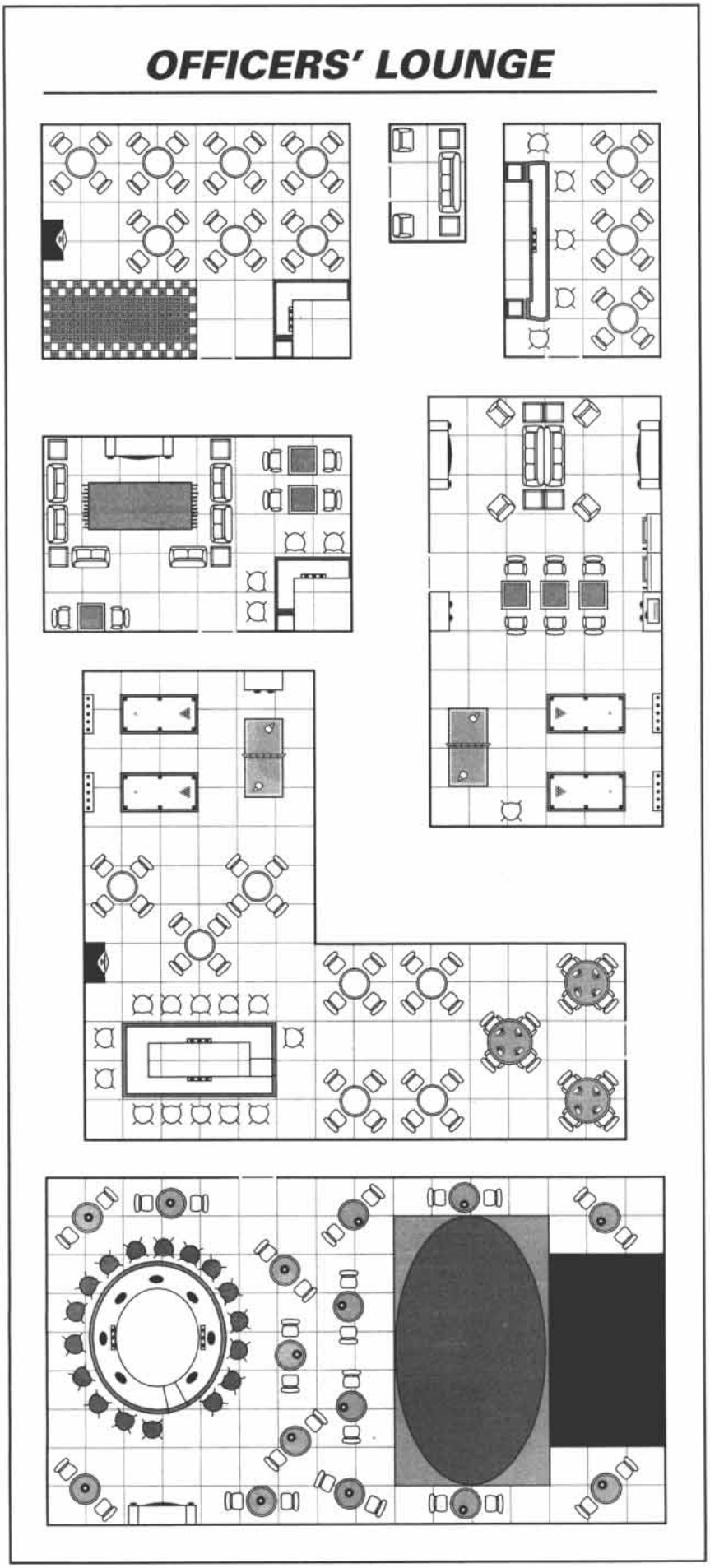
Mess Hall, Spacious

This is the mess hall most people think of as "standard." Its prominent features include either a cafeteria line with food in stainless steel containers and servers behind the rails, or "do it yourself" buffet-like counters. There are two different seating arrangements. In the military style, large aisles separate tables that seat no more than eight crewmembers in fairly comfortable chairs. Smaller areas for noncoms are more comfortable and seat four. Liner and commercial vessels run a more relaxed mess. Circular tables are the norm and food service is usually cafeteria.

The quality of the food served varies greatly. While military vessels are notorious for bad food and worse service, most Chief Cooks delivery nutritious, if not Epicurean, meals. The quality of food on commercial vessels fluctuates widely. There are few good cooks and ones who do take pride in serving a good spread are usually volunteers who are sick of the standard fare. Liners, of course, are another matter all together. A liner's mess hall is staffed by young chefs on their way up. The usual progression is crew's mess to officer's mess to restaurant chef.

In both military and civilian ships also stand vending machines, refrigerators, and stoves for crew use. Kitchen crews are always on duty since a hungry spacer is not a happy spacer. A lot of late-night, early-morning gambling is done in mess halls. No one wants to go to bed immediately at the end of a shift and, except for VR and physical fitness types, there is little to do in the wee hours. Many crews operate on split shifts as well, of four hours on, four hours off, four hours on. Poker and other card games are good ways to spend the break in between.





Officer's Lounge

Everyone in shipboard service needs a place for off-duty escape. Shown here are seven different example of officers' lounges, from the very small (top center) to the luxurious (bottom). The smallest of these is but a diminutive room with a couch, end tables and chairs. The largest is one found on liners and few other classes of ships. To the right is a stage area where live musicians and stand-up comics perform. The entertainers here are rarely paid; they are volunteers who enjoy playing together for their shipmates. Left of the stage is a tridee screen that shows the latest vids when the stage is not in use. Tables with two chairs are scattered about, plus a games cabinet (bottom left) and a large circular snack bar. Most officers' lounges lie somewhere between these two extremes. Common features in any lounge include billiard, card and ping-pong tables, and trideo players. Others might contain stoves and refrigerators, music systems, or ancient electronic games.

Smaller lounges are most often used for conversation or quiet reading. The most prominent feature of most officers' lounges is the presence of a bar — off limits to personnel on-duty. The lounges on military vessels frequently display the ship's awards, commendation, and even accounts of past glories. These items and documents give the newer junior officers a sense of the ship and its accomplishments, and serve to remind older hands of the responsibility of living up to the vessel's legend. When a new citation is awarded the ship, it is installed in the lounge with a near-ritual ceremony. Copies of all the awards, citations, and accounts posted here are also on display in the enlisted lounge (if there is one) or the crew's mess hall.

Passenger Staterooms

Seating, Short Term

This is used on ships and aircraft whose journey takes less than 48 hours to complete. The two possible seating arrangements are shown. On the right, passengers face a common tridee screen. On left, individual tridee/computer units rise up from the floor, enabling a passenger to work or relax with a choice of vids. Both have toilet facilities. Not shown is the food service area in which frozen meals are cooked and then served by safety attendants

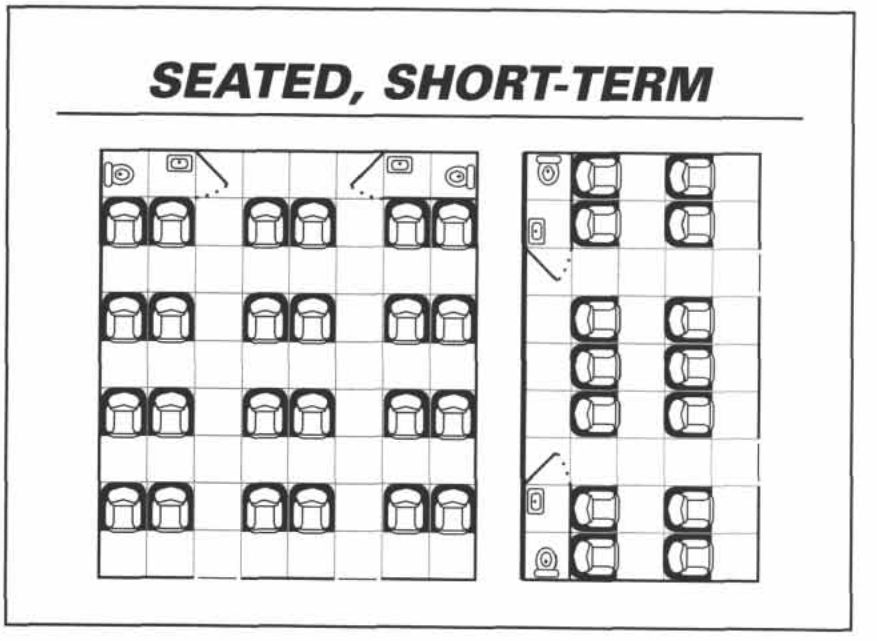
It may sound uncomfortable to be in a seat for two days, but it's not that bad. The seats are comfortable and recline into soft beds, the end of which equipped with an optional NoSound field.

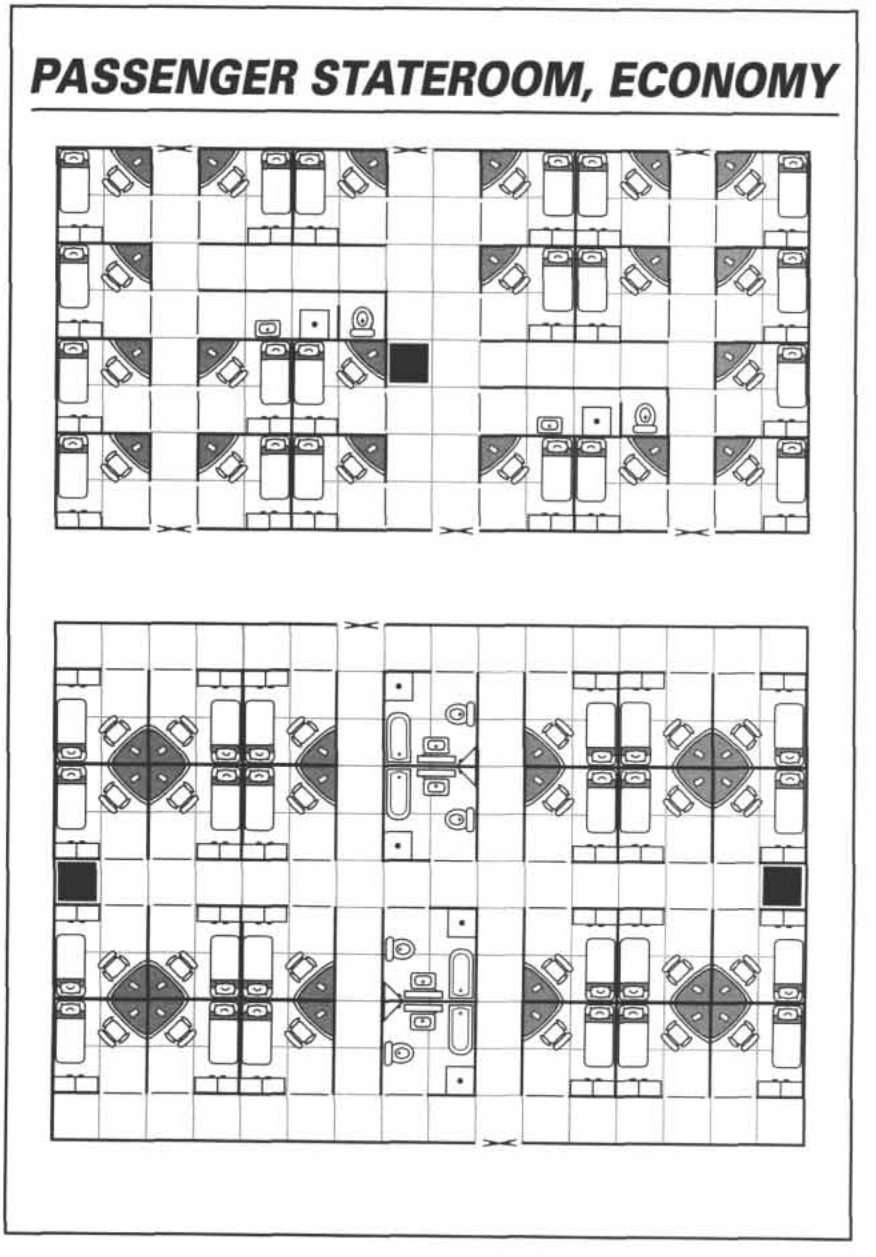
Passenger Stateroom, Economy

Economy staterooms are not much different than some enlisted quarters on military ships. They contain a single double-bed, a dresser, a combination desk and tridee/computer unit. Economy staterooms have shared bathroom facilities with showers and often a tub as well.

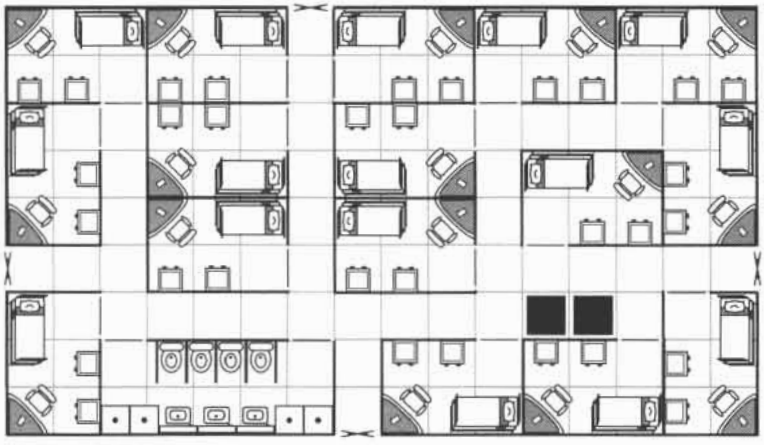
While the liner PR people call this "economy," it is not cheap, but it is less expensive than other onboard accommodations for those who prefer not to take a chance in cryosleep. The rooms are comfortable, and offer privacy, if not luxury. Middle ranked business people consider time spent on economy class travel, sometimes called "business class," as "paying dues." They are aware that, if they succeed, their staterooms will improve as their stars rise.

Many not-for-profit organizations, professional religious groups, political activists, low level travel clubs, and student Nihilist Tribes also use economy. The greatest single threat in economy comes from political activists and extremists, who travel cheaply and always with a purpose. Weapons have even been smuggled onto liners by teams of agents provocateur, each carrying an innocuous piece built into their luggage and then meeting in the economy stateroom of one of them to reassemble and use the device. For that reason, economy passengers frequently undergo more scrutiny at lobby security than others do.

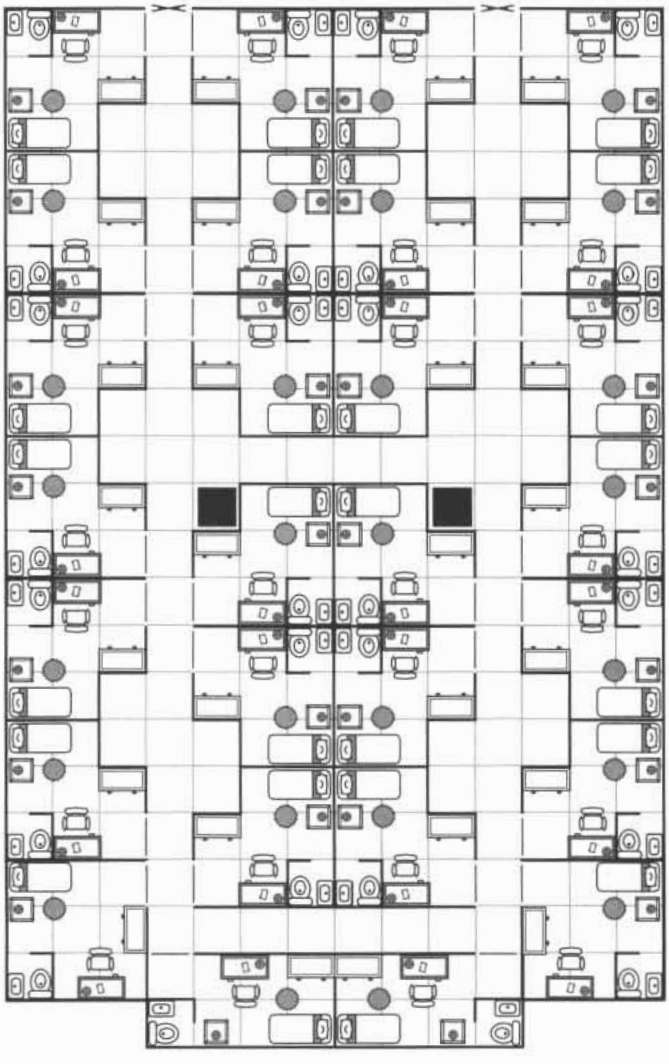




PASSENGER STATEROOM, STANDARD



PASSENGER STATEROOM, SPACIOUS



Passenger Stateroom, Standard

There are two major differences between standard passenger staterooms and those in economy. First, standard rooms are larger, with better décor — pictures on wall, carpeting, and closets. Secondly, most standard room can be made into double staterooms by collapsing the wall separating the modules into the floor. Beds, desks, and tridee/computer terminals are, of course, standard.

The difference in price between economy and standard is 25%, yet status seekers demand these accommodations just to say that they didn't travel in economy. The rooms are more capacious, and standard is the choice of many families traveling together.

Passenger Stateroom, Spacious

These large staterooms are much cozier than either standard or economy staterooms. They feature queen size beds, closets, a private bathroom with shower, a full desk and computer terminal, a separate holo unit, and even a nightstand. Less expensive than deluxe staterooms but by no means bargains, these commodious rooms are eagerly sought by honeymooners, retired citizens, and couples travelling together.

Government agents overt and covert, low level diplomats, and merchant traders are frequently assigned quarters here by their superiors. When agents or diplomats are travelling in teams, they usually acquire a block of rooms with interconnecting doors in order to work without being observed. Each of these rooms has a secure commlink that, for an extra charge, is activated to ensure complete telecommunications privacy. This feature also makes these rooms popular for traders, since such security is not available in the economy and standard staterooms.

At each door is a Do Not Disturb light. When switched on, the staff always honors these. There are passengers who spend the entire voyage locked in their rooms, and not all of them are couples on honeymoons. Writers fall into this category, locked away from the universe, calling room service for food and scotch, working until they dropped from exhaustion in these roomsl

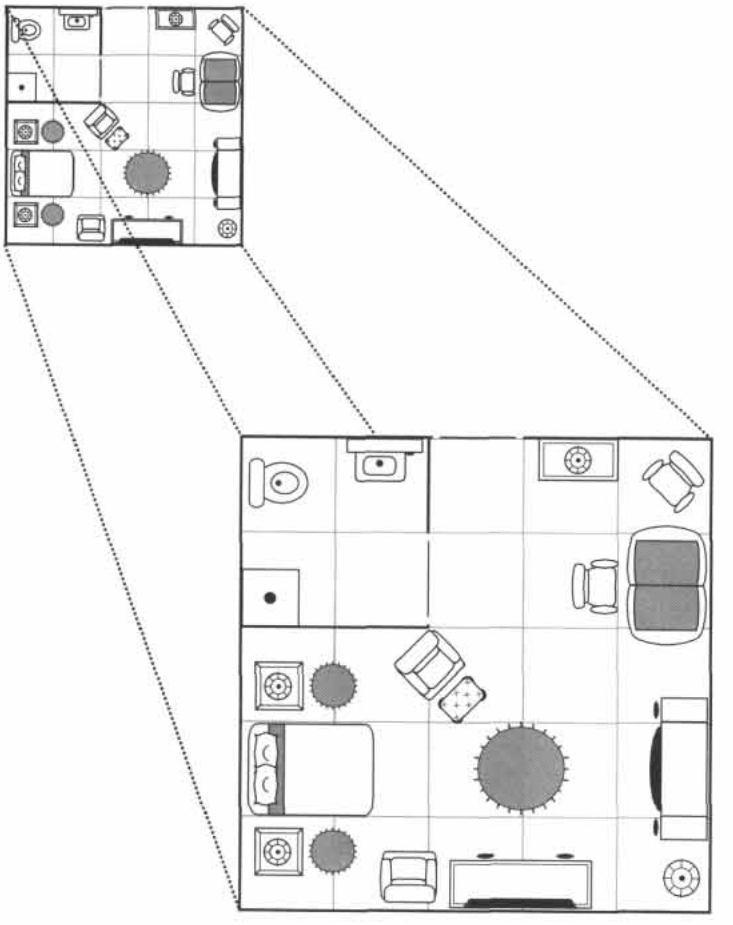
Passenger Stateroom, Deluxe Suite

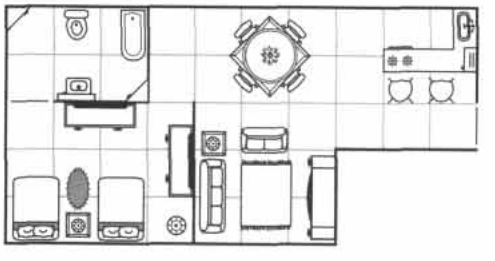
Homes in space for the very wealthy, deluxe liner suites compete with the finest hotels for the quality of their accommodations. Three different examples of deluxe suites are provided here, but most layouts will be specified in the architects' contracts. Still, the architect is responsible for the final execution of these quarters, and no expense should be spared, no corner should be cut.

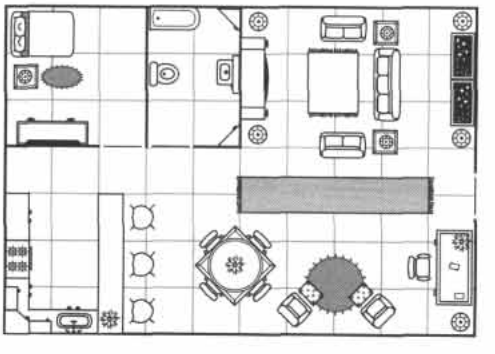
Regardless of design, deluxe suites should all include certain features, such as a separate bath of a shower and often a full bath tub, a large lounge-like room (sometime separate from the bedroom and made as comfortable as possible), and plenty of closets and dressers. Equipment should be well positioned. Easy chairs and couches facing a holostage, large desks with computer terminals, wet bars, kitchen facilities, and the like should be designed with ease of use and available space in mind. A small conference table is a good addition, as are throw rugs and occasional furniture. The watchwords here are luxury and style.

The executives, nobles, and the idle rich who book these suites believe in the ancient maxim "If you have to ask how much it costs, you can't afford it." Most of the suites are designed to be modular and capable of changing to suit the tastes of specific guests. (There are no "passengers" on decks containing deluxe suits; they are now "guests.") Does the gust have special needs? Medical attention is immediately delivered. Is the guest a non-drinker? The staff removes the wet bar. Is the passenger a fancier of marine lives? An aquarium is installed. Does the guest prefer vibrant colors to pastels? Do a rapid but professional paint job. In these quarters, the guests make the rules and the staff accepts them, no matter how strange or unusual.

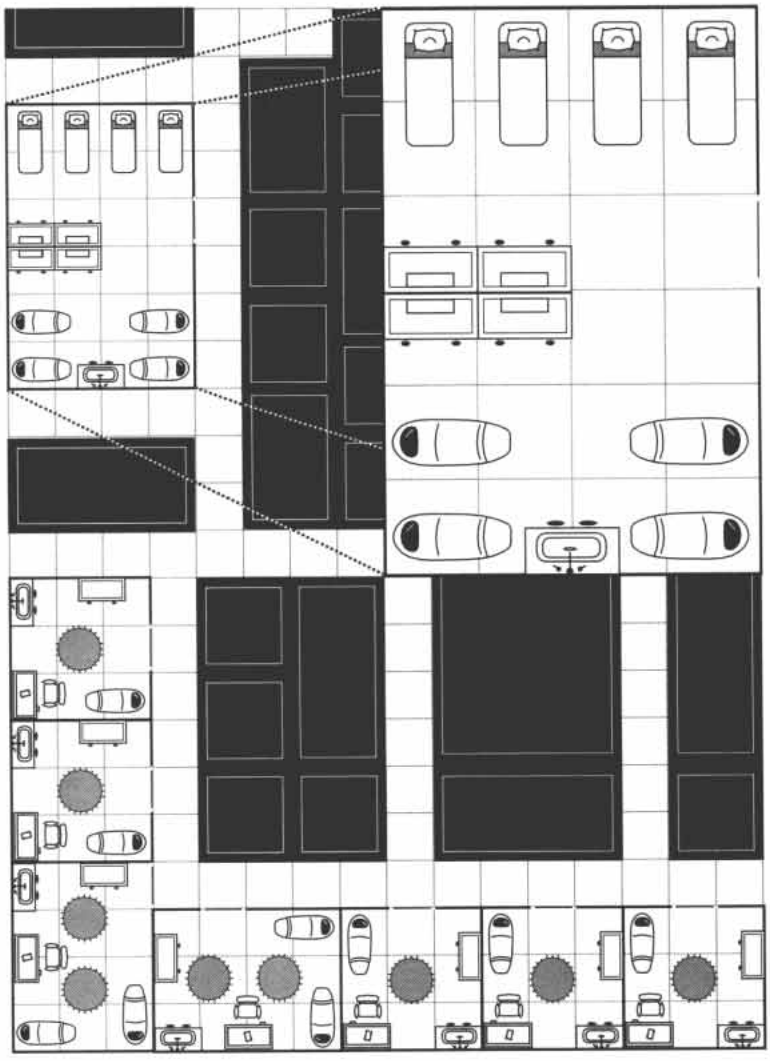
PASSENGER STATEROOM, DELUXE SUITE



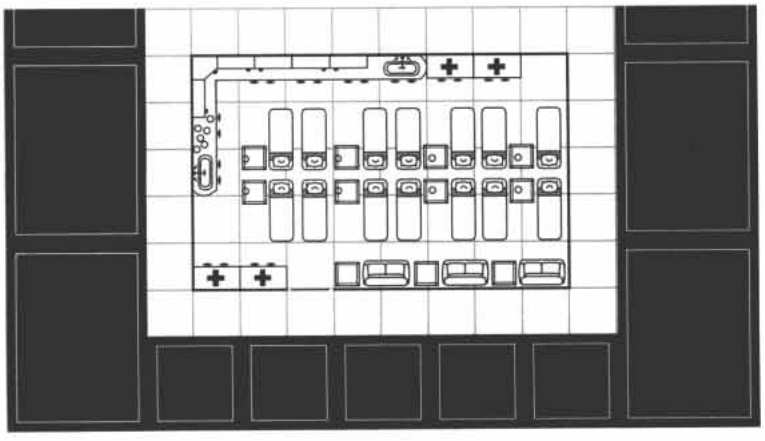




PASSENGER LOW BERTHS AREA, SMALL



REVIVAL WORK STATION AREA



Passenger Low Berths

Passenger Low Berths Area, Small

Several different styles of low berth rooms are included here. All have cryo tanks (or "coffins"), work tables where low berth passengers receive preliminary medical examinations and cryo injections before going under, and sinks. While not shown, each cryo tank also has a recovery bed (or at least a cot), whether in the room or in a connecting recovery area. There are also emergency first aid stations, desks for nursing personnel, and a large common bathroom facility.

Low berth or cryosleep facilities provide the most inexpensive travel accommodations in deep space. Passengers who travel in cold sleep require little maintenance and almost no services except for initial sleep preparation and resuscitation. They don't eat anything, require no facilities, and security can safely ignore them. The process is cheap, easy, and the reasonably low failure rate makes the risk attractive.

It is not just the poor who choose to travel in this manner. Many frequent travelers, even wealthy ones, opt for the cryo tanks because aging is slowed to a crawl. Age is a cumulative process and any means of slowing it makes one that much more effective upon arrival. Other low passengers include ethical traditionalists, the easily bored, and those who don't want to be bothered or distracted by the ship's regular activities.

Revival Station

The most critical service offered to low berth patrons is, of course, bringing them back. Revival workstations are not emergency bays. They provide care, under the direction of a nursing supervisor, for the normal recovery process to take place. The room is laid out like a ward, with beds, monitoring tables, and nurse workstations. First aid treatment kits are prominent, containing most drugs and supplements a reviving patient could possibly need. These stations are always placed near emergency recovery bays and a M.D. is always on call.

Little goes wrong during revival, but when it does, action is swift and frenzied. Doctors come on the run, and nurses work to keep the patient alive and stabilized until emergency treatment can be administered.

Passenger Low Berths, Large

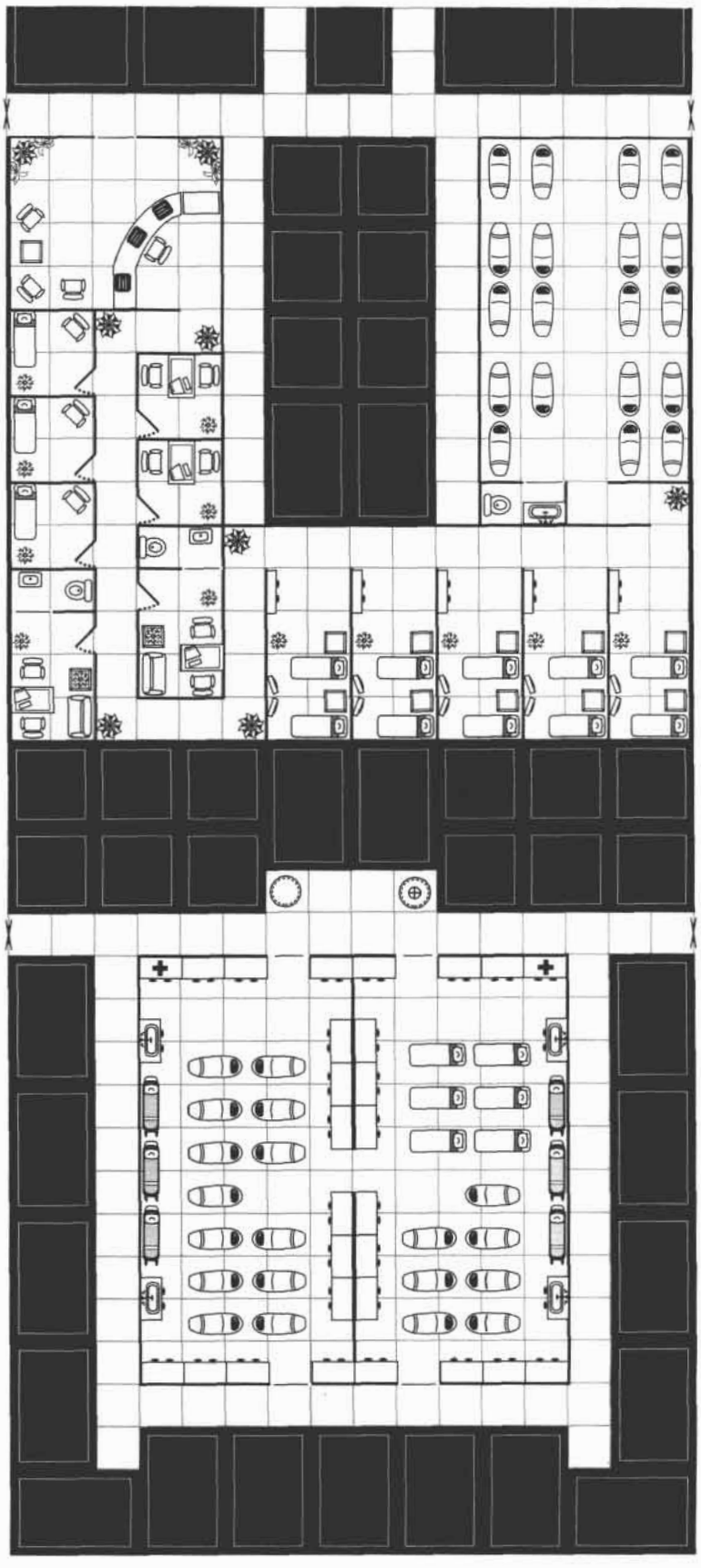
These larger low berth areas are found on large liners and those specializing in low berth passage. The facilities here include a lobby with a reception work area (top left), private and better-appointed recovery rooms with monitors, plus even dressers for personal effects. Double rooms are available. Recovery room assignments are made before the subject enters cryosleep and personal possessions can be secured in the locking dressers. There are computer stations for doctors and nurses, and toilet facilities. Between the bays is a large vault for valuables. The ward shown below is less costly than private quarters, about Cr1,000 as opposed to Cr1,375, but the care given here is the same.

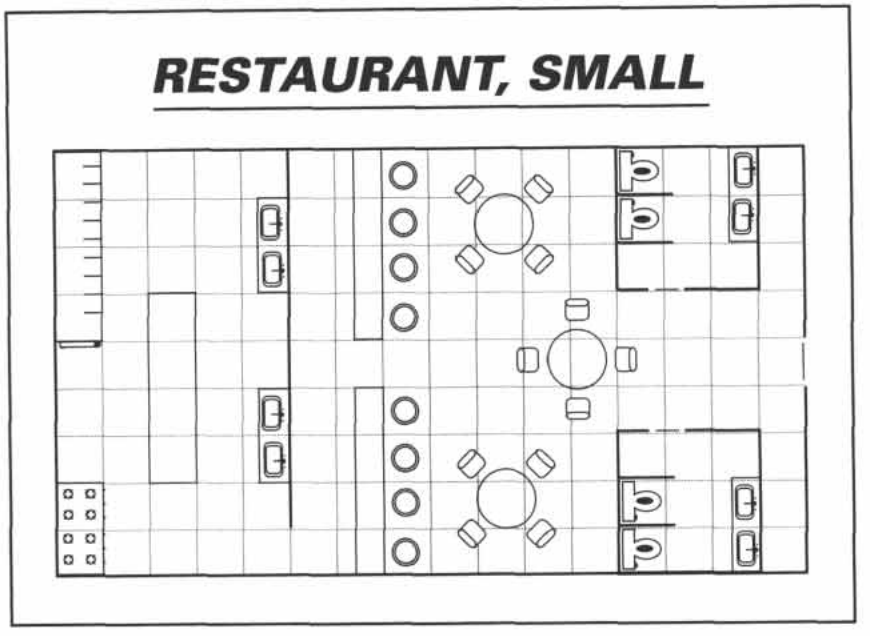
While these facilities are quite common, many people suffer from "cryophobia," the fear of cold sleep. Even planetside medical facilities are shunned by many who could be cured of serious diseases simply by waiting for a treatment. Yet, failure rates are actually low, far lower than that claimed by public mythology.

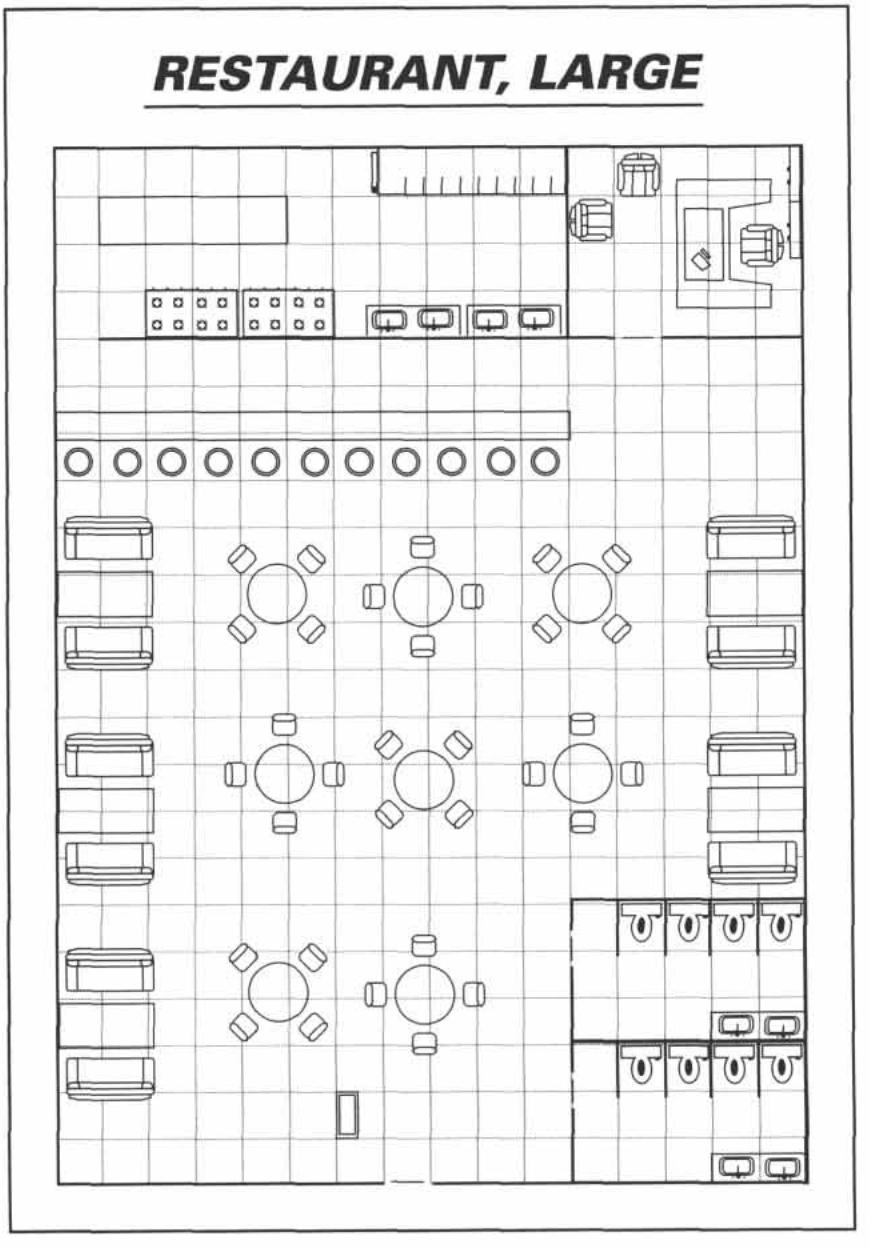
On the other hand, some recent studies have show slight increases in the aging rate among people who spend a lot of time (several years) in suspended animation. Whether this data consists of largely statistical variations or actually indicates a correlation between cryosleep and rapid aging is a subject of debate.

The most serious danger comes not from resuscitation failure, but from those who have natural allergies to the compounds and drugs. While the percentage is low, there are travellers with adverse reactions to the treatment. Most other causes for resuscitation failure stemmed from a patient's physical condition, mental aberration, or circulatory system. Ice Rot is largely a fantasy in the minds of the fearful.

PASSENGER LOW BERTHS, LARGE







Passenger Commons

Restaurant, Small

Small restaurants are often located on the promenade decks of space and interstellar liners. The restaurant operators frequently lease the facilities from the owners, but just as many are operated by the liners themselves. Standard features include a counter with stools, several tables for larger groups, public restrooms, and a screened kitchen. The kitchen is standard as well, with walk-in freezers, cutting tables, a multiple burner stove and sinks.

These small cafés are inexpensive places where passengers can grab a quick sandwich or a cup of their customary hot beverage. Quiet and safe, many a rendezvous begins in these little bistros.

Restaurant, Large

Large restaurants come in wide range of shapes, sizes, and decors. The architect should be guided by conditions of the contract and give the customer what he wants. The kitchen needs larger and more workstations than a small café. Stoves, ovens, sinks and cutting boards must be capable of serving the maximum capacity of the restaurant with the highest efficiency possible. While seating and décor are left to the designer and the needs of the client, in general booths should only be placed in low to moderate priced facilities, since even three-star restaurants shun them.

Quiet and expensive, large classical restaurants are traditional harbors for intrigue. Codes and secrets are exchanged and passed over glasses of rare wine and imported alien patés. Waitstaff and maitre de's are not immune to bribes, and most will do nearly anything for a price. A small quantity of powder given to a wine steward along with an appropriate gem can lead to a rival landing in a sick bay quarantine ward, a larger gem can ensure an enemy is disposed of along with the night's garbage, or a waiter could be "tipped" to ensure slow service while a victim's room is ransacked. And food storage lockers make wonderful smuggling lockers.

Dining Hall

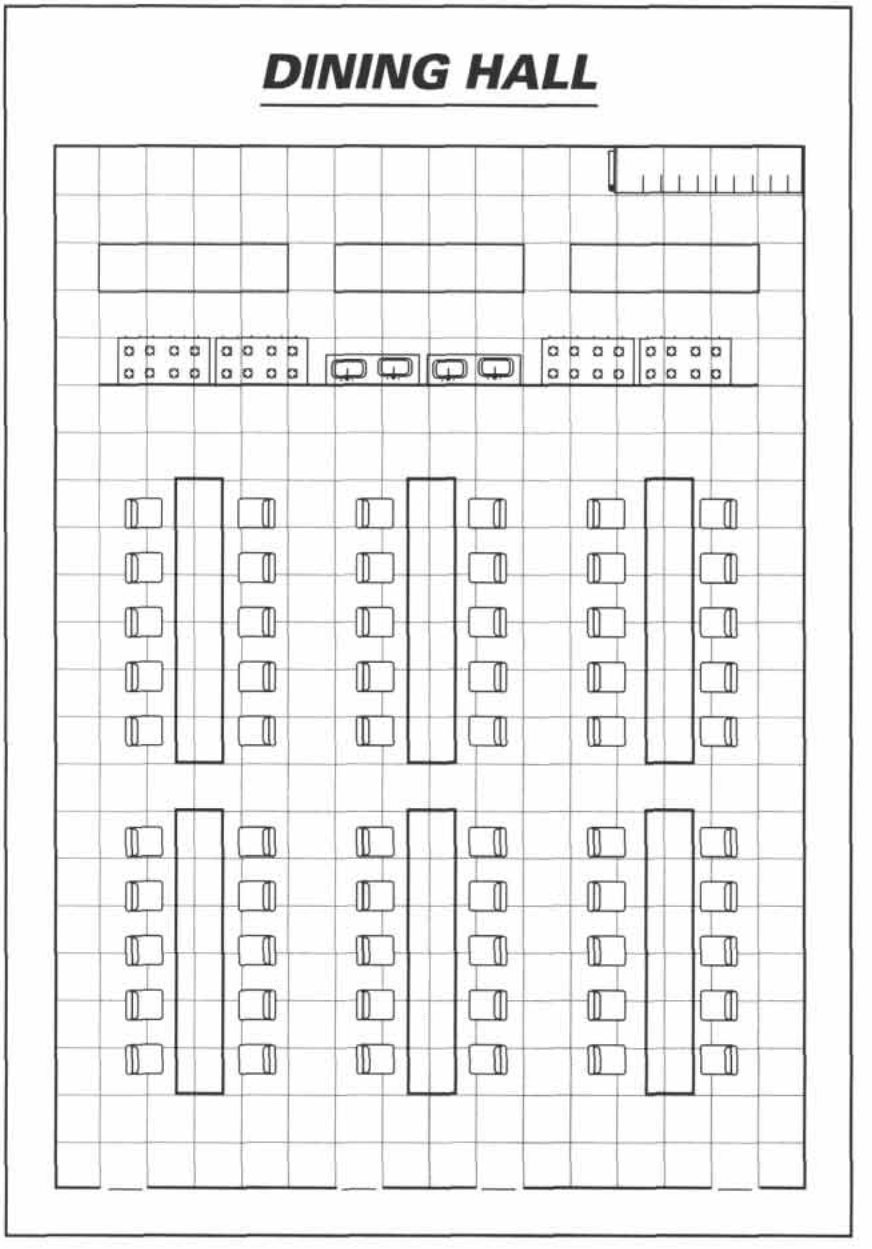
For passengers on a budget, or for those who just don't care that much about formal dinning, a dinning hall is provided. Large and rather comfortable, long common tables seat ten with elbow-room. The service center has a large walk-in freezer (top left), a series of cutting counters, sinks, and stoves. Service in most of these establishments is cafeteria style, but a few have waitresses who bring customer choices to them. A few of these halls are done on medieval or pirate themes. They feature limited menus and a choice of ale or wine, all served by "wenches" and "knaves" who sing, dance, and flirt with the customers, selling fun before nutrition.

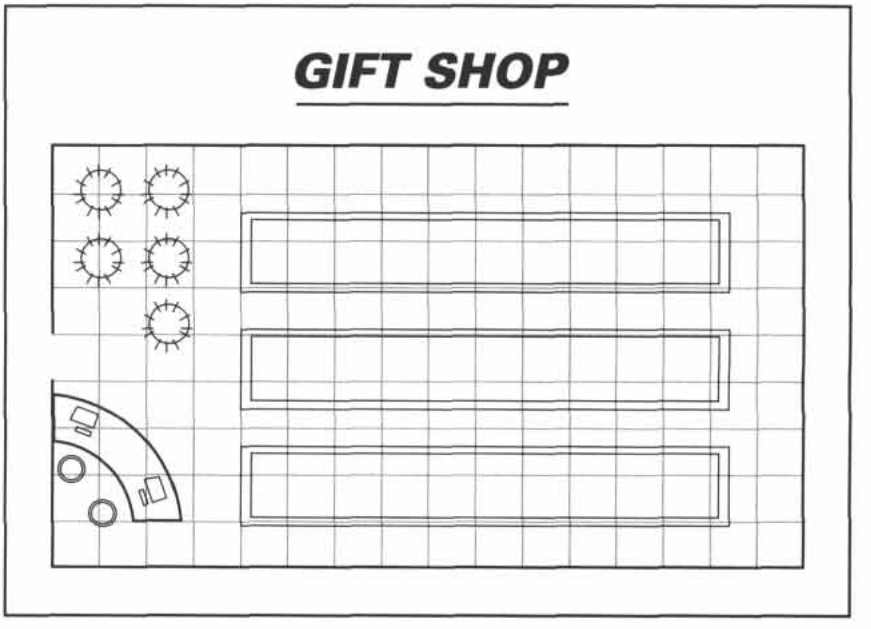
Dinning halls, except for the theme types, are places to stoke the furnace, not to hold conversations or mingle with other passengers. Most are quite; guests eat, pay and leave, usually without saying a word to the stranger next to them. Thematic dinning, on the other hand, is quite the opposite. Sporting names like "1512" and "Davy Jones' Locker," these inns provide an evening's entertainment for a modest price. Most of the actors are students who use this as a pleasant way to earn tuition and pocket money.

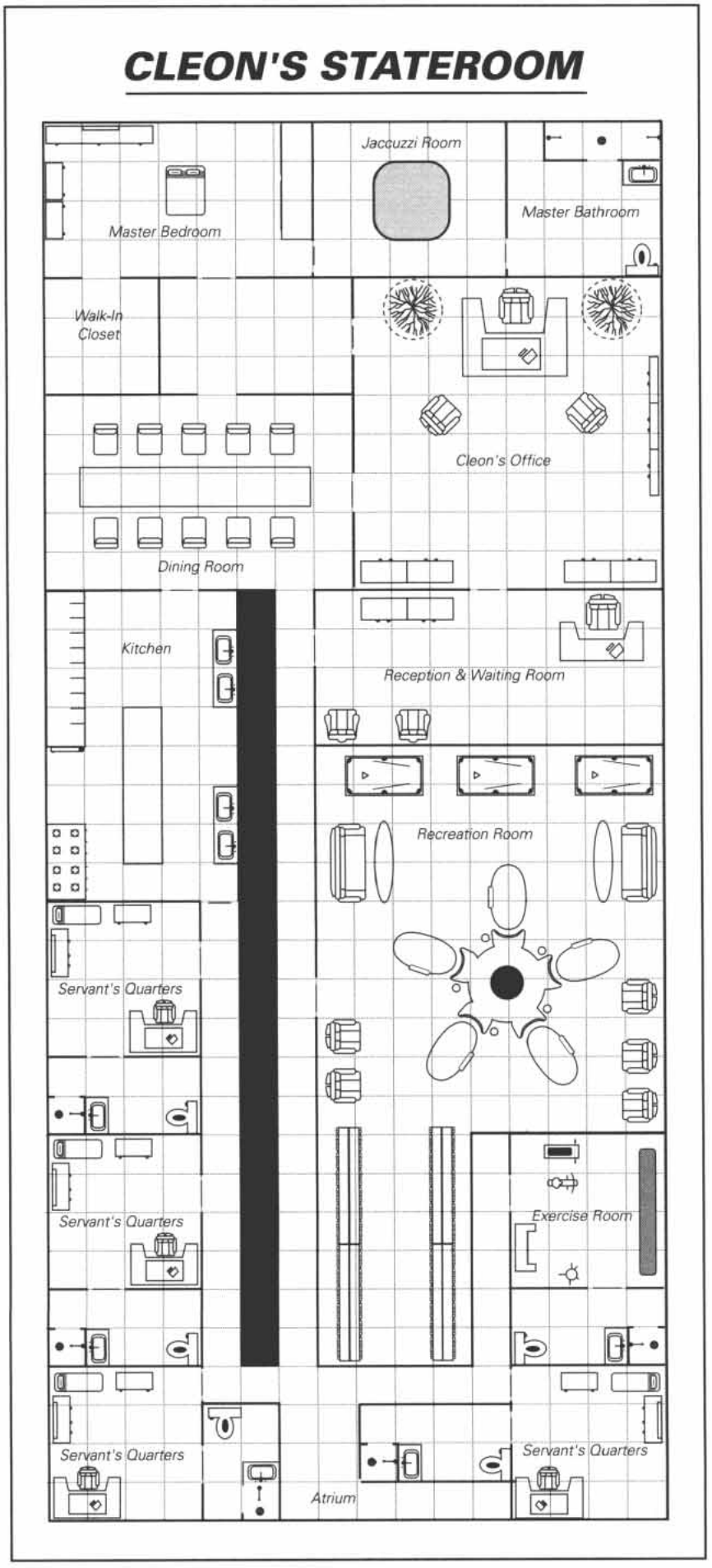
Gift Shop

Gift shops haven't changed much since their invention. Long racks and shelves contain nick-knacks and souvenirs from strange places with unpronounceable names, toiletries, cosmetics, and snacks. Books and small items are dispensed from circular spinner racks. The example shown is a corner shop with a double open entrance. Two cash registers and stools are provided for the clerks.

The liner corporations, who generally believe that dealing in such small goods is somehow demeaning, lease most gift shop space. The shop owners will never be rich, but they do visit places they would never be able to afford at no cost and earn a comfortable living.





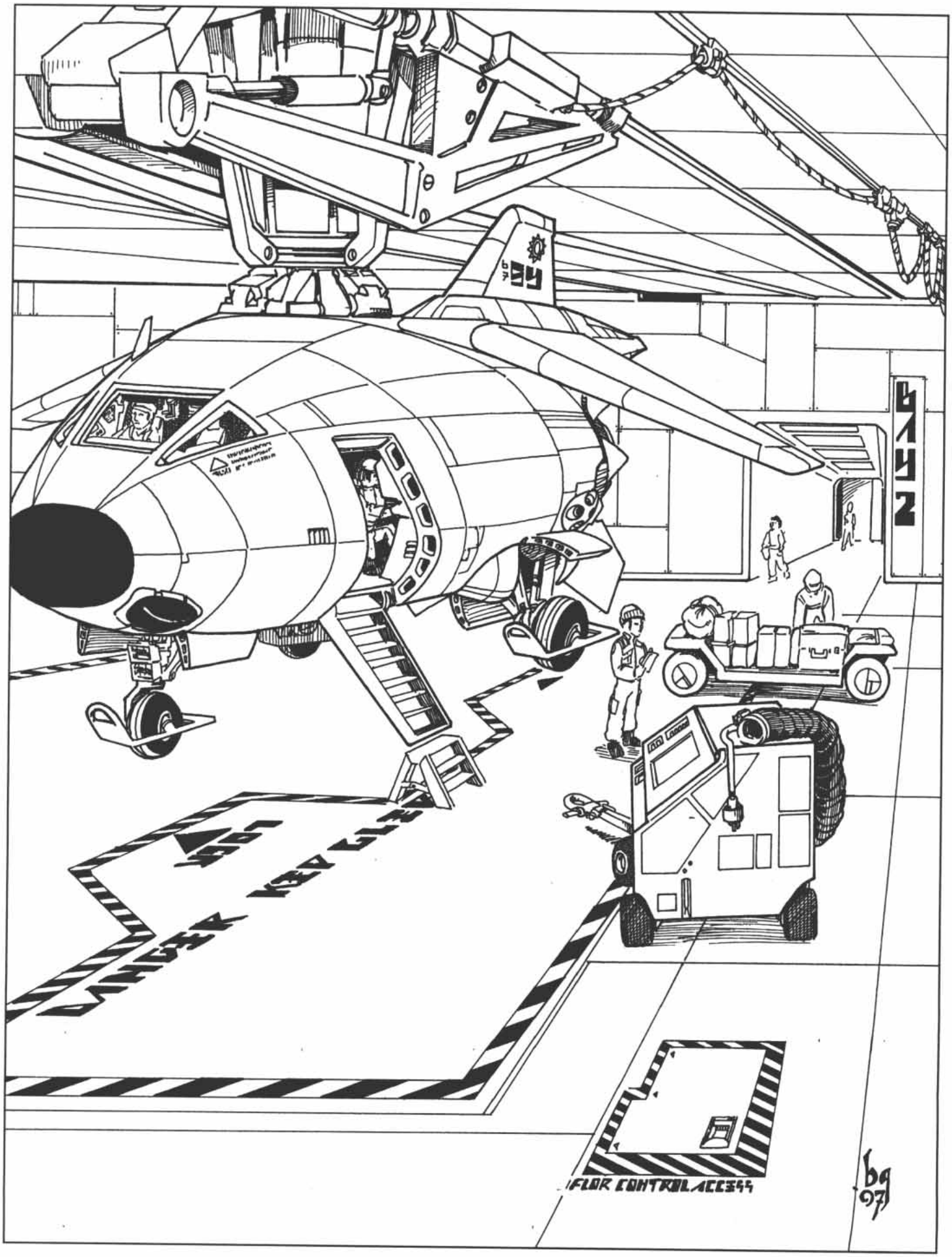


Cleon's Stateroom

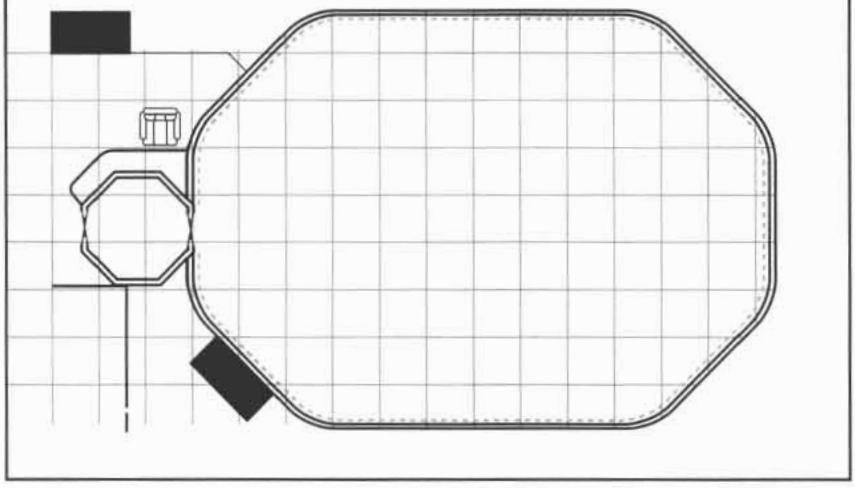
The Emperor's Stateroom is not as grand as one would expect, but it does include features that are almost never found in other staterooms. Beginning at the top left is the Master Bedroom, complete with dressers and a large closet and a walk-in wardrobe. The entryway of the bedroom holds portraits of Cleon's ancestors and special personal art. This hall leads to the dinning room and to Cleon's office. Connecting privately to the bedroom is a personal whirlpool bath that Cleon enjoys after a long day. And next to the whirlpool is the Master Bathroom, with a double size shower and the usual amenities.

The dining table seats six in formal comfort. This room is kept free of electronics (save for hidden audio recorders), vid screens, computers and all the other paraphernalia that keep Cleon in touch with his empire. The emperor is known for his lavish but intimate late night diner parties. An invitation here means a leap forward in one's career. The dinning room connects to Cleon's office (right) and to the Grand Hallway. This long corridor, hung with trophies, runs parallel to the servants' hall, which branches into the kitchen and the servants' quarters. Guests arrive through the atrium (bottom center). Below Cleon's office is his reception room. The recreation and exercise rooms include those things already listed under separate categories — but built with much more sophistication.

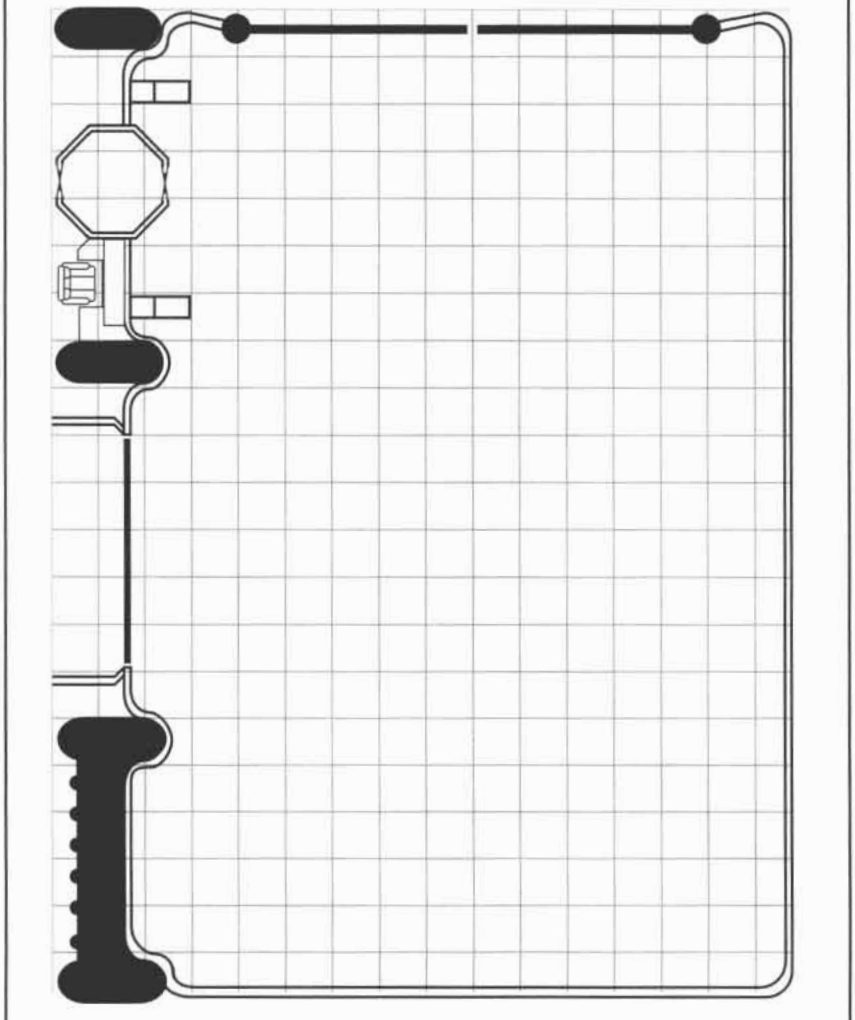
The Office of the Emperor is where official visitors, lawyers pleading lost cases, and others who would claim the emperor's time come to seek a hearing. The desk at the entrance is the domain of Maude Ten Parries, Cleon's stern and loyal secretary. Maude looks like a grandmother and performs like a drill sergeant. She is responsible for sifting through the claimants and she has her own triage system. Those selected are ones the emperor 1) would like to see, 2) should see, and 3) better see.


FLOR CONTROL ACCESS

INTERNAL HANGAR, MINIMAL



INTERNAL HANGAR, SPACIOUS



Hanger Bays and Docking Facilities

Internal Hanger, Minimal

These small hanger bays may be found on any ship carrying one or more special-purpose vehicles. There are several types of these hangers; the one depicted here is open to space with an internal airlock. The bays usually hold scout vessels or couriers. The pilot is responsible for servicing his ship after landing. The refueling and atmospheric connectors and regulators lie next to the airlock (left).

Normal landings performed by skilled pilots under normal conditions are rarely a problem. Disabled ships or those flown by injured or sick pilots are another matter, and a crash crew is always on standby alert.

Internal Hanger Bay, Spacious

Larger bays can accommodate more than one vessel. The model shown here has space doors (top) that allow the entire bay to be pressurized, but newer design protocols are moving away from this practice — it is not cost effective to vent large quantities of atmosphere into space and then replenish what was lost.

There is an airlock (top left) and emergency equipment in storage bays surrounding it. The Launch/Receive Officer's station is also at the airlock. At center left is a viewing bay, and at the bottom, the heavy doors open onto a large work-service corridor leading to the machine shop or repair bays. Service crews, which double as crash crew, take care of normal vehicle servicing. A pilot's ready room, complete with personal stowage lockers (not shown), lies just on the other side of the airlock.

The Launch/Receive Officer is in charge of all traffic entering or leaving the bay. He assigns priorities when more than one vessel is on the approach and is the officer in charge of the service/crash crew. The job takes steady nerves and the ability to make fast decisions when dealing with crippled ships.

Fighter Launch Bay

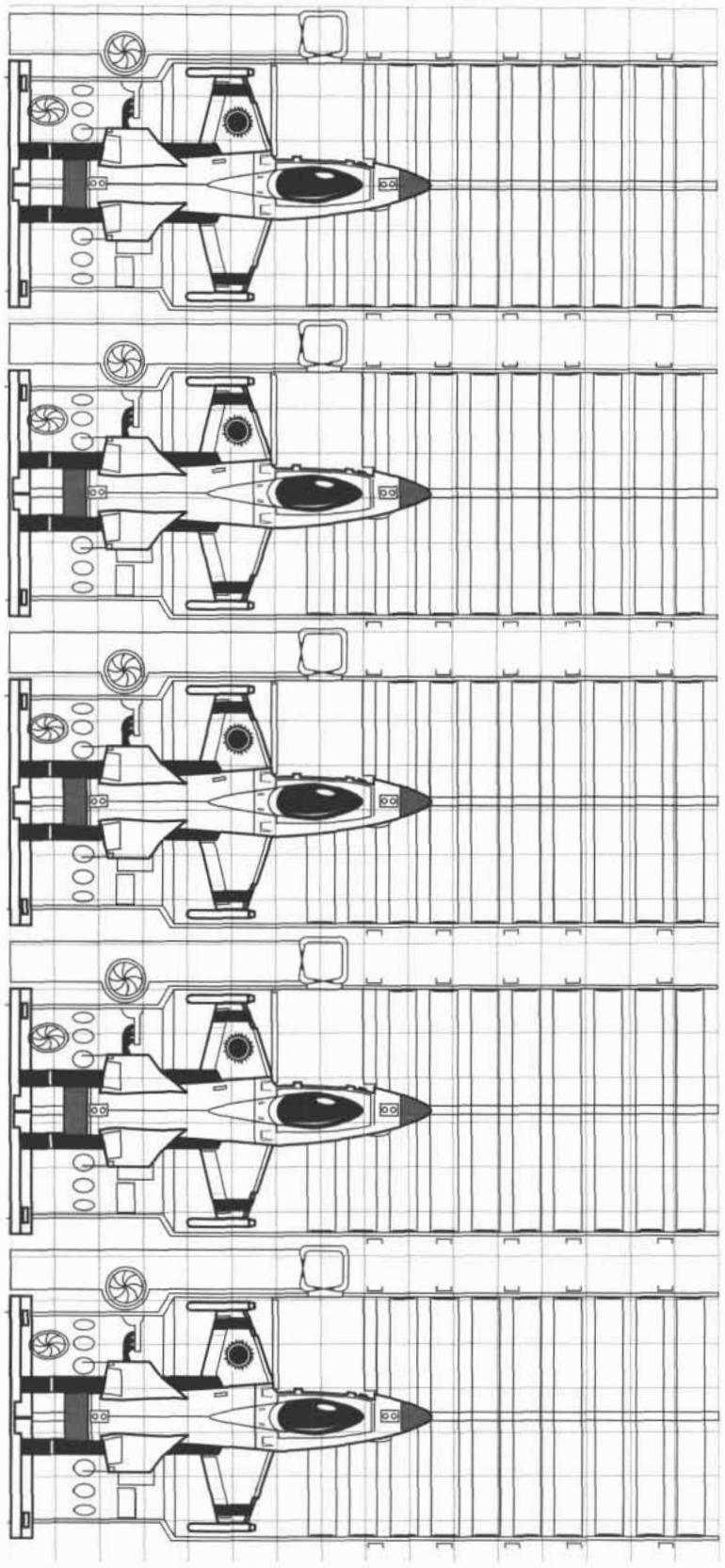
Large fighter launch bays are the offensive and defensive center of any warship. Care must be exercised in the design of this crucial facility. The architect must know the design specifications for the fighters carried, their fuel requirements, placement of intake facilities, even the clearance requirements of the pilot's canopy. Fighters are carried on high-speed launch beds that provide both directional and power assistance during a scramble. Efficiency is the main criteria. No wasted space, no wasted motion. Everything here needs to run like the fine machine it is.

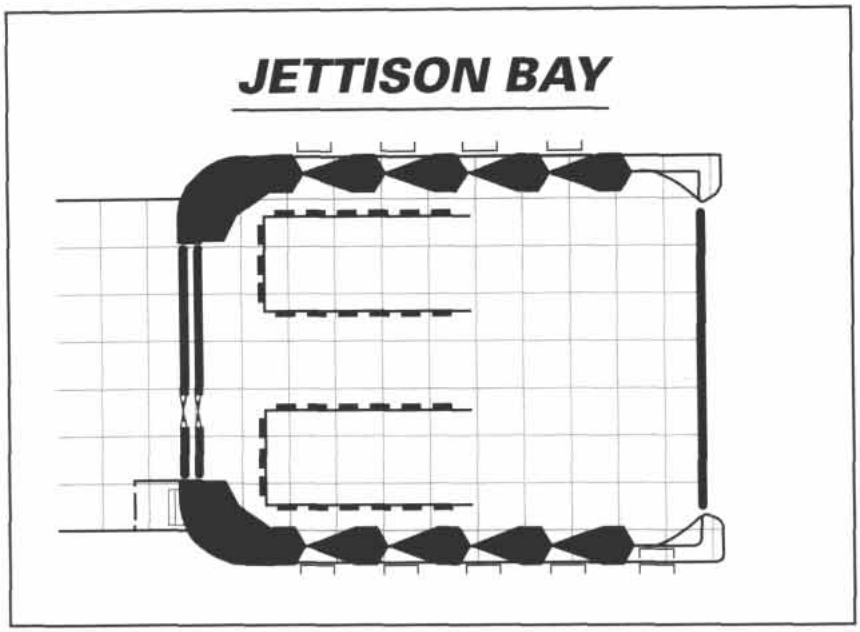
Returning ships need clear landing paths. Provision needs to be made for turnabout and refitting. Each ship has a pit crew of at least three assigned to it. These crews are responsible for refueling, rearming, and replacing lightly damaged parts. Tools, fittings, hoses, and clamps all need to be stowed at each launch track to ensure the fastest possible return time. Standby rooms for medical technicians are also required.

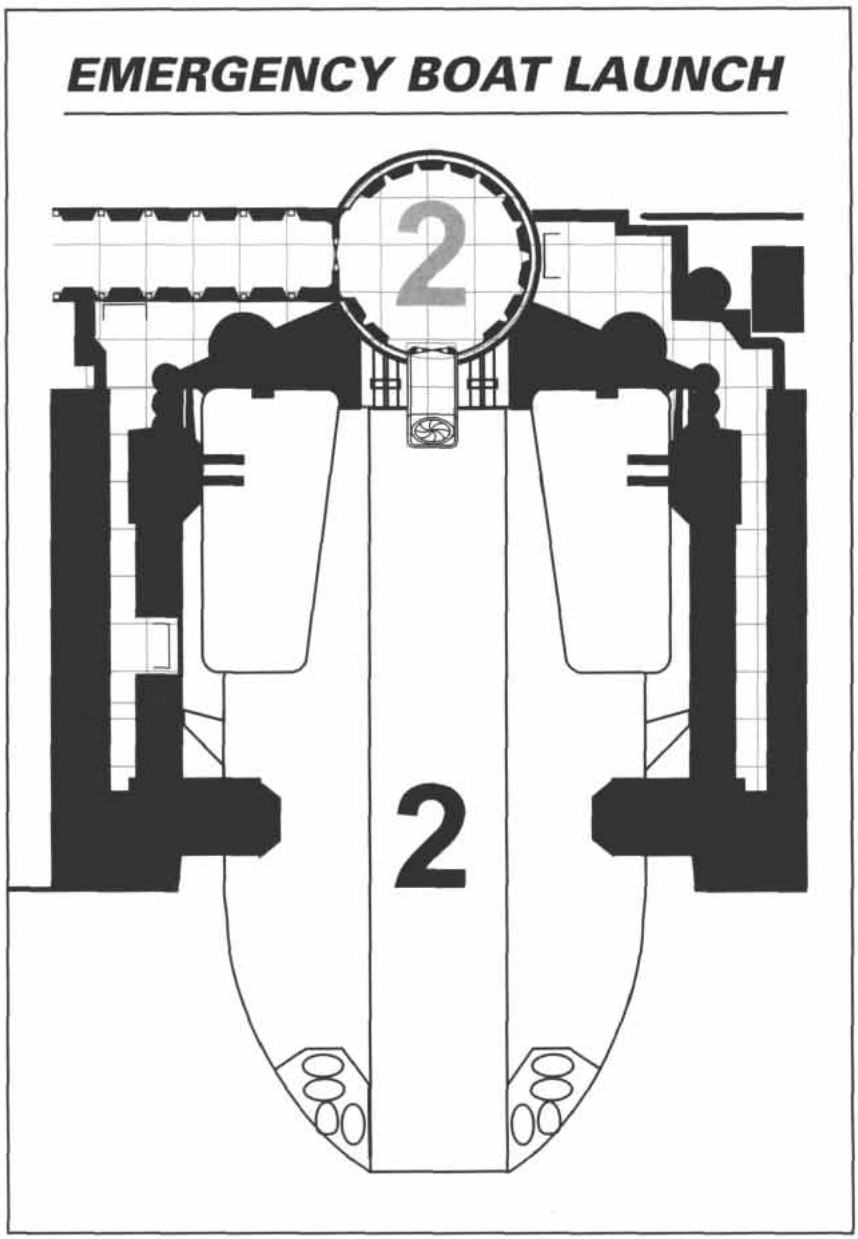
The Launch Director needs to have a high overall view of the bay (not shown) and telemetry reports for every fighter under his command. While pilots are responsible for the conditions of their own ships, the Launch Director's telemetry provides last minute information that allows the LD to scrub a specific, questionable vehicle. Once the fighters have left the bay, control switches to Fighter Ops. The LD continues to be in charge of refitting and relaunching fighters for the duration of the battle and for "lock-down" when the last ship returns. Lock down includes a ready-prep for unscathed fighters and assigning overhauls on battle-ravaged veterans.

The Launch Director can be seen as the conductor of a huge, cacophonous orchestra. The noise levels of the pre-flight launch bay are of the scale. Sirens, klaxons, loud speakers combine with the din of mech chiefs' and pilots' shouted demands, launch tracks being tested, fuel couplings being cranked and turbines winding up to produce a racket unlike any other.

FIGHTER LAUNCH BAY







Emergency Boat Launch

Constantly maintained and always ready, lifeboats are a vessel's final survival insurance. Emergency boat launch terminals need to be compact, clean, easily accessible and very well marked. The number of lifeboats depends on the crew complement and passenger count, capacity of the lifeboats, and the type of vessel on which they are carried. Liners ordinarily carry larger boats, military vessels smaller ones.

Launch controls are duplicated at the station and inside the boat. While the station controls are rarely used (who wants to stay behind to activate them?), they are included in all standard design protocols. The small ship is clamped, port, starboard, and aft, to prevent accidental release. A single launch control in the vessel, repeated at the station, fires the boat into deep space.

"Rescue" is never guaranteed. Once launched, the boat's cryogenic systems automatically place the occupants in cold sleep against their future recovery, unless the manual override is engaged before launch. Launch boats are sometimes employed as a means of eliminating shipboard enemies without killing them and mutineers find them convenient resources.

Despite the safeguards, accidental launches do occur due to malfunction or misfortune. For this reason, smugglers rarely use the largely unattended emergency boats.

Jettison Bay

The jettison bay can be located almost anywhere on the ship, but custom dictates that it be positioned near the garbage masher. This bay is used to eject solid matter into space. The materials to be jettisoned are placed in the twin gravitic launchers, the bay is vented, space doors open, and the ejecta is fired into infinity.

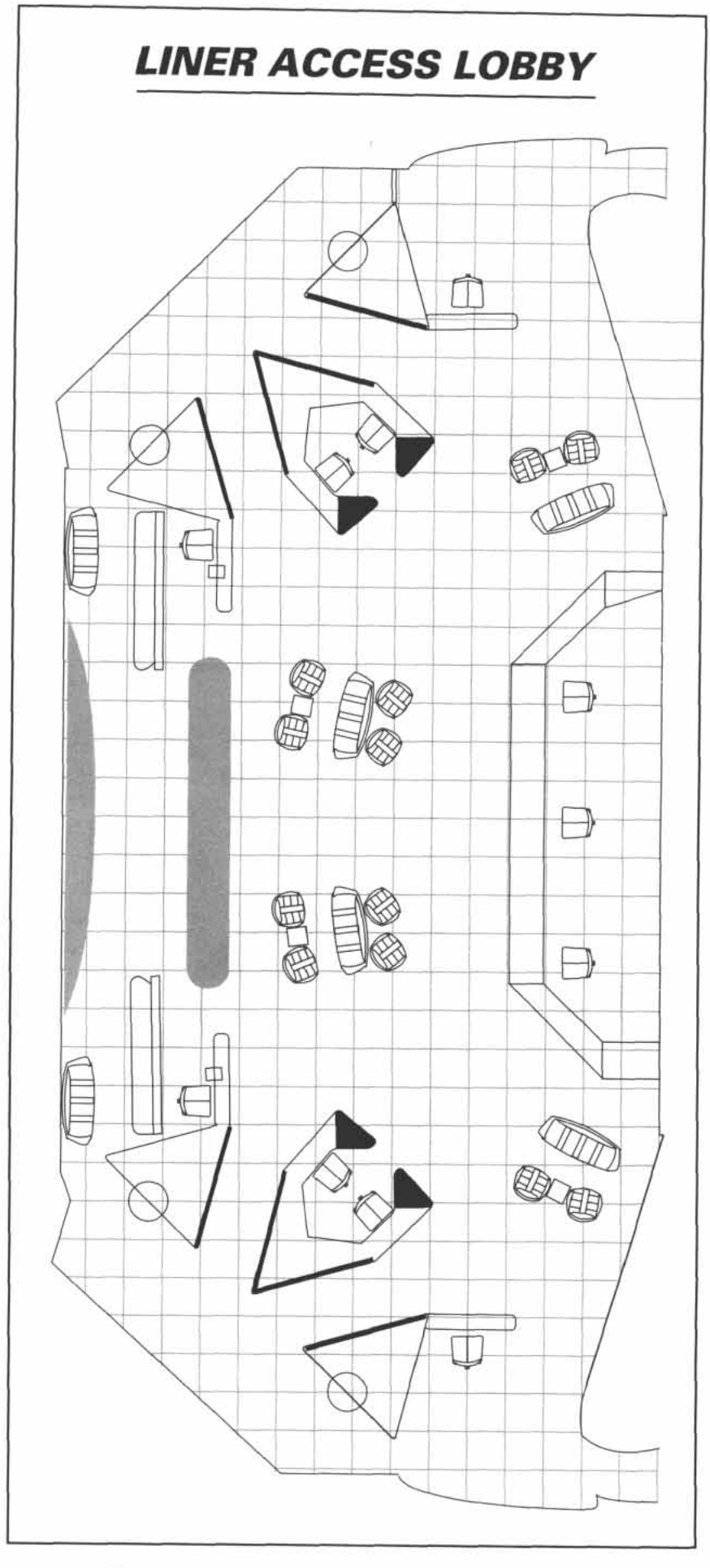
While regulations call for the inspection of all materials to be launched, this is rarely done. More than one "hard-nosed" officer has found himself sent to his ancestors in a jettison bay. The bay is also an excellent place to get rid of contraband when a ship is under General Examination Orders.

Liner Access Lobby

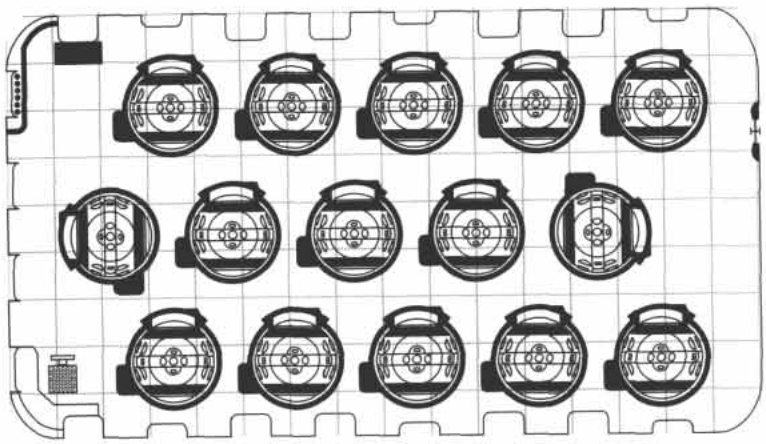
Entrance to the great liners is through one of the two portals shown at the top and bottom, to the left. Each contains a concealed, portable bomb detection device — an unfortunate necessity, even in this age. As a passenger proceeds through channels, tickets are accepted and scanned at the long counters to each side of the security checkpoints. Once passed, the traveller is introduced to this new environment through visual reference support systems. Halfway down the drawing to the left is a holotank that displays the current region of space in which the ship is docked. Across from the tank is the concierge and purser's desk, where voyagers check in for cabin assignments, declare their special needs, and acquire safe boxes for valuables. Lounge waiting areas are included and a holomodel of the ship, complete with "your are here, your cabin is located on deck X, here" instructions. Locations of exhibits, clinics, sports arenas and the like are also displayed. At the bottom are access ramps to travel tubes and elevators.

In spite of the visual aides, it takes first time passengers, as well as many experienced ones, up to a week to orient themselves aboard an interstellar liner. There are so many decks, public and private lounges, cabins, health sections, cosmetic refits, and entertainment areas that many voyagers are quickly disoriented. Add to this the arbitrary "up and down" orientation of many locations, and it is no surprise that folks lose their bearings. Some of the younger children of ship's personnel run thriving "guide" businesses. Having grown up aboard these ships, they know every shop, bar, corner, place of interest —and every "den of iniquity"— on board.

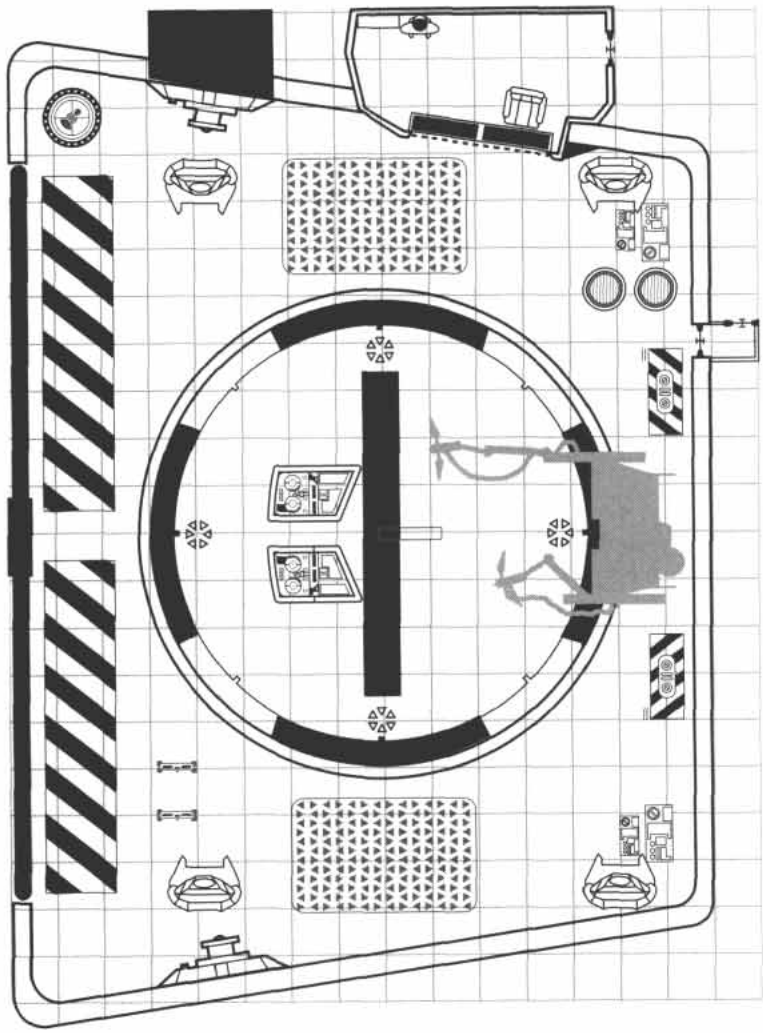
The crewmembers are always helpful, even if they expect a gratuity. Still, experienced passengers accept this as merely a fact of the travelling life.



ORBIT PARADROP BAY



FUEL TRANSFER BAY



Fuel Transfer Bay

The fuel transfer bay is used to refuel fighters and other small vessels. The ship lands through the access doors on the left and proceeds to the circular turntable. The Refueling Officer sits inside the control booth (top) and directs every aspect of the procedure. To the right of the turntable is a robotic work unit running on tracks. The extended arms and manipulators of the unit position the boat to receive the type of fuel it requires. The main fuel receptacles (top and bottom left) and the four fueling station dispense most common fuels, and the safety hatches on the right give the robot access to ports for rare and unusual fuels as do the nozzle ports located above them. Magnetic clamp grids above and below the turntable secure any loose connectors, parts, or fittings that might otherwise be lost to space.

"Speed and precision" are the watchwords of the professionals who run the refueling stations. Most ships, and especially fighters, can be refueled in under a minute using high-volume force-feeder hoses and lines. Pilots never leave the cockpit, and the refueler never leaves the control room except in an emergency. A space suit is kept in the office's locker for just that reason.

Orbit-Paradrop Bay

The orbital drop bay contains the eggs that are used to drop men and supplies from low-planet orbit into the atmosphere and down to the surface. Each egg has a carry-off acceleration couch. When removed, the egg is ready to send supplies. Each canister has protrusions on top that allow the officer in charge to set reactivation controls, system jets, and deorbital navigation commands quickly and easily. Each pod has its own hatch, and ejection is as simple as pushing a button.

Crews have their own terminology for this facility. Since the transit pods are eggs, the bay is the "nest," the Drop Control Officer is "Mother Hen," and the eggs themselves are "Humpty-Dumptys."

Cargo Loading Areas

Cargo Bay, Minimal, with Airlock

This small cargo bay is typically used for receiving travel commodities. Foodstuffs, small machinery, replacement parts, medical supplies, and other stocks enter shipboard service here. An airlock (right) serves as the docking facility, receiving containers through the bay door. Once aboard, the containers are indexed and broken down by crewmembers who send the materials to their final receiving points along conveyors.

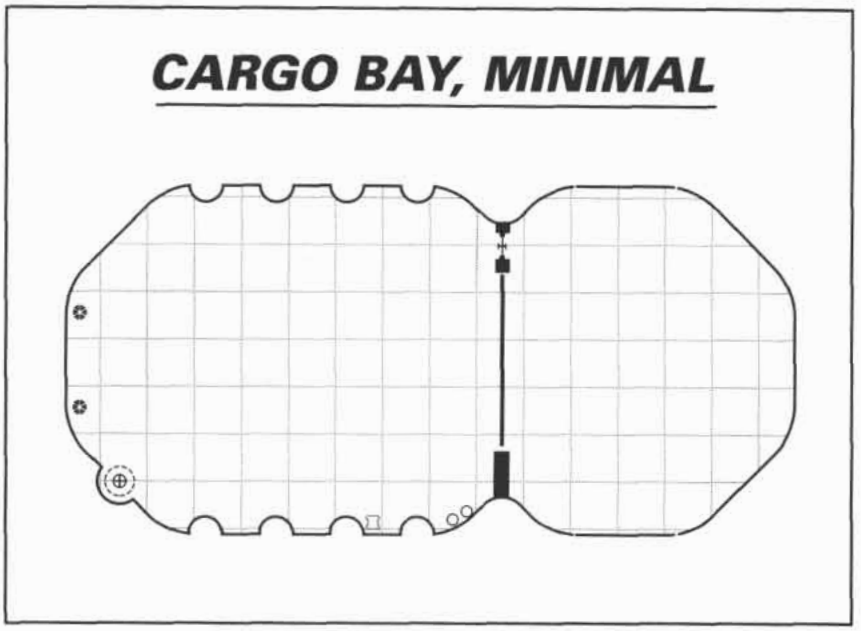
Smuggled goods and contraband flow easily in and out of cargo bays along with standard deliveries. Noncoms are usually placed in charge of the operation and, for a fee, turn a blind eye to off-manifest transactions.

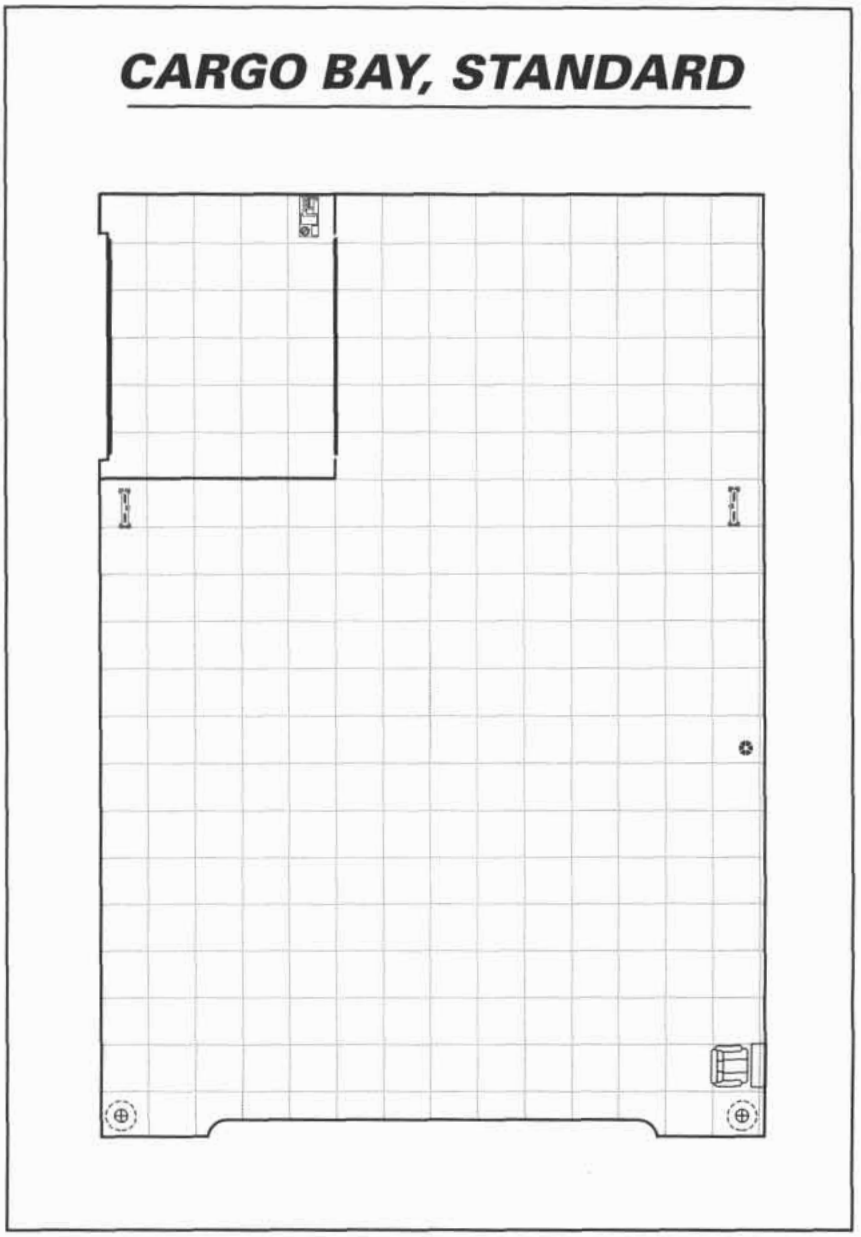
Cargo Bay, Standard, with Airlock

This medium size cargo bay handles the same sort of containers as the one above, but can deal with more of them. Cargo enters the airlock (not shown) and then the bay through the door opening at the bottom. The robotic containers are routed into breakdown position on tracks and the entire operation is controlled from the Cargo Master's Workstation (bottom right). After the cargo is classified and marked for routing, it is loaded through the conveyor station (top left).

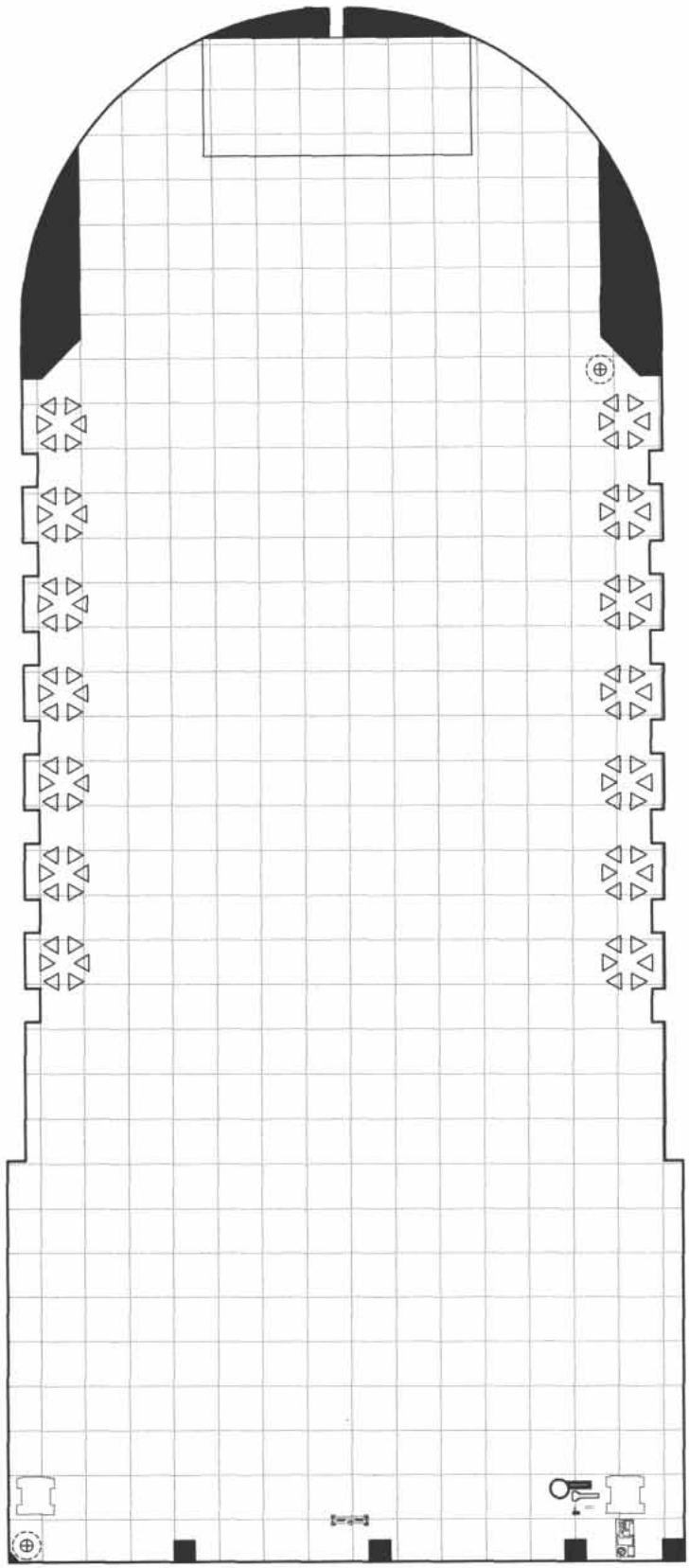
On some ships an officer manages the cargo bay, but on most, a noncommissioned officer or the equivalent is in charge. Cargo operations vary in importance depending on the purpose of the vessel. The architect should keep this in mind when designing this facility — a scientific research vessel engaging in physical archeology may actually need a larger cargo bay than a liner.

Cargo handlers pride themselves on the accuracy and speed of their deliveries. Broken into teams, they compete with each other's time and accuracy, wagering on the outcome. Cargo masters whose own bonuses depend on the performance of their crews encourage rivalry between teams. Sometimes these competitions even spread through an entire fleet, and records are kept at the main offices.





CARGO DOOR, STANDARD WITH CLAMSHELL DOORS



Cargo Bay, Standard, with Clamshell Doors

Primarily used on cargo ships, large bays like this one carry the products of the known universe. The large clamshell doors open to receive containerized freight on the staging floor (top). Fourteen workstations at the sides of the bay control each container individually, routing them by delivery sequence, and guiding them into pre-selected tie-down placements.

On ships equipped with this design, the Bay Cargo Master is always an officer with one other officer assigned to each bay. Supervision is in the hands of the Chief Cargo Master, who is always a senior officer. The architect is advised, therefore, to include office space in each cargo bay as well as a commercial office suite, appropriate lounges and recreation areas for these managers.

In recent decades, the transport of interstellar freight has become a fiercely competitive and cutthroat business. Cargo ships that were once lightly armed against raiders now bristle with particle accelerators, meson guns, and missile weapons to protect themselves from other merchant ships — or attack them. Most of a vessel's armament details will be given in the architect's contract, but suggesting additional weaponry can increase your commission and bolster a client's opinion of your worth. Heavy bulkheads and extra plating can be added for defensive purposes.

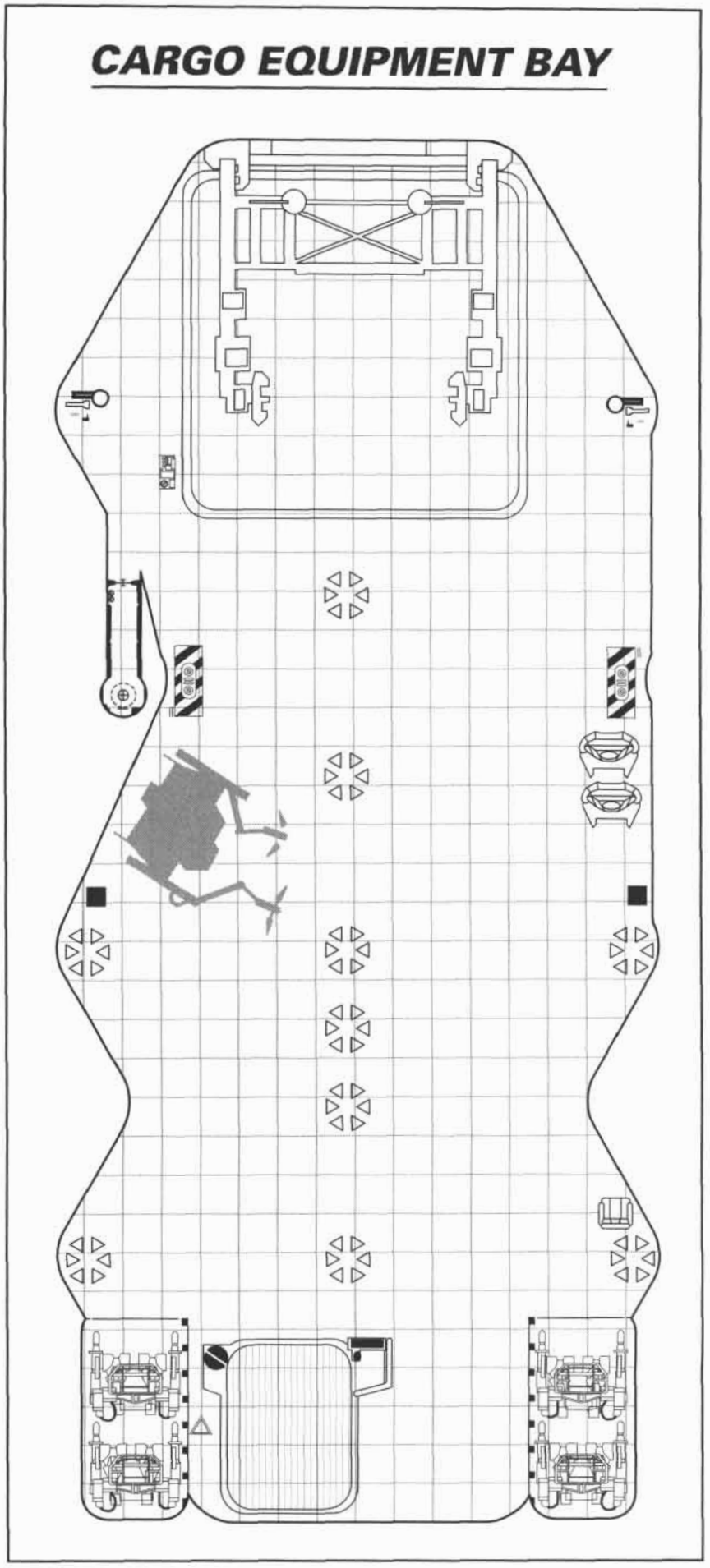
Recently, deep space freight concerns have begun to cross-train all of their officers in fire-control. This practice in turn has given rise to the number of privateers (many of them former cargo vessels) infesting the spaceways. Captains of all ships should be aware by now that just because a vessel mounts a corporate logo and identifies itself as ship engaged in trade to the stars does not mean it won't open fire the minute a chosen victim falls for the ruse.

Cargo Equipment Bay

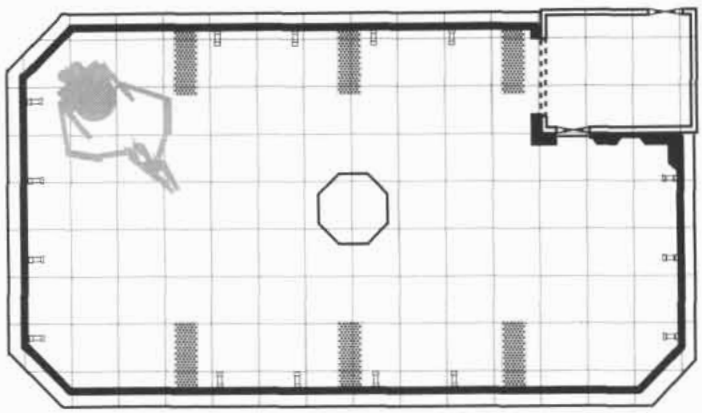
This specialized cargo bay is designed to handle equipment and special needs. At the top is a large cargo vehicle storage rack hanging over the elevator hatch. Heavy hardpoint cargo tie-downs are spotted down the center and at several points on the bulkheads. Cargo is positioned either with the ceiling-tracked cargo bots or by crewmembers in exoskeletons (bottom left and right). A cargo grav sled (bottom) is also available, as are attachable grav float modules. Workers in the cargo equipment bay have no permanent workstations that could waste necessary space. Instead, they wear computer notepads strapped to their forearms. On these units they record and inventory every piece of freight that comes through the elevator. The pads report directly to the Chief Cargo Officer's workstation.

There is nothing that cannot be handled in this bay. From giant earth moving equipment to delicate line inspection robots, every item passing through here can be locked down and safely secured. It is incumbent on the architect to ensure that the hardpoint tie-downs are placed in the best positions to facilitate the securing of even the most unusual and irregularly shaped item. Likewise, as much floor space as possible should be dedicated to cargo. Offices and workstations are unnecessarily waste of floor space.

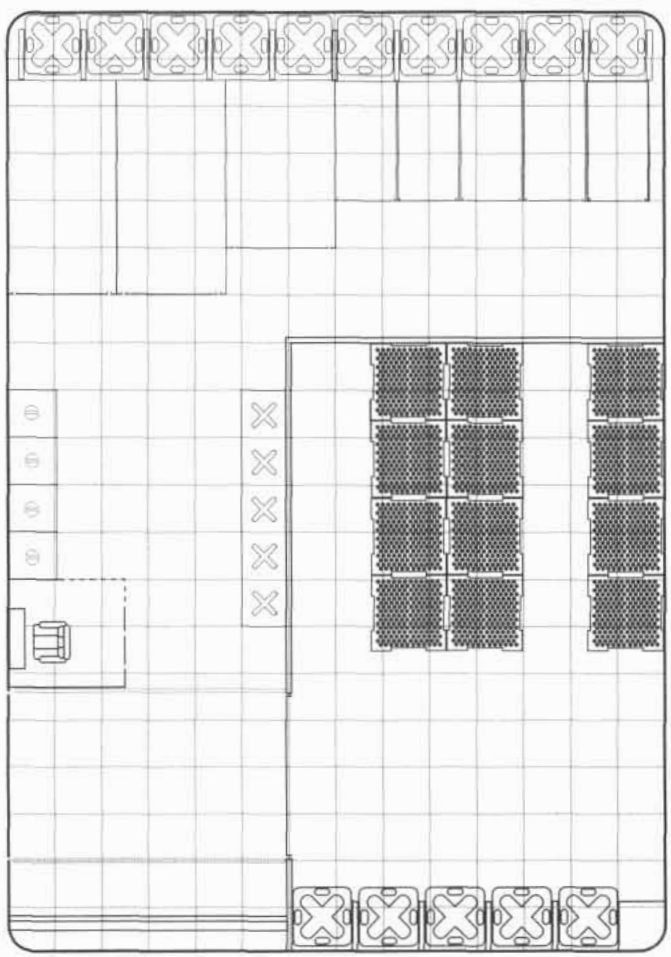
The equipment bay is the safest cargo hold on any ship, simply because crewmembers are trained to deal with the strange and the unusual. It is to the equipment bay that many archeological treasures are sent, not for security, but for safer handling. The Marne Magister once took onboard an entire temple complete with statuary, votive bowls, candles, and pillars. It was brought in on three huge grav-sleds, locked into place, and arrived at its destination without spilling a drop of holy water. Or so the crew claimed.



CARGO BAY, EXOTIC SUBSTANCES



CARGO BAY, ANIMAL HANDLING



Cargo Bay, Livestock

Like the cargo equipment bay, the livestock cargo bay should be equipped for any contingency. Shown in this example are large and medium animal stalls with feed and water stations (top) and small stacked animal cages (center and right). Another set of feed stations is at the bottom. The entire room is modular. Herding and pop-up guide fences can shift into confinement position. The cages, too, can be resized at the flick of a switch to handle anything from big game to pets. The veterinarian's office (lower left) has cages for very small animals and veterinary medical equipment. The Animal Emergency Response equipment locker (not shown) holds a variety of control weapons, stun guns and hypo delivery systems, as well as stretchers and various breathing apparatuses.

Ship's vets are a rare breed. They tend to be mavericks, people who did not fit in with their veterinary classmates, and, when bored, trouble makers. Most take to space to escape the company of others of their own race. As a group, they tend to close themselves off with their beasts and enjoy as little human contact as possible.

Cargo Bay, Exotic Substances

Walls of double thickness surround this room. The bay has a ceiling-mounted cargo bot, controlled from the handler's office (not shown) when the room is airtight. Materials come into the bay through a self-sealing floor-mounted elevator (center). A hardened airlock (upper right) can be used in an emergency to dump the room's contents and the entire area is protected by a fire abatement system. Six high-speed pumps enable emergency atmosphere dump, should gas threatens the ship.

Not all ships are equipped to handle dangerous materials; those that are charge high fees for the service.

Fuel Port and Skimming Bays

Fuel Port, Standard

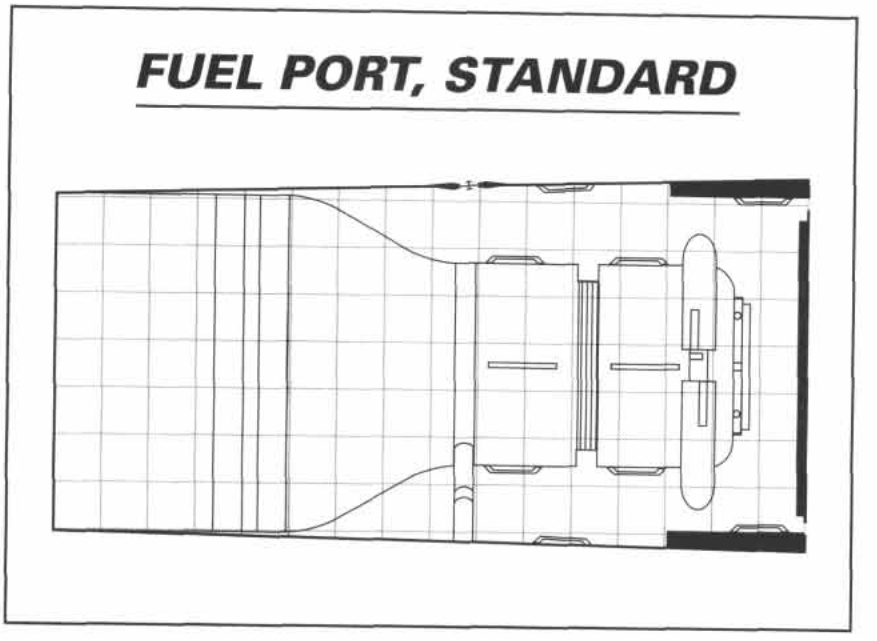
Once a refueling vessel is docked and secured, the fuel take-up doors (right) open. A robotic guide extends the fuel connector shaft; both made of hardened plastic, with sensors for accurate setting. Once the connector shaft is mounted, the entire system is pressurized and the fuel transfer begins. While the process is fully automated, the chief fuel officer is charged with ensuring there are no mishaps.

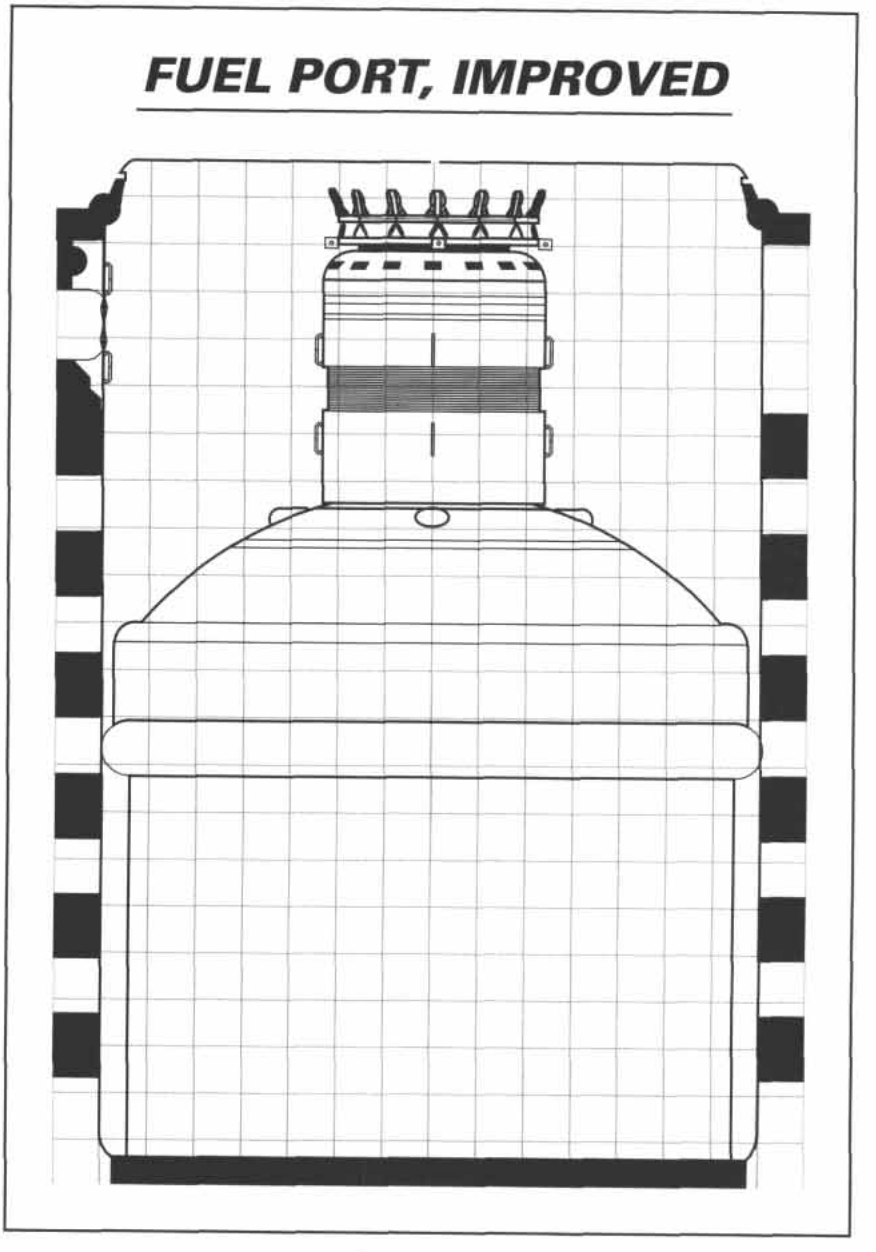
And mishaps there have been. There are no metal parts nor exposed electrical components in this system. A single spark can blow both ships halfway across a star system.

Fuel Port, Improved

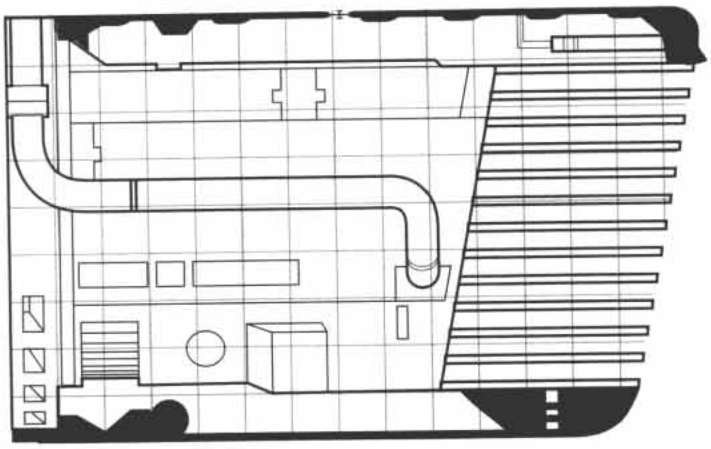
Little technology remains in stasis forever. Recently, a new standard for safe, accurate fuel delivery has come into use. This system uses a free-flying docking collar, robotically controlled, that propels itself to the fuel source and couples with a universal-docking receiver. The fuel is then transferred through the flexible tunnel collar trailing behind it. This system has several advantages. First, there is no need for the refueling ship to dock with the vessel to be serviced. Second, because the collar is universal, the practice of carrying several adapters is unnecessary. Finally, the system provides a far higher level of safety than the previous standard. While the system does have a supervisor, he can do little except hitting the Emergency Stop key on the control pad, however.

No system is perfect, of course. There have been reports of free-flying collars smashing into observation ports when an electronic synapse refuse to fire. It is even possible, although no reports have yet come, that the collar could mate with the atmospheric coupling, since that is the system it was developed from and the couplings do match. This could result in a vessel's atmosphere being flooded with liquid hydrogen.

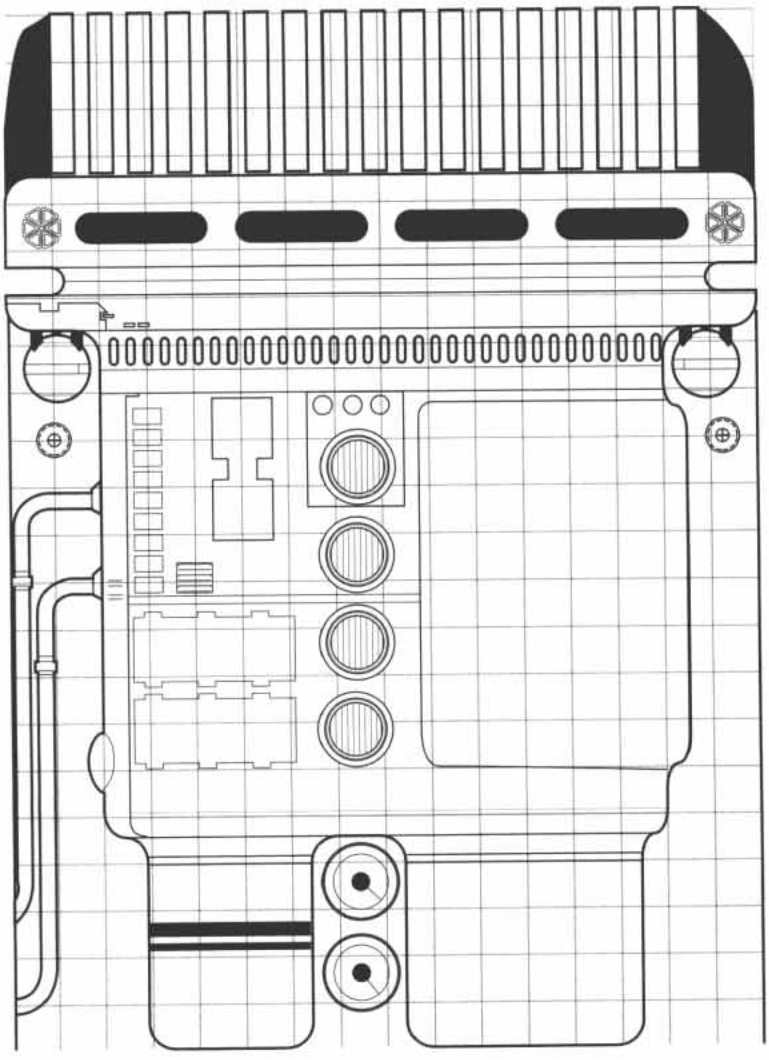




SKIMMING BAY, STANDARD



SKIMMING BAY, IMPROVED



Skimming Bay, Standard

One primary source of hydrogen fuel is the gas giants that are common to almost every star system. The gas is mined by "skimming," bringing the ship as low as possible into a planetary orbit and extracting the gas through a purifier that captures the H2, expels unwanted gases, and pumps the hydrogen into the refrigeration unit. The unit shown is the one commonly used on military and commercial vessels to obtain emergency fuel supplies.

While an emergency is an emergency, skimming is a dangerous practice when carried out by ships not designed for it, for they are easily lost to gas giant's tremendous gravitational pull.

Skimming Bay, Improved

These larger units are the ones used by miners engaged in hydrogen recovery. These large tankers are physically light and carry oversized gravitic generators and equipment. They spend days sweeping the atmospheric envelopes of individual gas giants, always moving on to the next until their tanks are full. While hydrogen is their chief stock in trade, they also capture other commercial gases, argon, helium, plus any other useful substance they come across.

The improved skimming bay shown here can purify, sort, and chill up to four different major gases and two minor ones. The wider scoops collect more raw gases, forcing them into the purification and sorting chamber under pressure. While the process is almost the same as a standard skimmer, this model is far more efficient and can handle greater volumes of gas at higher speeds.

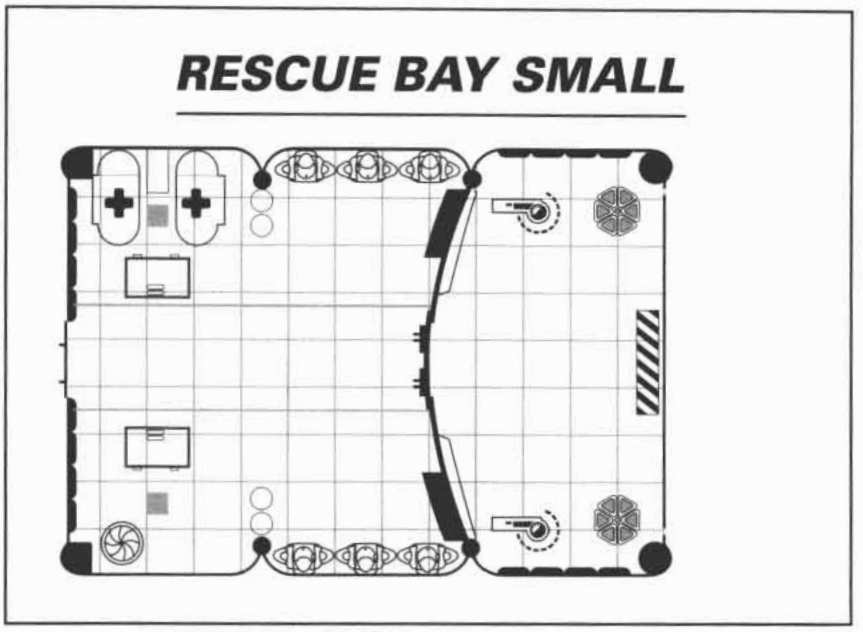
The "gassers" are hearty, confident, independent tramps who prowl all regions of space and always have tales to tell. This is a dangerous job and requires skilled professionals able to work together to get the job done at the lowest possible cost. Bonuses, however, are based on volume acquired for time spent, and some of these ships take many risks.

Rescue/Emergency Launch Bays

Rescue Bay, Small

Passengers and crew in need of treatment can use the rescue bay after a major accident or disaster. In the sample shown, a large capacity airlock (right) holds moorings for cables and two main hatch release bars. Inside the bay are suits, rescue equipment, and engineering armor. There are first aid beds that double as emergency low passage tubes. Rescue bays are also designed to handle survivors from other vessels.

Space Common Law demands that the ship nearest to a disabled vessel stops and renders assistance. The law is rarely ignored, since spacefarers know that their ship could be next.

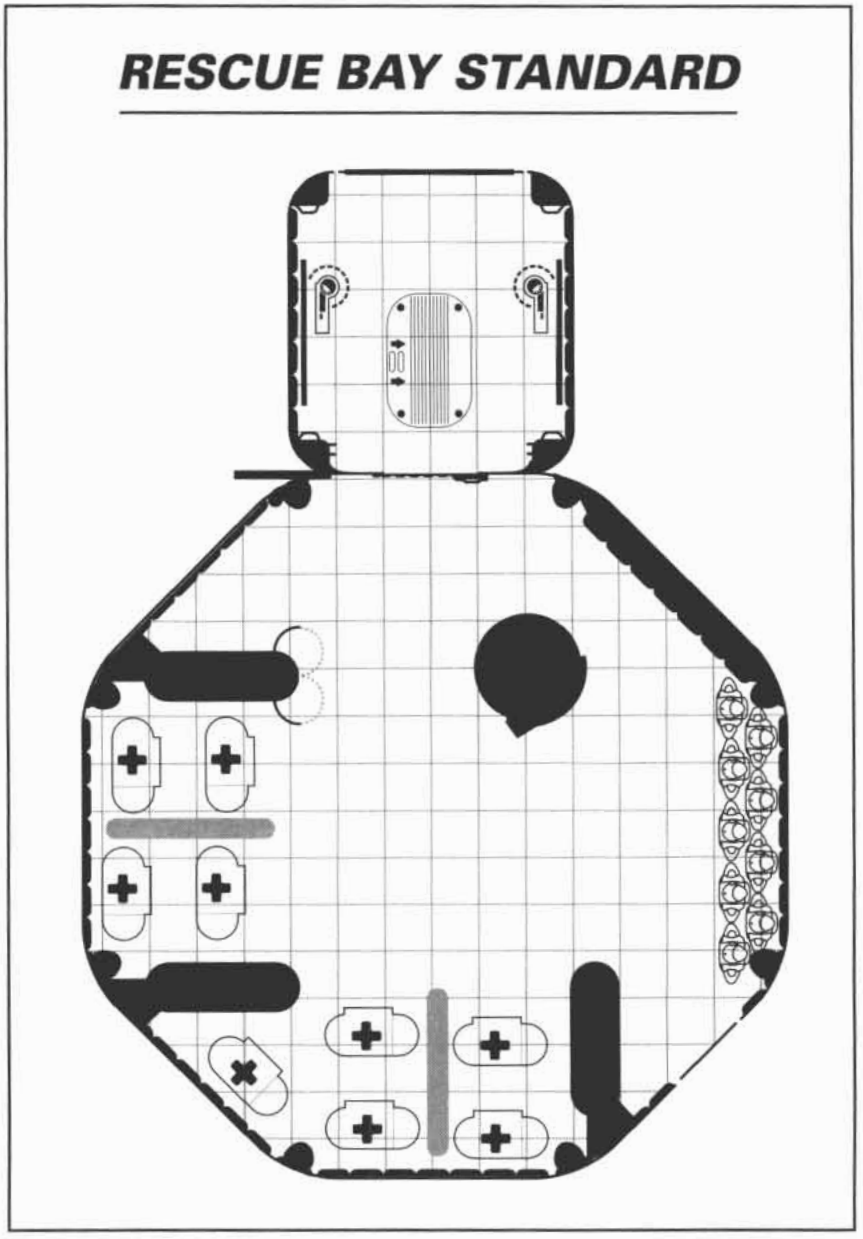


Rescue Bay, Standard

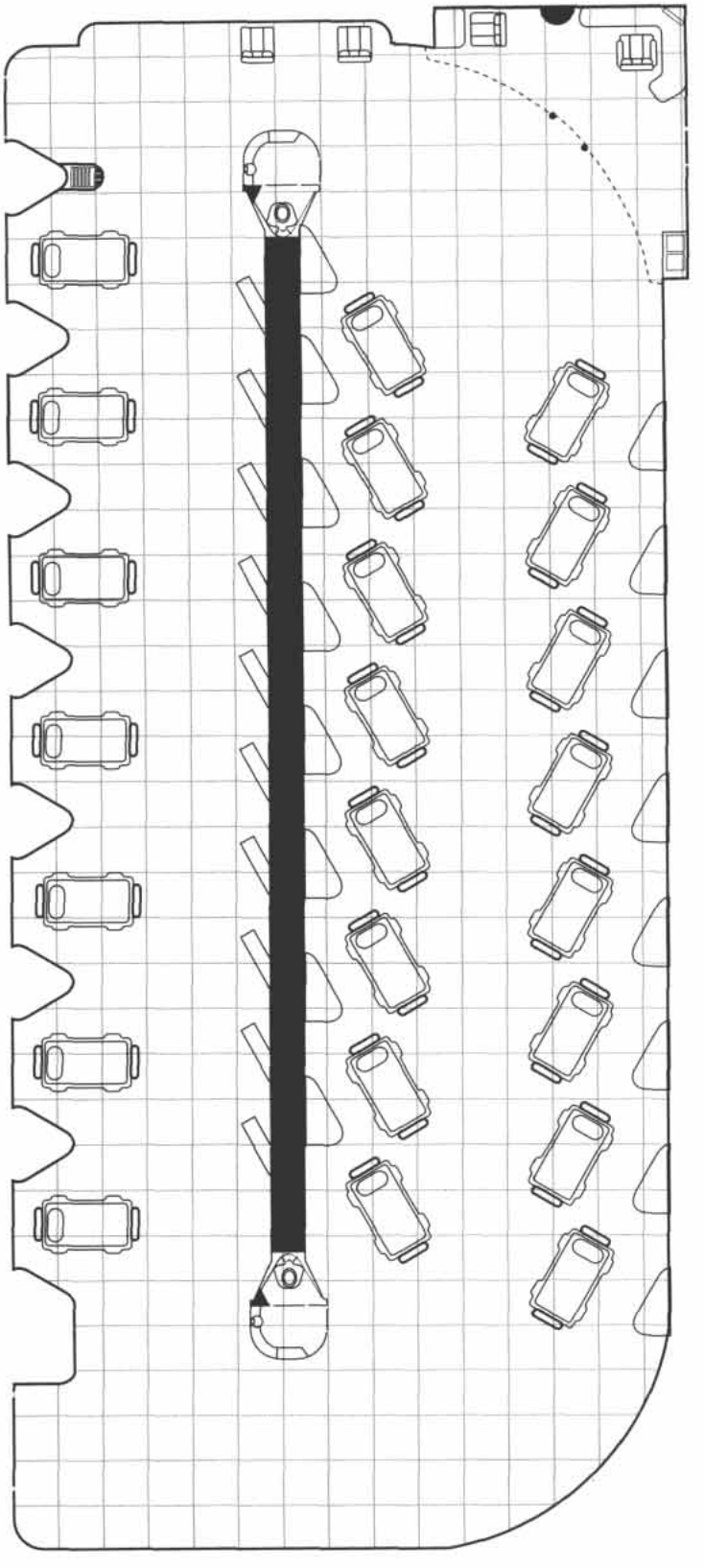
This greater rescue bay is found on liners, some commercial vessels, and large warships. The bay features a large cap airlock, again with two main hatch releases. Rescue equipment is located in a storage locker at the airlock, where it can quickly be put to use. The bay itself contains an emergency pressure chamber, every conceivable piece of emergency medical equipment and supplies, more suits, and more combination bed units. While all units are not shown, up to thirty individuals can be treated here.

The airlock has a special high-speed door that can be opened and closed in seconds. Atmospheric vents are also pressurized to allow rescue teams to get in and out in the fastest possible time. The more efficient the architect's rescue bay design, the more lives that can be saved.

Rescue teams are made up of volunteers who pride themselves on their rapid response. Training is ongoing, usually four hours a week. Rapid Response Teams memorize the locations of every piece of gear in the equipment locker and are fully trained in the use of all. Many corporations sponsor annual competitions for the company RRTs with very substantial prizes.



LOW BERTH DISCHARGE BAY



Low Berth Discharge Bay

The low berth discharge bay is an observation ward optimized for the treatment of those who have difficulty coming out of cryosleep. Medical readouts on the lids of the tubes flash tell-tales when a passenger is at risk or is weakened from the experience. The containers are then hooked to portable cryomaintenance carts and wheeled into the discharge bay. Here, doctors and technicians slowly revive the individuals, treating specific problems, and then transferring them to lightweight gurney beds. The robotic gurneys are then sent into the recovery portion (right) to await discharge by the Medical Officer in Charge. Insurance concerns and lawsuits have helped to make low passage recovery an almost exact science. While there are always unusual complications to be dealt with and occasional rejection syndrome, most patients spend less than two hours in recovery.

In the case of a serious medical emergency, the first warning comes from the low-berth unit itself. An annoying klaxon sounds in the low berth section and repeats in the CMO's office. The details of the medical problem are sent through telemetry to the CMO's screen, which also displays treatment options.

The chief medical officer's office is located at the top right, with a transparent wall built for observation. Equipment is carefully stowed and is available for emergency procedures when required. Toilet facilities are located at either end of the center wall.

Most of the medical personnel on shipboard are young recent graduates. Spending a few years as a "space doc," even as an intern, looks great on a resume. Those who enter private practice hang their commendations and awards on the walls of their offices, silent testimony of their skills for their patients.

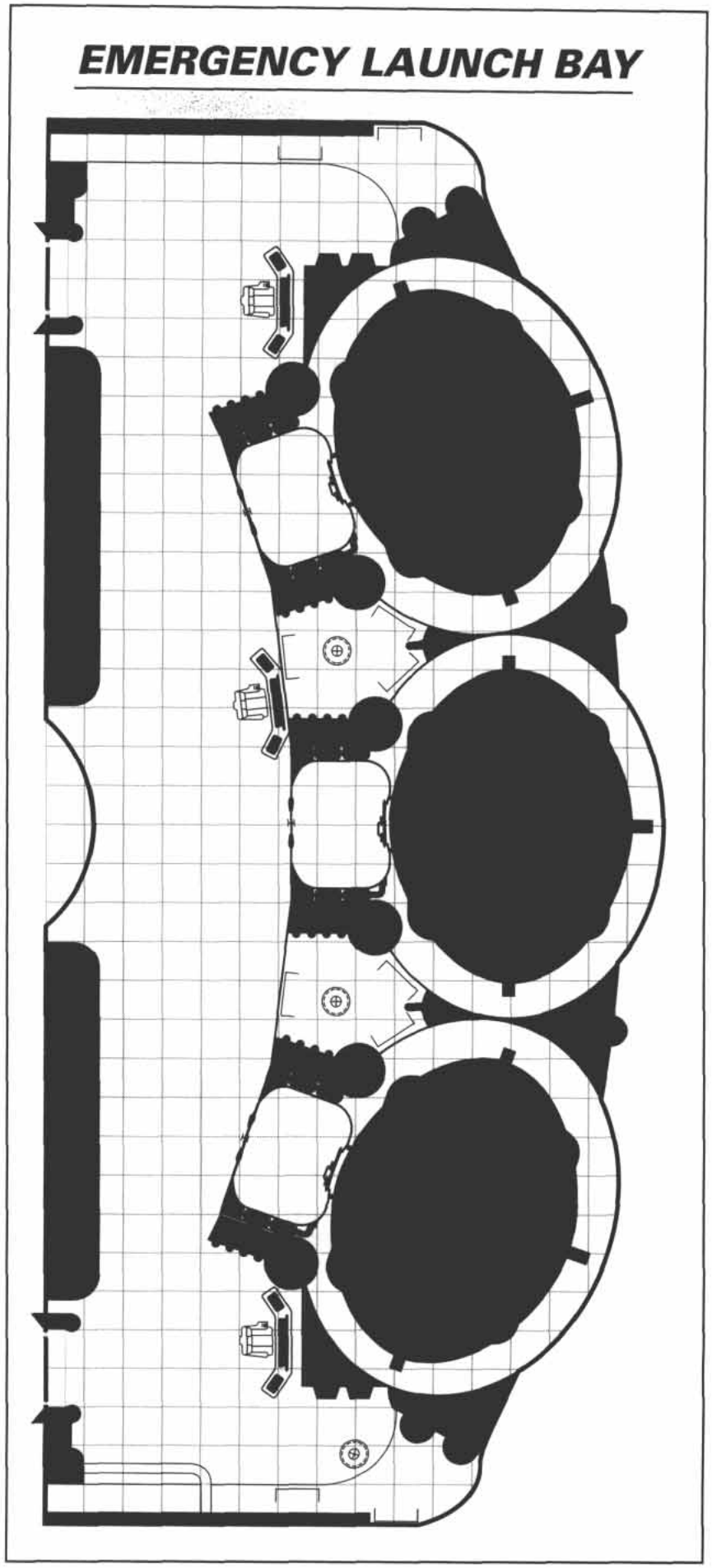
Senior medical staff, of course, consists of old hands, career men and women who have channeled their wanderlust into vocations.

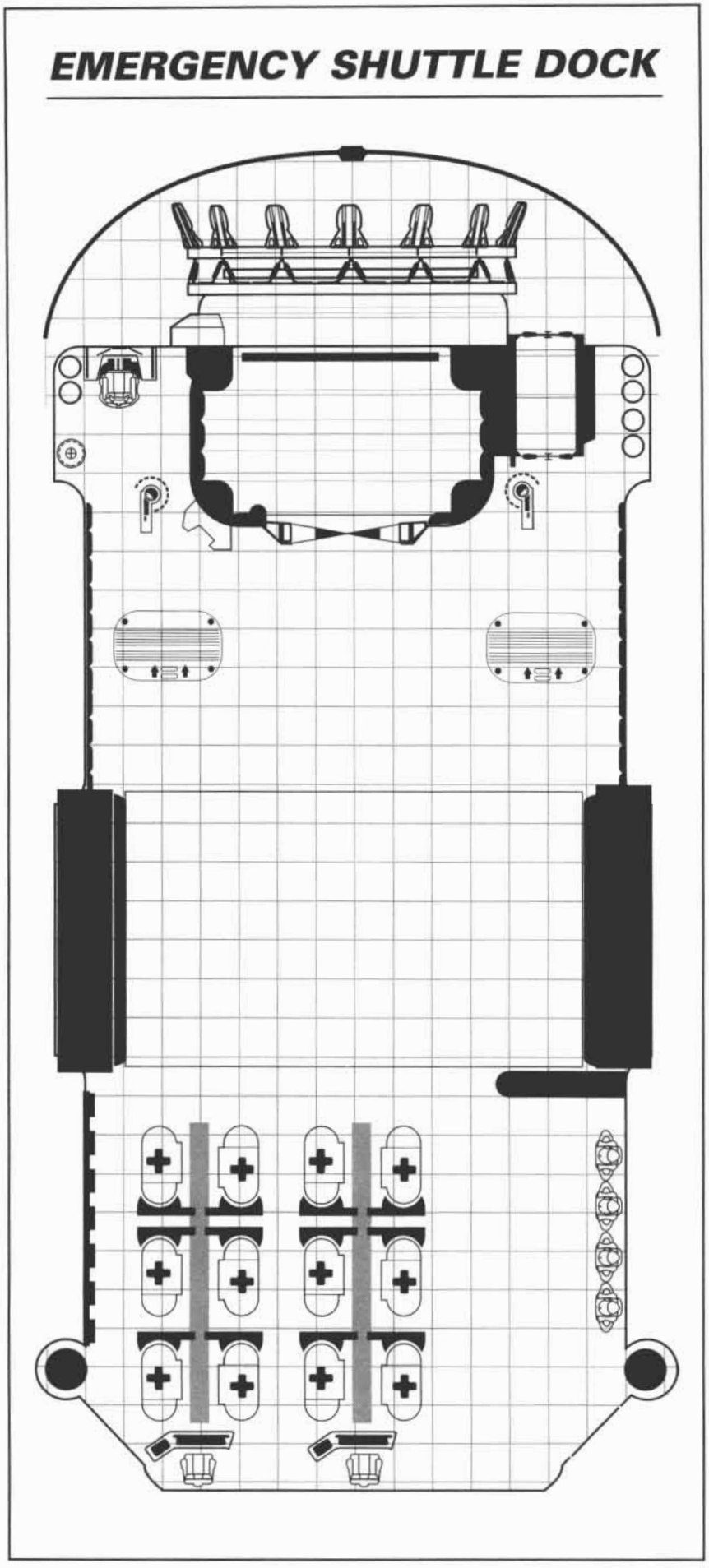
Emergency Launch Bay, Small

The emergency launch bay is used to escape a ship that is plunging headlong into disaster — a hull breach, collision with an asteroid or another ship, a fusion engine approaching critical mass. . . whatever the reason it is time to get out. In the example given here, three emergency doors equipped with explosive bolts can be blown open. At the base of each is a large capacity manual airlock. At the top, bottom, and near center are control panels to remotely bring emergency boats and other ships on-line. Maintenance access hatches, above and below the center, control boat launches and other emergency systems while repulsers push the escape vehicles clear of the ship. Survival balls and space suits are stored in lockers at left, top, and bottom.

These bays are rarely used, but they are always set on weekly maintenance schedules because when they are required, they have to work. Although safety is always foremost in the minds of naval architects, the design of last ditch survival mechanisms should be a primary concern. Explosive bolts, for example, have been known to refuse firing, so double the numbers required and wire them to different sets of controls. The vehicle demand panels should also be duplicated, as should any other part that could fail in a crisis — the lives you save directly reflect upon your professionalism. The bonus for a job well done lies in satisfaction, not in credits and gems.

With the exception of maintenance crews, crewmembers never think about these areas until they need them. The rate of failure in emergency launch bays is small, but has permanent results. Any equipment failure here will doom those trying to get out, and anything can fail. Survival most often depends on the quick wits of the survivors.





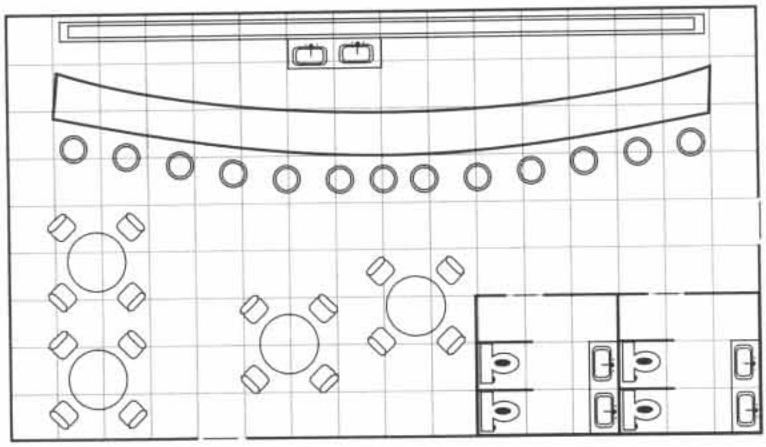
Emergency Shuttle Dock

These receivers have saved a lot of lives and can be found on any class of vessel. Beginning at the top of the example, the architect should bear in mind all of the components of this complex rescue mechanism. The crown at the top is the dock cover. This can be opened electronically or manually from either in ship or from spaceside. In a worst case scenario, the cover can be blow off with explosive bolts, although the resultant debris could create problems. Once the cover is removed, the docking collar can be extended. The universal docking collar will mate with any known airlock system without the need for adapters. The collar is free-flying with a built-in guidance and gas jet propulsion system and trails behind it a telescoping escape tunnel. The tunnel protects escapees from hull and space debris while providing atmosphere and pressure — as long as it is unbreached. Below the collar is a large transfer airlock that affords entry into the tunnel. To the right of that airlock lies a smaller two-person version used for normal maintenance and repair. Like all other emergency systems, the shuttle dock is on a weekly schedule for preventive care. To the left of the airlocks is the dock control station. Interior control of this facility is routed here. Below the locks and the control station are the engineering equipment lockers, spare parts for the unthinkable. Below and to the right and left are stowage for space suits and rescue balls. Below the lockers are emergency medical stations and low berth passage tubes. Finally, engineering armor (right) are placed at the shipside entryway.

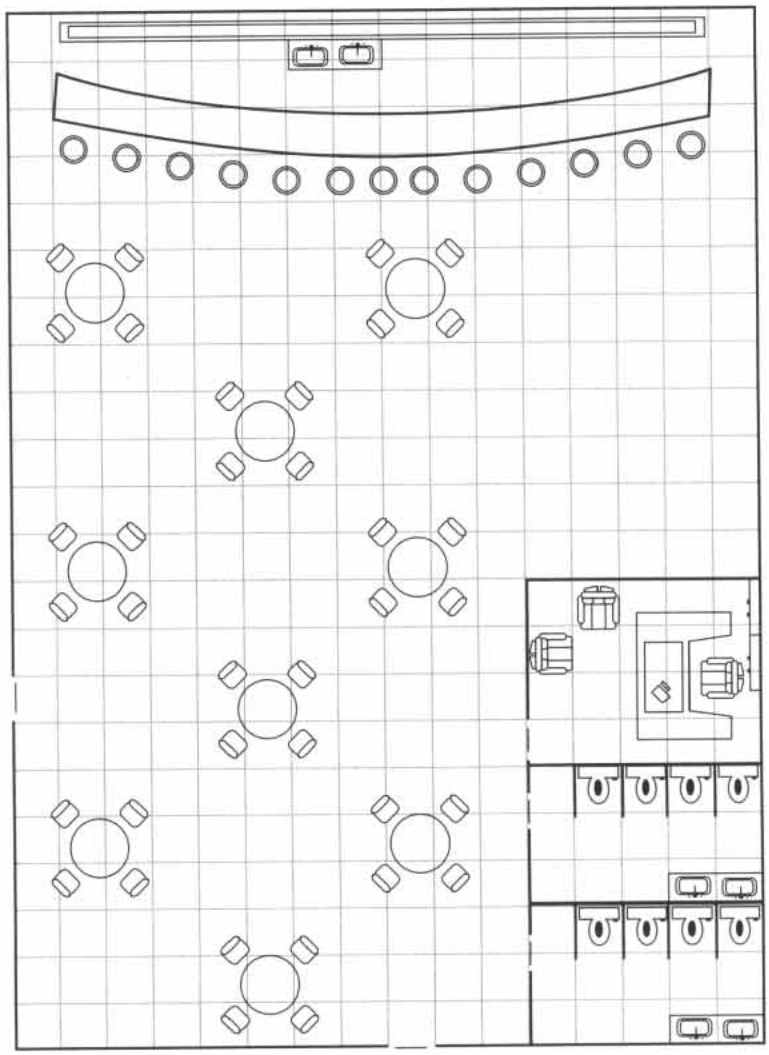
Given the current state of ship design and power enhancement, most of the emergency stations and bay are never used — but that doesn't mean they should be neglected. If there is one spot of absolute terror aboard a ship, whether a system tramp or interstellar voyager, it is the thought of a crisis with no solution.


LIFT

PUBLIC CLUB, SMALL



PUBLIC CLUB, MEDIUM



Clubs

Public Club, Small

Public clubs require no memberships and no fees, except for "cover charges" when entertainment is offered. The architect is given a lot of latitude when it comes to public clubs; any given single standard or spec is rarely spelled out in the contract. Still, what is required here is atmosphere. People come to these places to meet, drink and dance, so the floor plan should reflect this, regardless of décor.

Public clubs are the equivalent of planetside bars and cocktail lounges. Games are played, confidences are exchanged, and fights sometimes break out.

Public Club, Medium

This larger club provides an actual dance floor as well as an office for the manager or lessor. Like many smaller facilities aboard liners, public clubs are often leased to private operators.

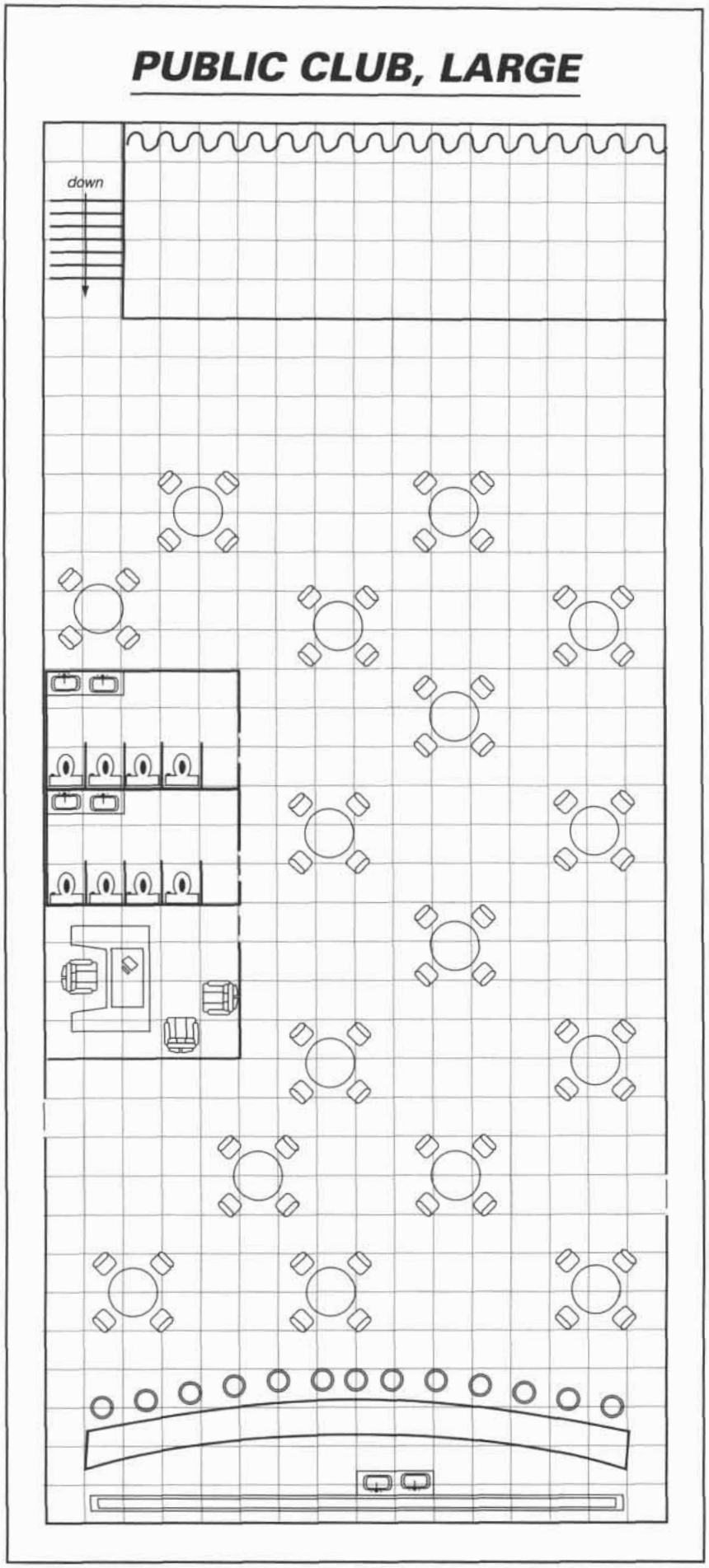
Many of the public clubs are owned, through fronts, by information gathering organizations or "Pinkies." (The name Pinkie is an ancient and, we are told, honorable one, but no one has ever traced the source of the term.) All employees of clubs owned by Pinkie groups are agents. And all conversations overheard at the bar, and even at the tables, are recorded and examined for salability. It is surprising, however, the amount of intelligence and detailed bits and pieces they uncover. Is a corporation about to release a new, startling discovery? A mechanic, here on the vacation of his life, may brag about his contribution to a seatmate at the bar. A medical salesman, en route from here to there, might just mention a new drug that will triple the value of his company's stock. Is a government trying to learn about a new fledgling revolutionary group? A pair of radicals, on a gun-buying trip, stops into the bar to release some stress, and the table is bugged.

Public Club, Large

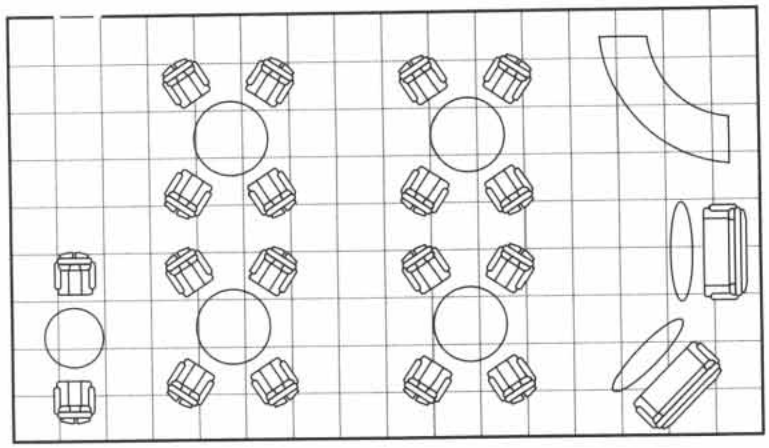
The largest of the public clubs, this lounge features more tables, a bigger bar, and a partially canopied dance floor. Frequently, these large clubrooms also feature live entertainment, both musical and stand-up. Cover charges are the norm here, not the exception. Décor tends to be better as well, and although not as elaborate as the theme rooms of the private clubs, some attempt at ambiance should be made. The architect is advised to do as much as possible within the budget of the project. Just because these are common gathering places, do not assume you can neglect color and style. The patrons who frequent these lounges pay for their entertainment and that money goes (directly or indirectly) into the coffers of the Liner Corporation. The more money an architect's vessel generates, the more commissions come to the architect.

Larger clubs are often leased too, and not just to Pinkies. The Imperium, and some other governments, has learned from the private contractors. Many of these locations are leased to governmental secret security organizations, all under dummy names, of course, for the purpose of monitoring "political purity." In fact, some security agencies have sent agents into Pinkie organizations, not to spy on them, but to learn their techniques. The government types, of course, care little for commercial information or data of concern to governments with whom they have no contact, so their scope is more limited. Still, more than one prisoner in a political incarceration facility got there after one too many drinks supplied by an overattentive bartender

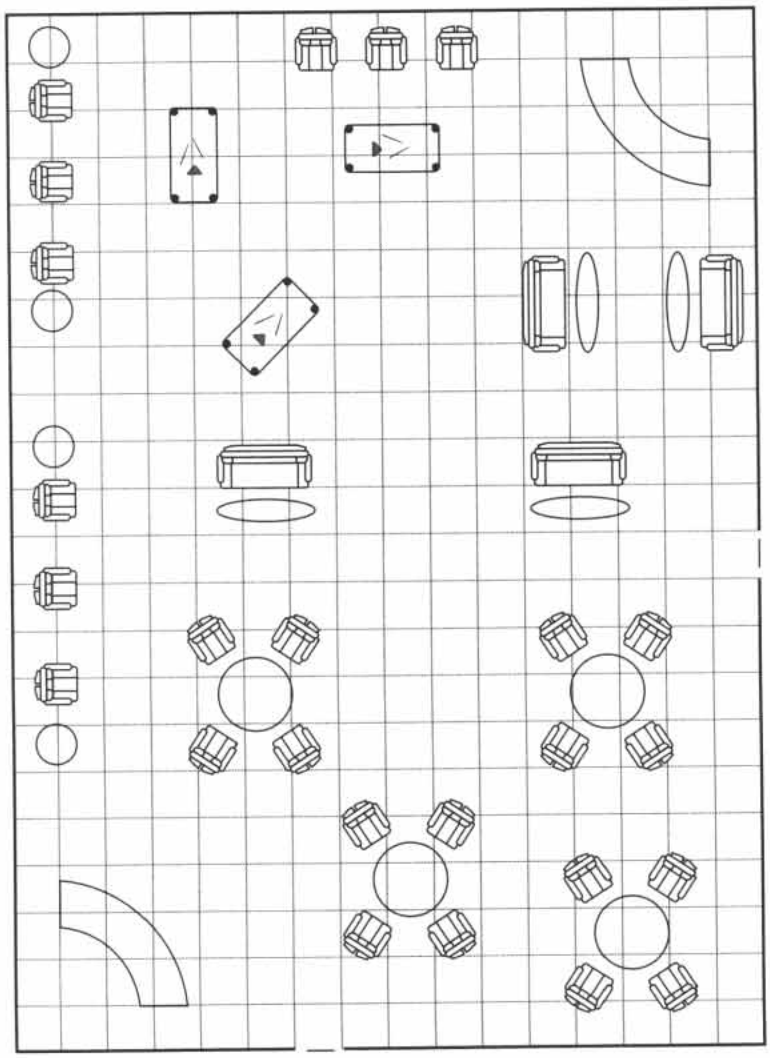
Agents in this kind of service learn more from their private instructors than how to catch a radical and are actually hired by the Pinkie group as well to collect other information in which the government is not interested. Many of these agents go on to very comfortable retirements.



PRIVATE CLUB, SMALL



PRIVATE CLUB, MEDIUM



Private Club, Small

These clubs are called "private" because to use one requires a membership. Of course, the liner sells the memberships and they own these lounges. They are not that much different than public clubs, except that most of the private rooms have unattended honor bars, and a passenger needs only to sign his name and room number for whatever is taken. The private rooms are more spacious, better appointed, and usually decorated in a thematic style.

The liners like to claim that these rooms are "safe zones," meaning that they are guaranteed to be devoid of listening devices and bugs. This claim is not universally accepted. . .

Private Club, Medium

This larger club has a frontier theme. Two honor bars at opposite corners of the room provide self-service beverages. The walls are hung with the heads of game beats, wheels from wagons and carts normally drawn by heavy draft animals, weapons, rough clothing and other items common to the expansion periods of many worlds. This has always been one of the more popular themes, and there is a long waiting list for membership. There are billiard tables in all these establishments if space allows, and the restrooms (not shown) continue the motif of the lounge. (The toilet control cranks in this one, for example, are shaped as handgrips from archaic projectile weapons.)

Intrigue is rarely practiced here; plots and counterplots are not discussed in these kinds of private establishments. The people who join such clubs are usually dull and without guile; thoughts out of synch with their simple, predictable lives just never enter their heads. The members do enjoy the fantasy of strange and exotic places, however, as long as they remain fantasies. This room, for example, is as close as most of them will ever get to a frontier community.

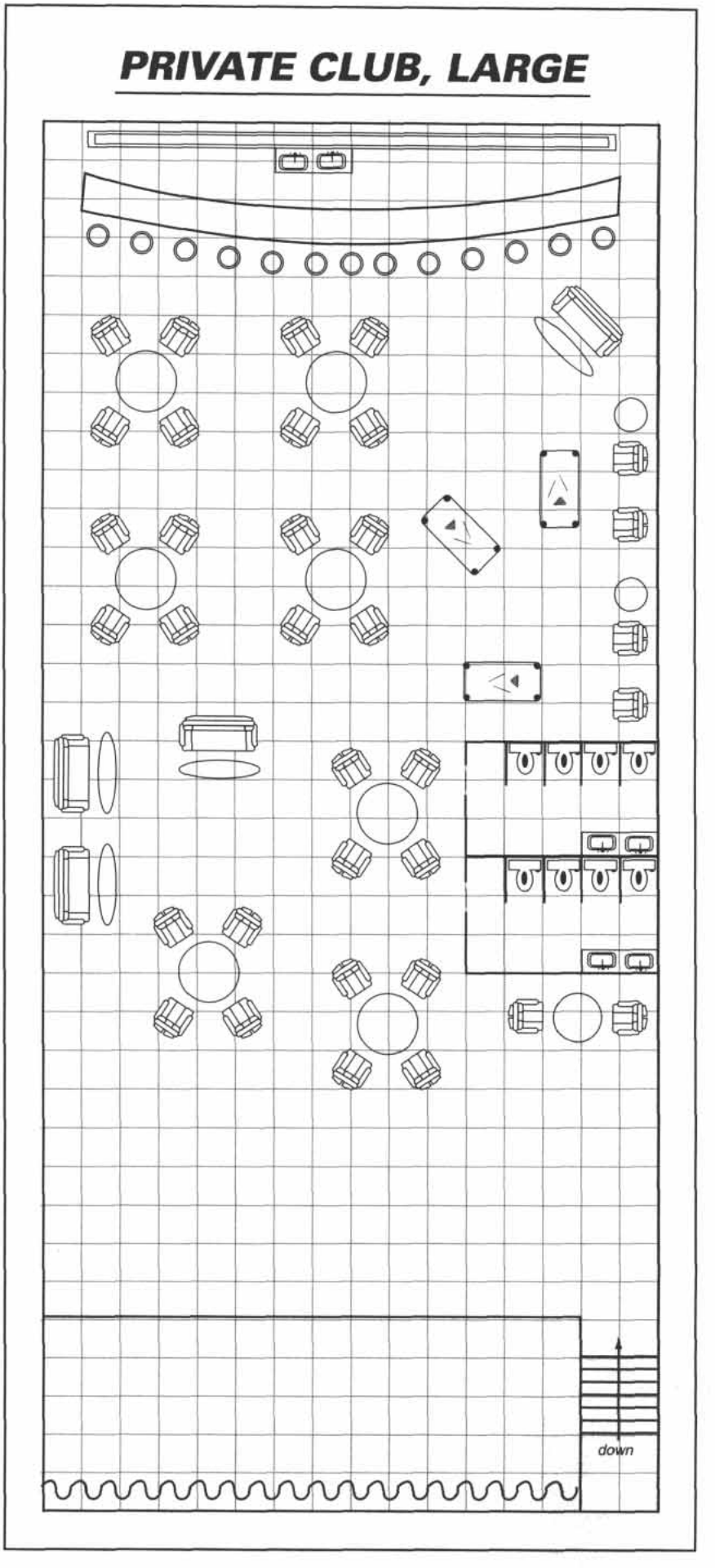
Private Club, Large

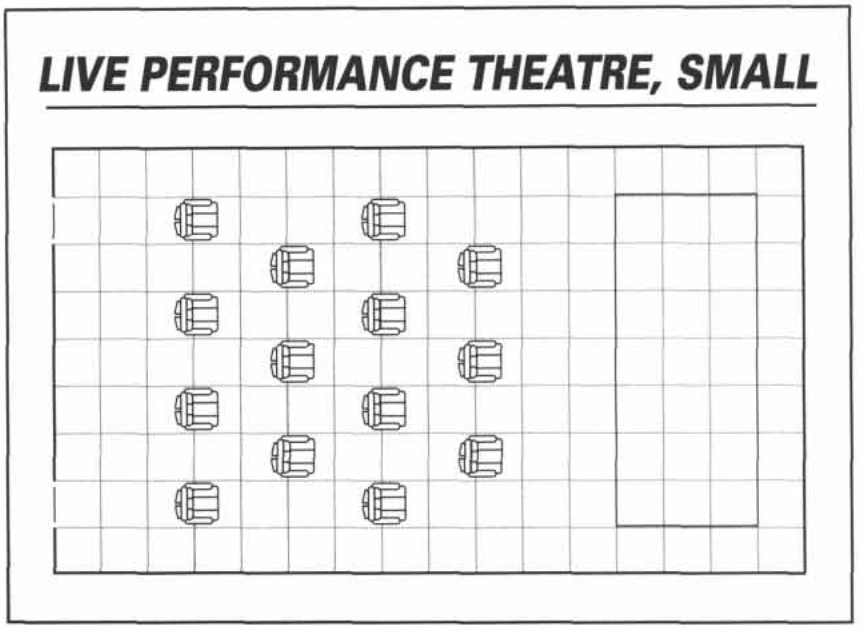
"Private clubs" are what liners call the relaxation lounges to which they sell memberships. A standard example of a large a club is shown here. There is a cash bar (top), plenty of tables and couches for games or just conversation, and billiards tables. Atmosphere is the real commodity sold in these rooms. Most have themes that are repeated throughout the décor and built into the sound system. The one shown here boasts an Ethnic Pub motif, complete with dartboard (not shown), billiards, and tankards of ale. Other thematic treatments based on jungle scenes (potted trees, live birds, soft background sounds of familiar animals), desert landscapes, seascapes, and orbital station views are also popular subjects.

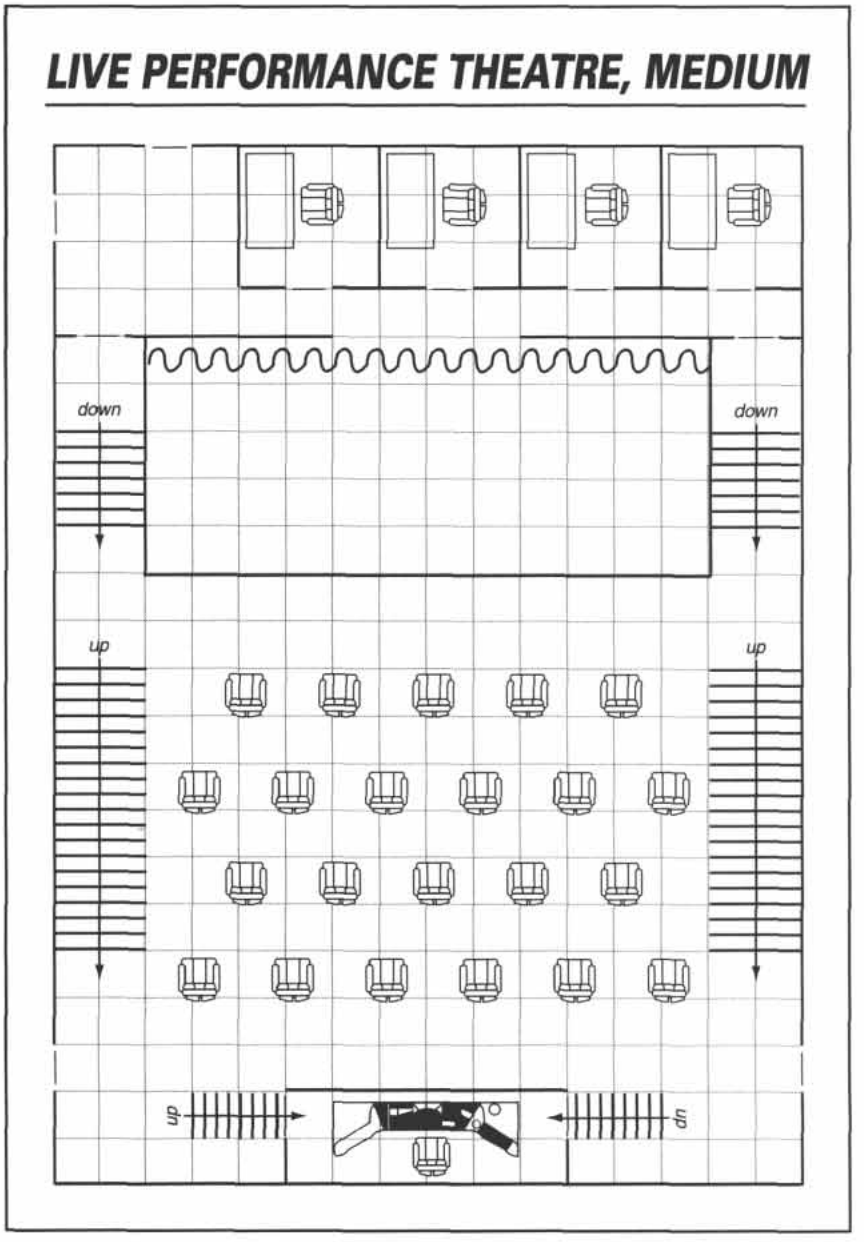
The architect is cautioned to consult with the client for details of décor and ambiance. Never assume you "know" what a client wants! More than one commission has been frittered away because the cost of non-specified changes came out of the designers' own pockets. These lounges are fun to create, but it is advisable to keep an interior decorator on retainer to deal with the minutiae of the theme, fabrics, furniture, and art — the jacks-of-all-trades died centuries ago. Likewise, color consultants and gaming specialists should be on staff or retained by those engaged in liner architecture.

There are few if any problems in these establishments, people who pay for the privilege of coming here don't abuse it. Rooms like this function as "homes away from home," so people traveling together for business or personal reason generally join the same clubs — insulation against new ideas and riff-raff.

Large clubs are particularly attractive to "travel clubs," groups of like-minded people who vacation together once or twice a year, seeking adventure (but not stress) and a brief escape from their routines.







Theaters

Live Performance Theater, Small

Most liners, some commercial ships, and even a few long-range military vessels, have a theater tucked away somewhere. On naval vessels theatrical centers are usually built by crewmembers with a common interest in the performing arts. The stage is as large as space will permit and still leave room for audience seating. On liners and commercial vessels that carry passengers, even small theaters are comfortable and well appointed.

Performances of all kinds are offered in these theaters, from dance and standup comedy to revivals of Shakespeare, Rostand, and Goyd'yen of Tharpor. Smaller vessels are exclusively given to amateur works; larger ones may hold a professional company.

Live Performance Theater, Medium

On mid-range liners and commercial vessels that take passengers, particularly on ships carrying professional acting companies and headliners, larger theatrical facilities are required. These should be cleanly laid-out, but care must be taken to ensure that every seat is a good seat. This is usually done with risers, so that each row back from the stage is a little higher than the one before it. Even when a theater is set up circularly, good seats guarantee attendance. Dressing rooms (a minimum of four) lie backstage. The stage itself is large with full lighting banks both above and at the sound, and work console in the upper balcony at the rear. Low-rise stairs allow the actors easy access to the stage and the audience.

Professional acting companies are as diverse as the people within them. Some specialize in comedy, drama, dance or musicals of specific cultures. There are also generalist companies offering a variety of talent and a different show every night. Paid performers customarily receive a small stipend and a percentage of the gross gate receipts.

An actor's life is also good camouflage for spies and assassins. Security chiefs are aware of this and keep a close watch on thespians.

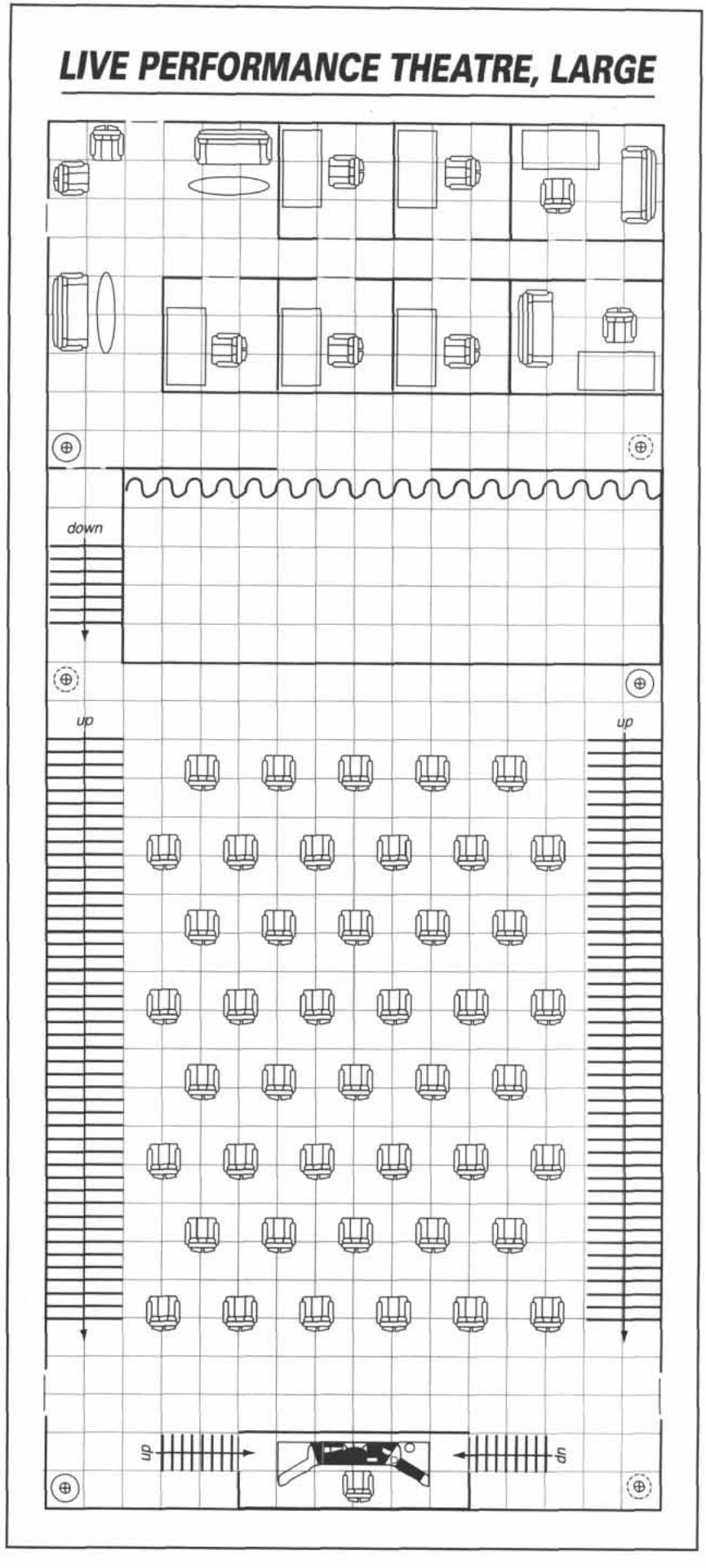
Live Performance Theater, Large

A theater of this size is found only on great liners and onboard the small handful of wealthy theatrical traveling companies that own their own vessels. These theaters are an actor's dream. Fantastic lighting and special effects, sound-on-demand systems, and holoscenery add a magic to live performances that doesn't happen on any other venue, even tridee. The companies performing in these theatrical palaces demand certain comforts. Dressing rooms must be larger and more comfortable — six to eight of them are ideal. A "Green Room" (ancient term, exact definition unknown) is also a requirement. This is a backstage lounge area where actors relax when not on stage with fellow cast members and the occasional guest.

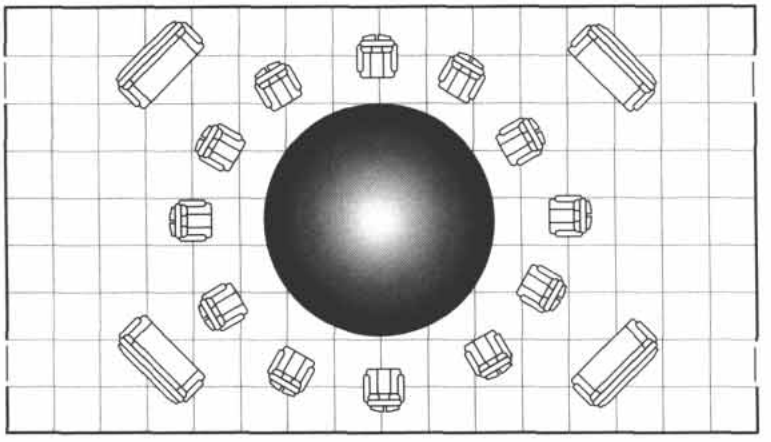
Nor is audience seating neglected. Large comfortable chairs, spaced so that no one has to rub elbows with a stranger, are the standard. Restroom facilities (not shown) should be provided for both the acting company and the audience.

Actors who reach this level are usually at the top of their careers. They demand to be and are treated as stars. Petty thieves, spies, and assassins are rare in these companies, but a few always slip through. After all, a spy, an assassin, a good thief must first be a good actor, and many find old habits hard to break as they climb the ladder. Security officers are aware of this, but are forced by protocol, tradition, and senior management people to treat performers with respect and courtesy

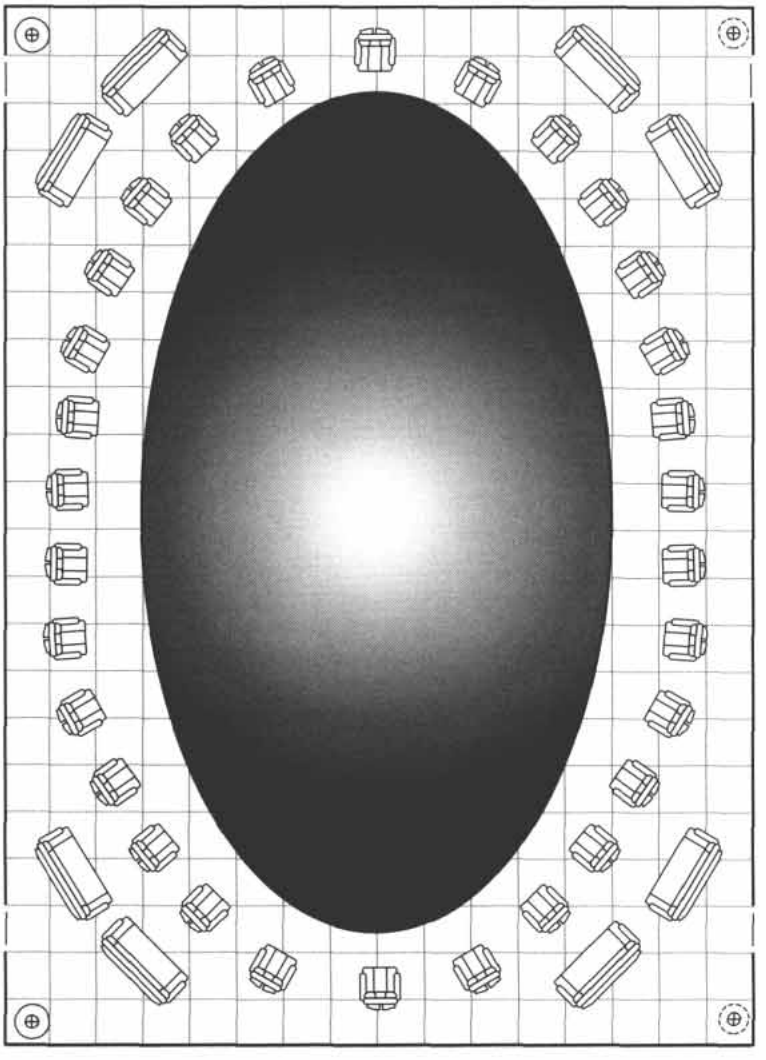
Sometimes, when a ship is "between performances," amateur performers or clubs are allowed to take the stage. While professional troupes look down on these "players' with great disdain, they often take risks that trained companies would never attempt. Experimental drama and comedy is often a specialty of these groups and should not be missed.



TRIDEE THEATRE, SMALL



TRIDEE THEATRE, MEDIUM



Tridee Theater, Small

Tridee is an antique term for a contemporary entertainment center. While current technology is actually holographic, the tridee name stuck. Tridee projects in an oval auditorium with chairs set all round. Because the action takes place in a fully three-dimensional area, there is no distortion to the image, no matter where a viewer is seated.

Small tridee theaters are found in military vessels and crews' entertainment sections on liners and commercial vessels. Size is as appropriate to the ship and her crew, and most small theaters seat twelve to fifteen viewers, occasionally more with seating on sofas.

Tridee Theater, Medium

Medium Tridee theaters seat thirty to forty-five people in comfort. The screen is larger, producing a better image, and hidden speakers provide a true "surround sound" experience in all directions. These theaters are built for larger military and civilian ships. On smaller liners, it is common to install a small theater for the crew and a medium-size tridee for the passengers. The basic layout is shown here, and the architect is advised not to deviate from it much.

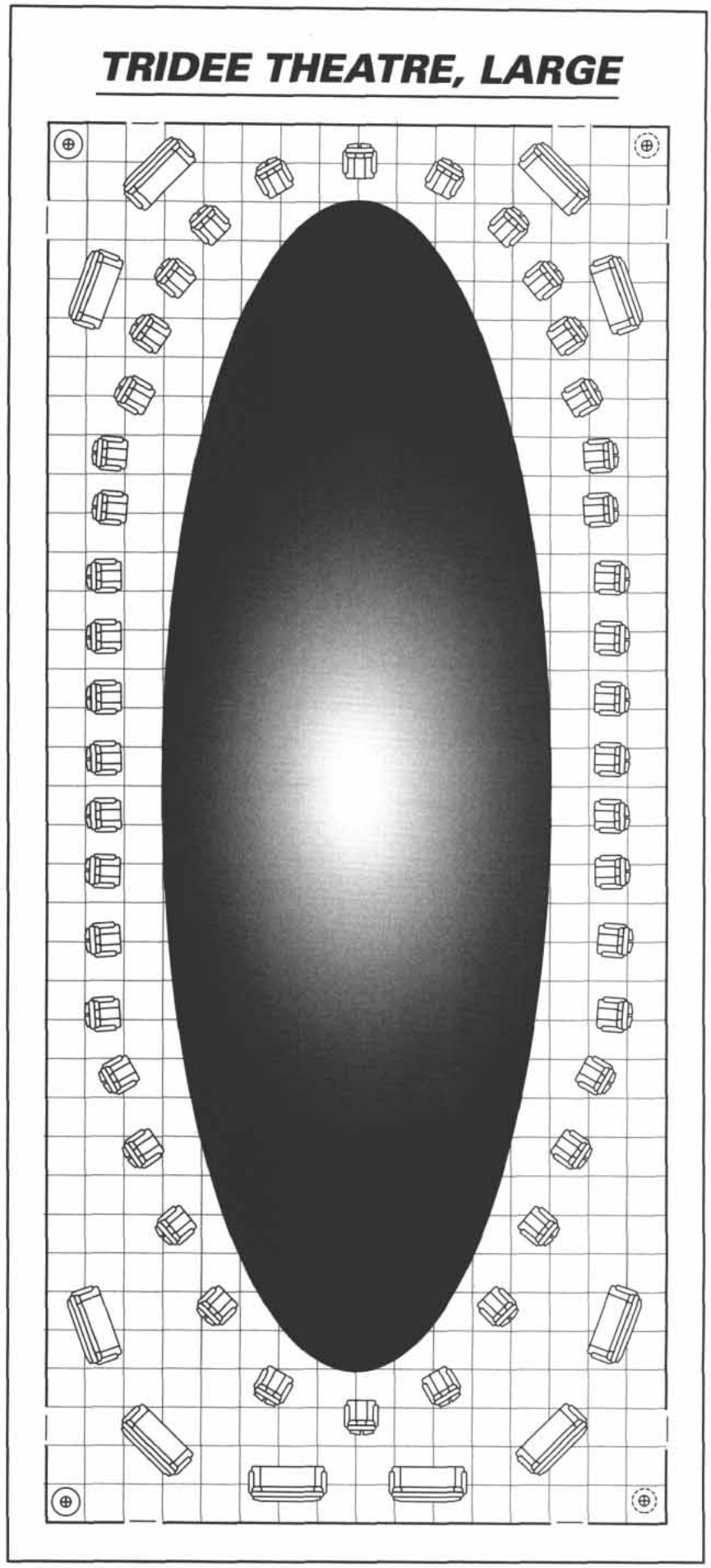
The holographic images in the tridees are so convincingly real that many viewers are overwhelmed emotionally by the image and some react strongly. Horror vids in particular are almost guaranteed to drive the faint of heart screaming from the theater. Even travelogues can be frightening, as viewers are plunged down the sides of fifty-mile high mountains on a frail snow-skiff. Liners, which are sensitive to the comforts of their passengers, make a regular practice out of showing comedies or placid romances in the passengers' theater, while the "good stuff" is on the crews' projector. Passengers seeking the more exotic fare customarily bribe crewmembers to take them into the smaller theater as their "guests."

Tridee Theater, Large

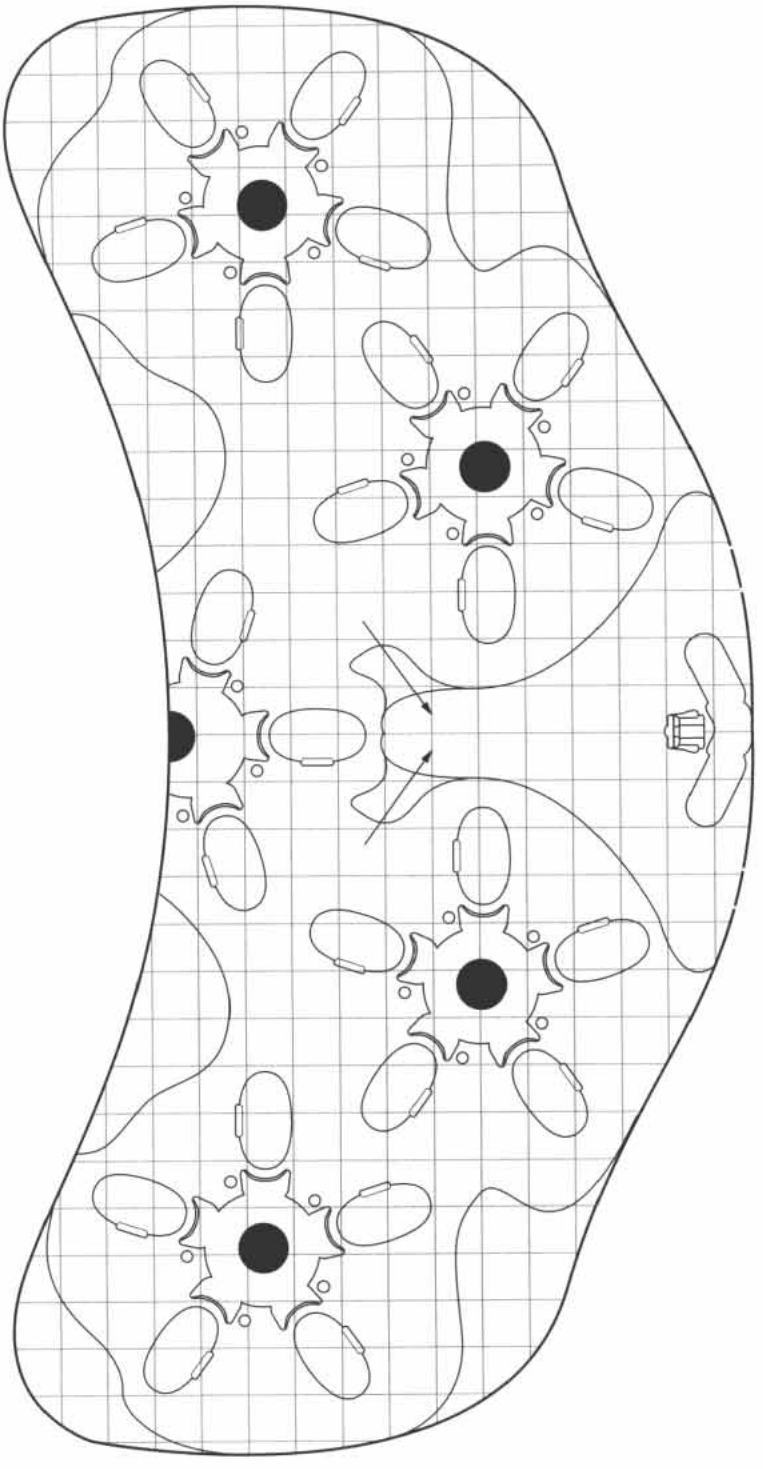
The king of tridee theaters, this large holographic display has all the features of the smaller theaters at as large as present tech level will allow. The resolution of the image is even better than the picture on the medium screen, and the huge size actually reinforces realism and special effects. Due to the graduated admission scales, many of the more frugal passengers watch new vids in a smaller format, then, if they like what they see, pay the stiff charges to see it here.

There are popular vid stars, of course, and directors whose names alone can guarantee a good box office, but most "products" are just that —products. Weak stories driven by weaker characters, all dependent on the visual impact of tridee to pay their bills.

Recently, a strange collaboration has injected new life into the industry. A human, Georgeapolitra Hermenicine, has joined with a Trakii, Numoultingdag, in the production of two critically acclaimed films. To find a dragon and a human speaking frequently is remarkable. To discover that they actually collaborated is nearly beyond belief. Numoultingdag is a youngster at 379 years old and Georgeapolitra is 78. In the last two and a half decades they have produced only two vids. The first, Absence of Light, *dealt with the decline of culture and society on Trakiini in universal but ethereal terms that were entirely understood and widely applauded. It still runs in tridee theaters everywhere. The second was called "a masterpiece."* Thunderfall *is the story of Wunthunderbay, a Trakii historian, the property of a mighty duke who replaces that noble and then meets his own tragic fate. The vid subtly suggests the decadence and decline of all nobles and the tragedy of the average individual. It is said that it took Georgeapolitra the better part of a decade to interpret the sheer poetry of Numoultingdag's concept for* Absence of Light, *but less than half that to do* Thunderfall.



VIRTUAL REALITY STATIONS



Game Rooms

Virtual Reality Stations

VR stations take many forms, as development of these popular entertainment centers seemingly knows no limits. The example shown here couples sensory depravation tanks with advanced VR electronics. The result, users claim, is an experience that is as real as life.

The guests change into special SenDep suits, which suppress physical input, and put on the sensory headbands in the large dressing room on the right. The structure of the facility is free-form and meant to be relaxing. Five SenDep units are connected to each of four modules. A player enters the unit and floats in salted, naturally buoyant water. A technician closes the lid and the unit's light seal snaps into place. Locked in absolute darkness, the sensory emitters in the headband activate, directly stimulating sensory and motor response in the brain. Any desired experience, whether alone, with simulated participants, or even networked to others in the same module, is available. Library banks store the most requested scenarios, but frequent users can decide to control their own interior experiences through imagination.

Unknown to SenDep VR players, a medical/psychiatric crisis team is on constant alert in a secured ready room (not shown) containing emergency equipment. The experience is so real that small percentages of users come out of the tanks and fall into catatonic states, seizures, and even death. The headbands worn by users also hold remote sensor monitors that report to screens in the ready room. The monitors relay blood pressure, heart rate, rapid eye movements, and perspiration levels. Crisis teams are not permitted to intervene except in emergencies, but they can stop an experience in mid-sequence, "pulling the plug" and bringing the player back gradually by flooding the "coffin" with soft light before releasing the lid. When fully restored, the player sees only a technician who tells a canned story about "equipment malfunction."

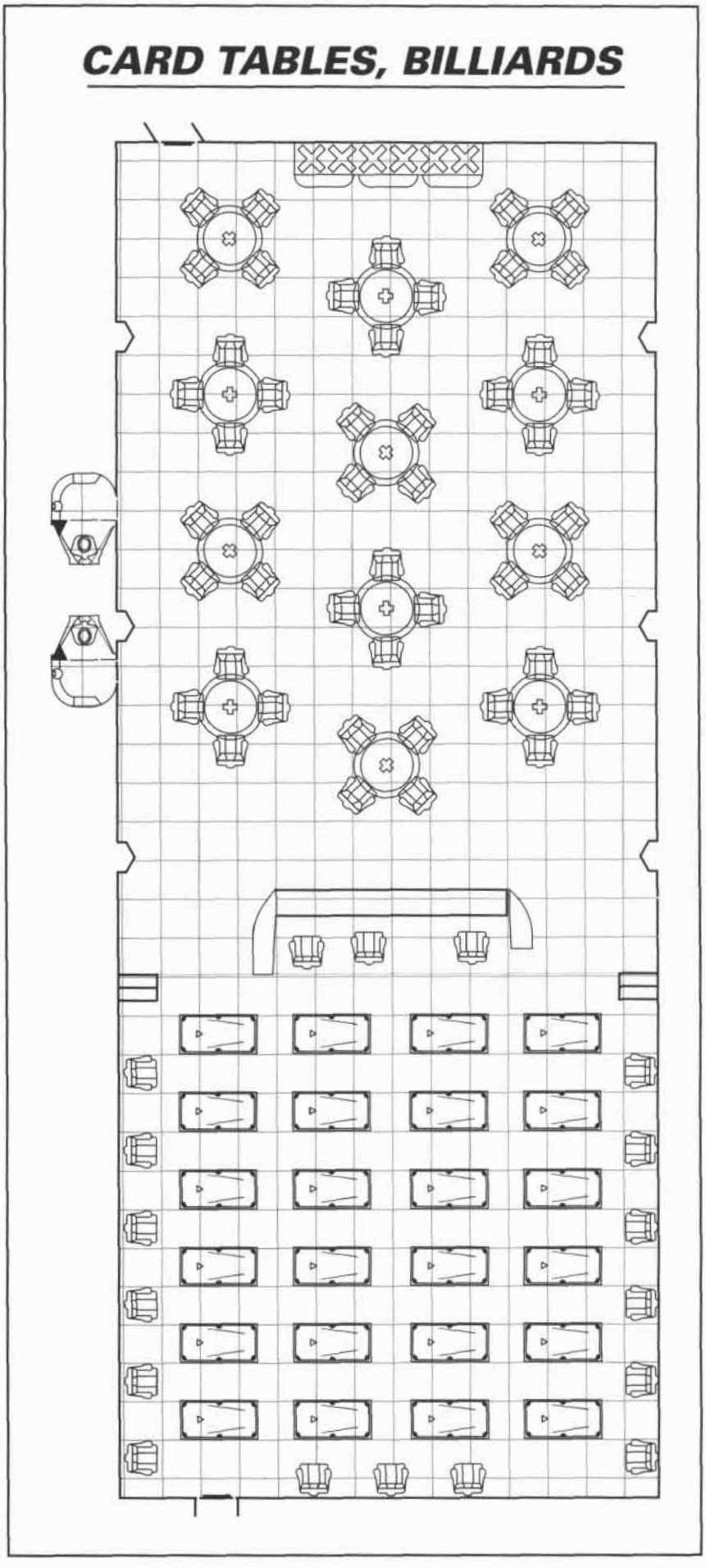
Card Tables and Billiards

There are as many games and gaming rooms in the known universe as there are cultures and races. The sample given here is for one style, primarily human and, in the main, pre-space games. The upper section contains card tables. Card games have never lost their attraction, the combination of luck and skill is a double seduction. The games played on ship range from the traditional to the bizarre. Poker is a game at which the Hresh excel, and bridge, although it's considered to be an "officer's game." Emperor and Deuce, a sort of high-stakes hi-lo game is popular, as is an ancient game whose origins and name are lost to time. In this game, called variously "Wizard, Earth, and Sky," and "Magecraft," players attempt to destroy each other with spellcasting cards while protecting and empowering themselves through defensive "bounty" cards. The winner is the last one left. There's a new game called "Quard," developed within the last two decades, with strict rules understood only by dedicated players.

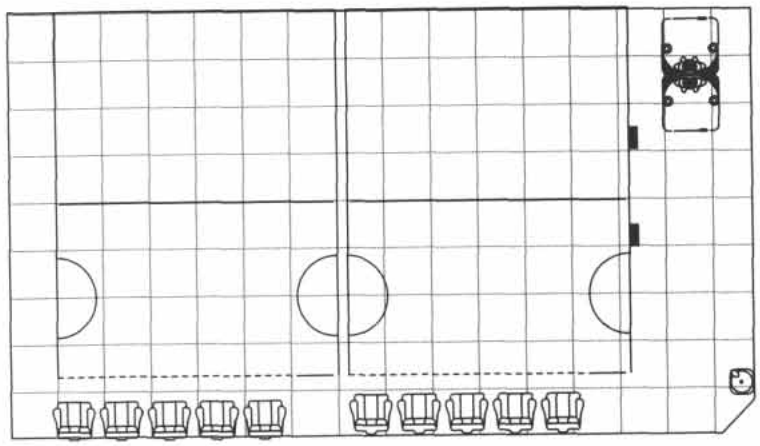
In the center is the gamemaster's counter, where cards may be purchased for various games and billiard/snooker balls rented for the pool tables below. The gamemaster is mainly there to keep order, billiard and card games being what they are. Beneath the counter are three heavy stun guns that the GM and his assistants are not hesitant to use.

Billiards is an Old Earth game, which, along with its tighter pocketed cousin, Snooker, needs no explanation here. Let it simply be said that the legend of "Minnesota Fats" has never faded with time.

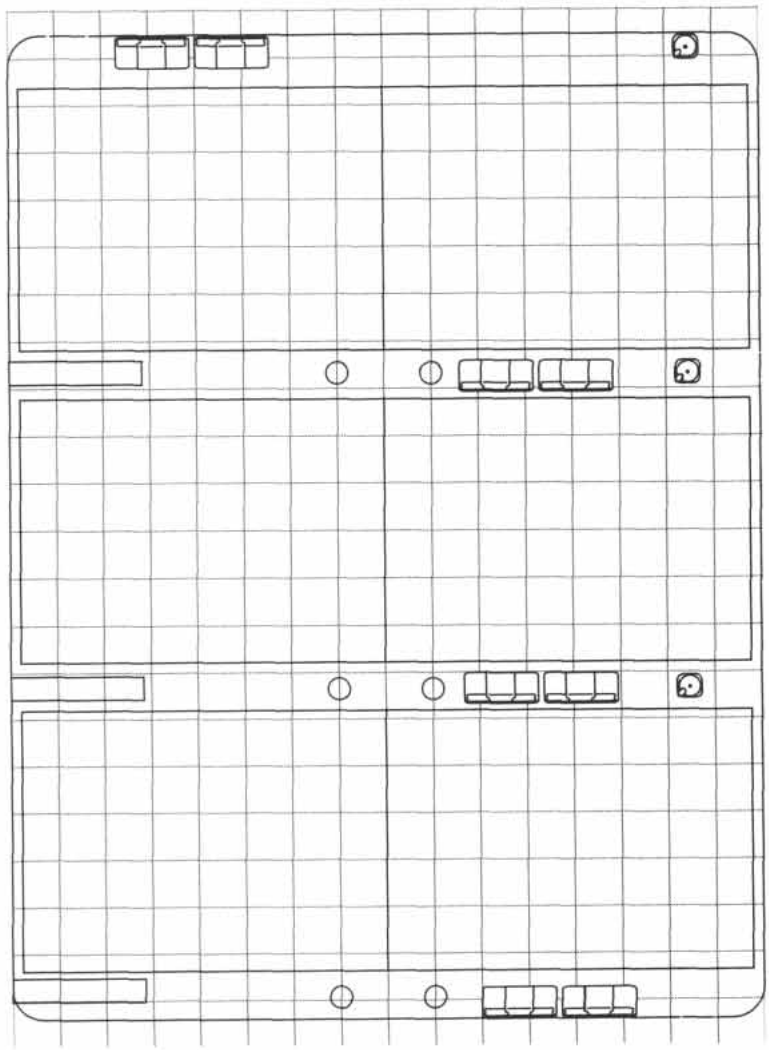
These games are run by "table rules": the players set the conditions for the game, the stakes, and agree to abide by the outcome. Gambling is common and so are fights. The GM's under-the-counter weapons see frequent use.



RAQUET BALL COURTS



TENNIS COURTS



Sporting Courts

Handball Courts

Handball has not only survived ancient Earth, but, to the amazement of explorers, seems to be a universal sport, regardless of the level of culture. The standard shipboard layout includes an emergency pressure shelter (top, right), as do most locations or at least decks. Below the shelters (not shown) is the medic ready room, staffed and equipped with cardiac resuscitation gear.

The courts themselves are laid out on very traditional models, although some prefer the round, 360° version to the rectangular courts shown. There are also showers and toilets installed (left). Spectators sit (bottom) behind a reinforced glass wall and dodge balls coming at them.

Tennis Courts

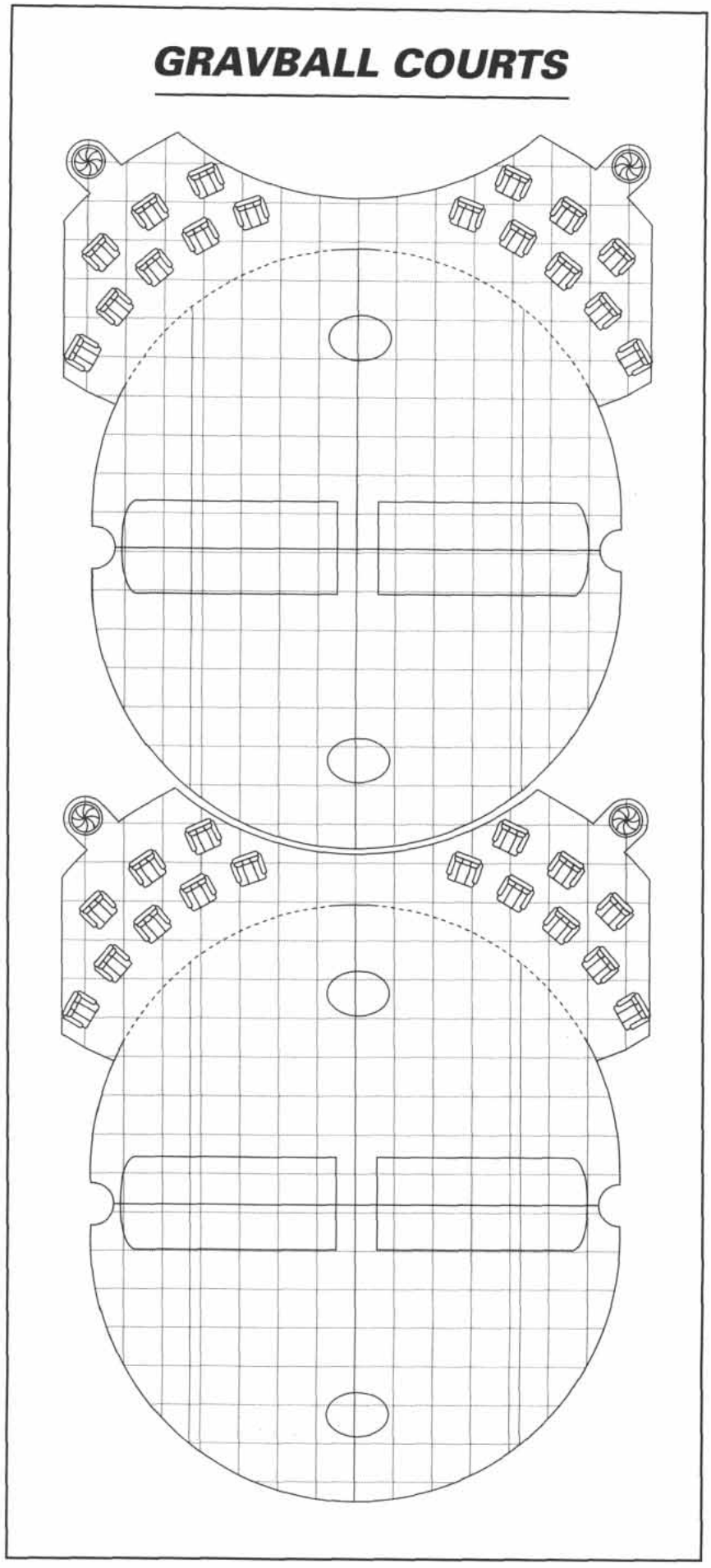
Like handball, some version of tennis exists on nearly every world regardless of technological level. Primitive and safely violent, the games provide a release for aggressions that might otherwise spill over into overt and real physical action. The sample given here shows far too few seats for spectators, for this is a game with millions of fanatics. It does show the courts, the nets, and water fountains above each set of playing fields. It omits the judge's stations, since Tennisites feel they must be judged.

The hoary cocktail lounge challenge, "Tennis anyone?" is still heard today, although this architect cannot understand why. What possesses two otherwise normal and intelligent people to stand across a battleline (the net) from each other and hurl minuscule, spheroid objects (the balls) at each other while keeping score in the name of love? And then the loser embraces the winner, at whom, moments ago, he or she was screaming expletives of the most vitriolic origins, and with whom the loser now proclaims everlasting friendship and solidarity. In fact, so mad is this game, that it has given birth to a common term in our language—Tenniscide, meaning one who self-destructs while playing a game. Truly, this is not a game for the rational mind.

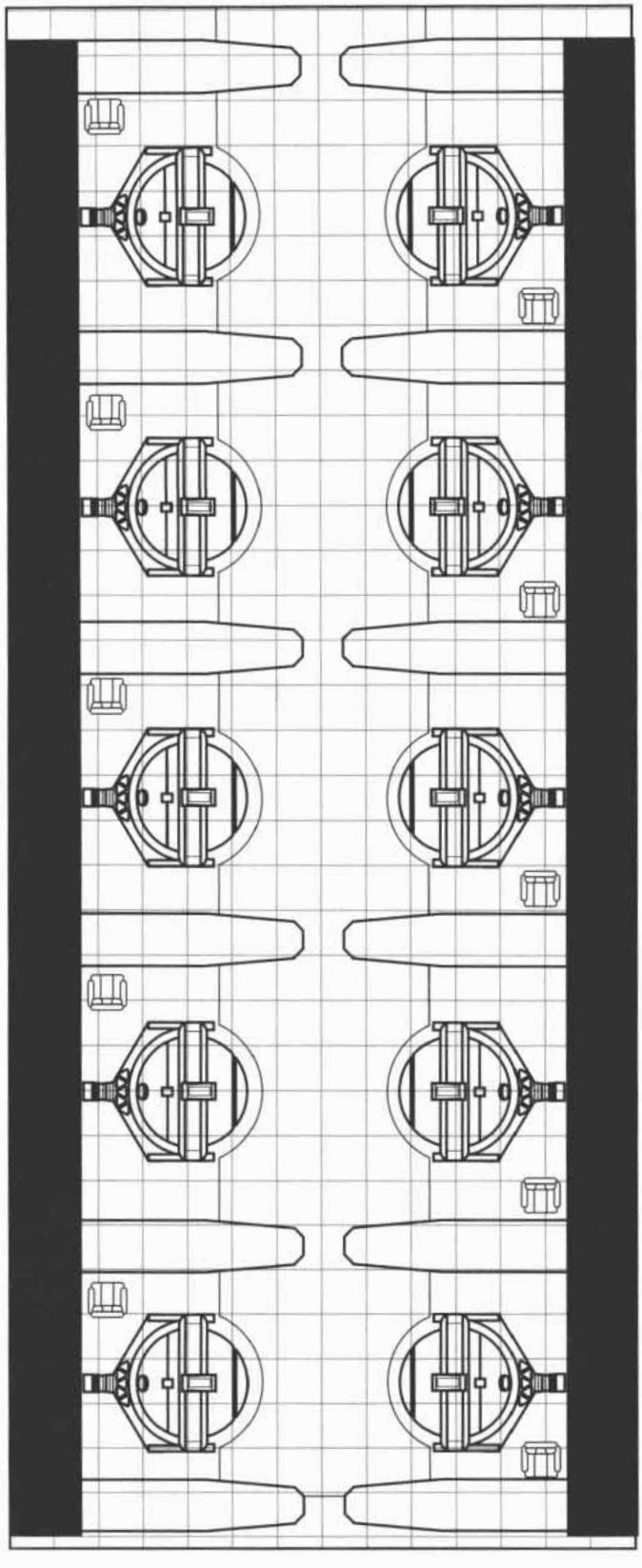
Gravball Courts

Gravball, sort of free-floating soccer game with circular, projected hoops instead of goals, is a played in zero-G court that is obliquely spheroid in shape. The zero-G effect and the perimeters of the sphere are artificially generated. The two zones marked at the center of each court are grav wells with a narrow null-G corridor between them. Spectators sit in viewing galleries arranged at 90° intervals around the ball court. The object of the game is to sink the ball into the opponent's hoop while successfully defending your own. There are seven players on each a team and substitutions or timeouts are not allowed in this game. However, like most sports, simplistic definitions do not even begin to describe the game.

Players may "push-off" from any "wall" to gain momentum, and then bullet across the court until they 1) touch the ball, 2) collide with another player, 3) fall into the grav well, or 4) achieve a "turnaround" and push off against another surface of the sphere. The players may hit the ball with any body part, but they may not hold it except to shoot, and then they have five seconds. Shooting the ball technically means throwing it, but kicking and head-butting are just as effective. While the grav well is a hazard for players, it also assists them — a ball punched hard enough to achieve a bounce from the grav well can double its velocity. Aimed correctly, it will carom off the "wall" of the sphere and into the hoop floating thirty feet above the opposing team's backcourt. The idea is to punch the ball down into the grav zone, slip through the null corridor and be ready to direct the ball on the opponent's side. Games are played until one side scores five goals or until a tie is broken. This is not a sport for amateurs.



FLIGHT SIM COURTS



Fight Sim Courts

Fighting simulators are mounted at three axis points. This provides a full 360° field of action and some very real thrills. The hatch is the inboard feature of each pod and swings upward to allow access. Inside, a 360° Surround-Me System projects images of opponents and a scenario in which the battle takes place. Players can participate as a group or singly against a computer profile.

A wide variety of battle tapes are available. Participants can choose to engage in hand to hand combat, including swords (with or without armor), clubs, or knives. "Barroom" is especially popular. In this plotline, anything in the scene may be used to attack an opponent: barstools, bottles, glasses, doors, even forks, though standard weapons are never built into the scene. Tank to tank and warbot to warbot conflicts, recreating some of history's grander metal melees are also favorites. Fleet battles, either on the high seas or in deep space are extremely fashionable for ship's officers — liner officers dream and military officers practice.

There are also physical challenge and "silly" modules. The sims can provide mile after mile of running or cycling through some of the most hellishly grueling terrain and conditions ever encountered. One version, high on the charts these days with troops and marines especially, is Quartathelon Sim. In this simulation, at least two players ride a self-propelled, wheeled vehicle for ten kilometers, swim a raging river for four more, run another five, and then wrestle each other, no holds barred, until only one is left standing. Silly Modules are hard to categorize, most are animated extravaganzas in which anything can happen — and usually does.

While it is almost impossible to be physically injured in a sim, the manager of this facility does have first aid training, psychiatric as well as medical. The sims are also addictive, and many find themselves spending more time in sim than in reality.

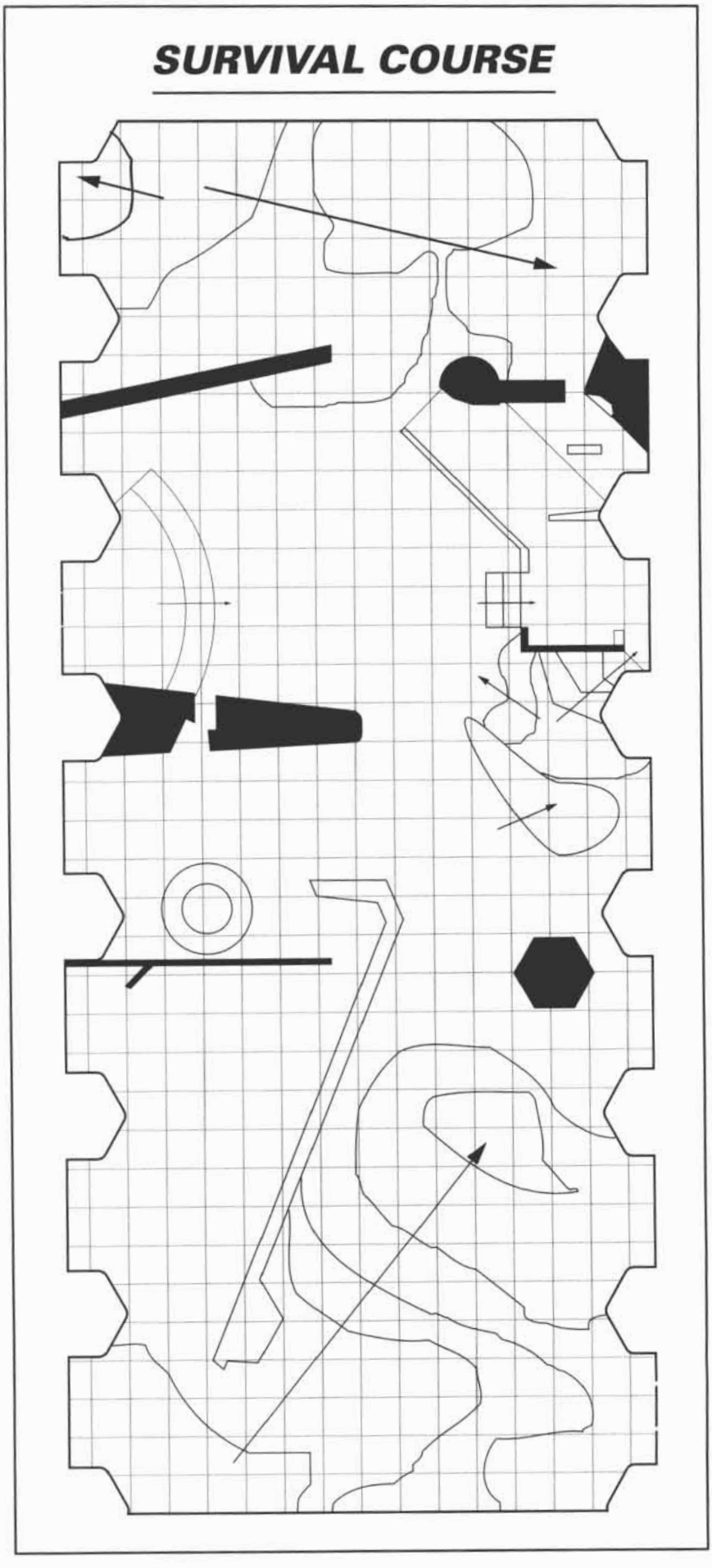
Survival Course

The survival course receives a lot of traffic. Because players can adjust the course to their own skill levels, this is one of the few areas where kids, grandmothers, and hard-body types can all be found in the same place. Kids enjoy playing games on the course. The layout includes terrain schemes, water hazards, hills, cliffs, valleys, and rocky wastes. (Arrows on the illustration always point "up.") There is a secret about the course, known to every kid who's ever played King of the Hill, Steal the Bacon, or Capture the Flag on it: The top of the course connects to the bottom. The "room" runs around the inner side of the hull like a band, so that the effect is continuous.

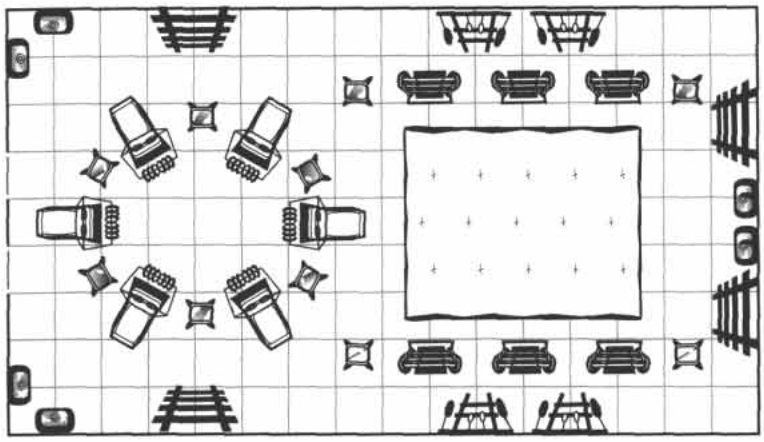
There are regularly scheduled competitions when the course is closed to all except participants. The starting times are posted on the sign-up board in the locker room. Passengers create and name their own teams, going up against others or against crew teams. Teams of crewmembers are, of course, usually the best. They have access to the survival course anytime they are off-duty, and take these competitions seriously. Inter-passenger team events frequently pit groups of different physical abilities against each other: grandmothers against kids, kids against adults, men against women. Handicaps are given if requested (not a common occurrence). The contests are either timed heats or stamina competitions where the course is run until there is only one survivor and the survivor's team wins.

Referees on the survival course have all been trained in first aid with an emphasis on sports injuries. Unlike SenDep VR Sims or the fight sim units, a mishap here can mean torn ligaments and worse injuries.

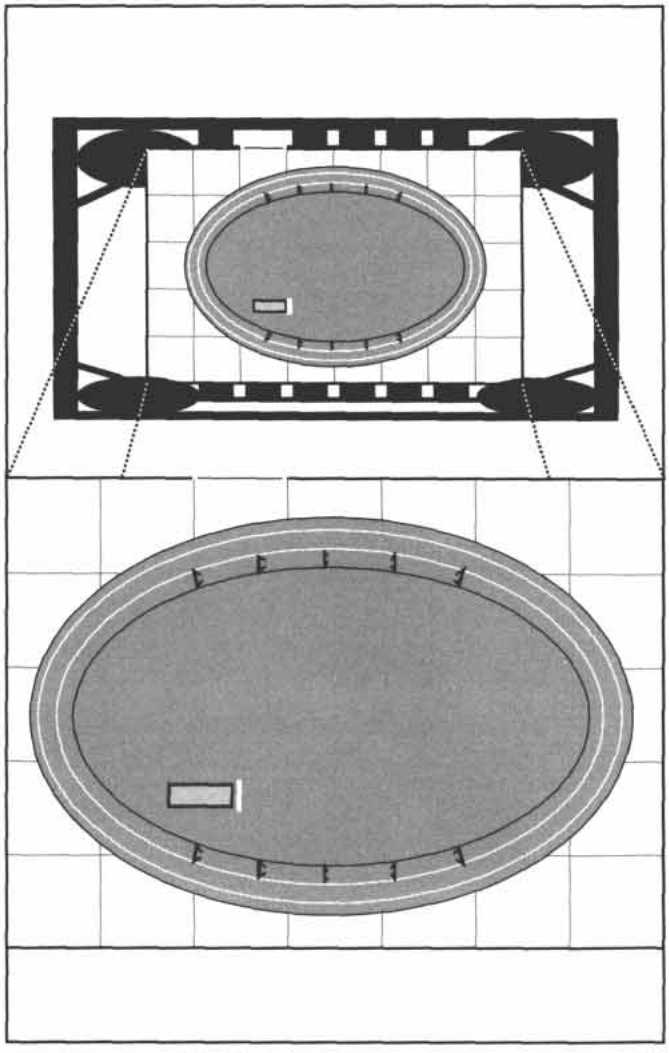
All participants must sign a standard "Hold Harmless" waiver. Owners hate "management negligence" lawsuits.



WEIGHT ROOM



RUNNING TRACK



Exercise/Personal Improvement Centers

Weight Room

Except for replacing a human spotter with repulser units, weight rooms haven't changes in thousands of years. In the sample shown here, barbells are stored on racks (left) against the walls with six benches, placed in a circle between them. Additional weights are stored in the corners of the room. Workout clubs and another rack of weights are on the walls to the right. In the center is a wrestling mat and seats for spectators.

Physical fitness buffs would be lost without this type of facility, common on liners. Weight rooms also exist on military ships and commercial vessels to keep crews in shape.

Running Track

Running tracks are found on liners, especially smaller ones that don't have survival course. They are set up for a variety of competitions, from 100-, 200-, and 300-yard sprint races to full track events on the outside oval. Not shown is a common locker room shared by this and the weight room, for they are usually designed as adjoining sites. First aid equipment is stored in lockers along the walls as is a stretcher and oxygen bottles. Volunteer medical staff, often runners themselves, are always present. Runners don't know when to quit, and frequently go until they drop. If a runner collapses, he is barred from the running track until a sports physician certifies his health. The liner companies do not impose this rule, but the Insurance Consortiums, which don't like medical claims, insist on it.

Runners tend to be fanatics, regardless of race. They keep their bodies and legs fit and trim and disdain the use of handicapping when racing. They will also ignore heath signs that might keep them from running — more than one weakened heart has given out while the owner's chest was breaking the tape at the finish line.

Psionic Exercise Area

In the example given here, a large area (right), like the playroom of an unruly child, is filled objects of varying weights and materials for psionic lifting, levitation, or teleportation. Two sets of telepathic exercise stations are located the left. The 3-position rooms (top) enable developing telepaths to practice in tandem, or just communicate silently. The bottom rooms are for telepathy drills; one concentrates on a card or object while the other tries to "see" the image. There is a screen between these two seats.

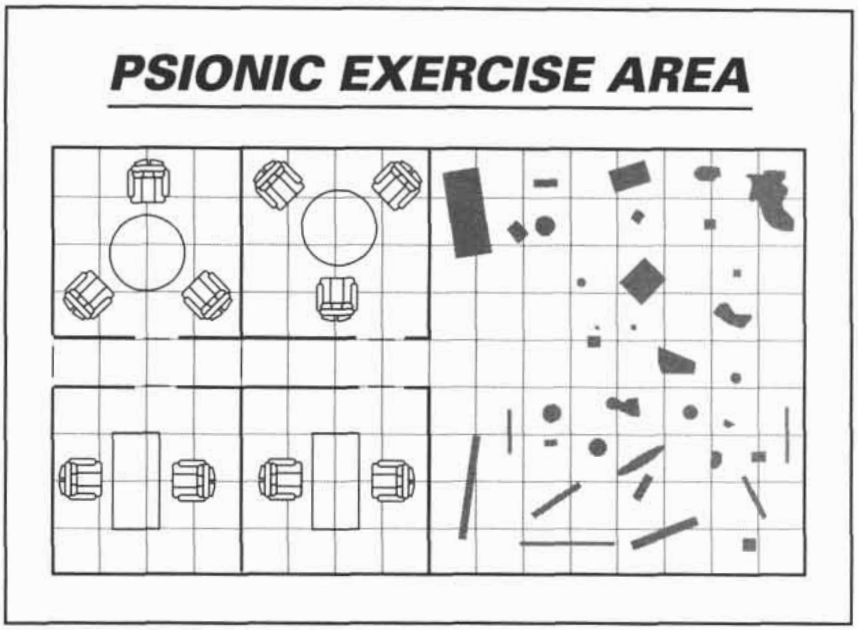
The locations of these rooms, while not hidden, are only revealed upon request as a security measure to protect users from anti-psionic factions.

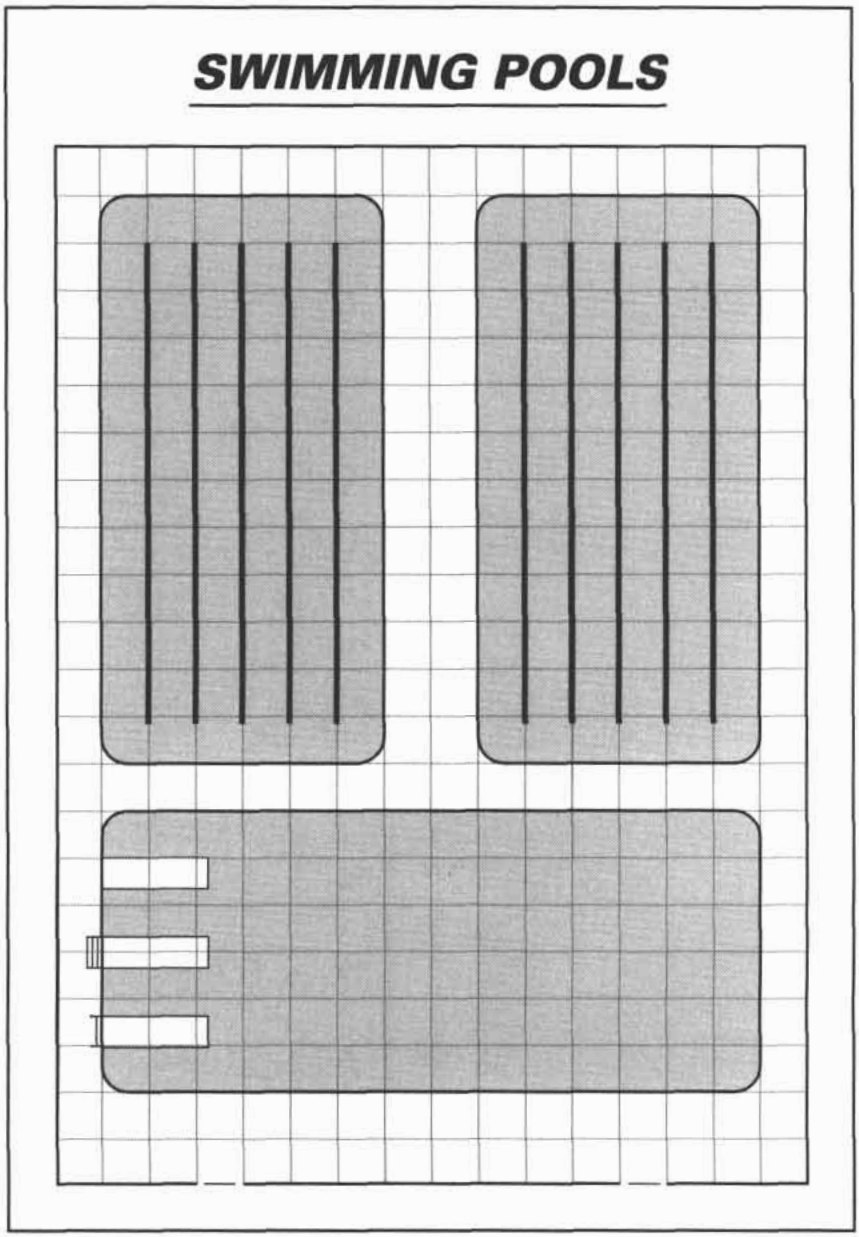
Swimming Pools

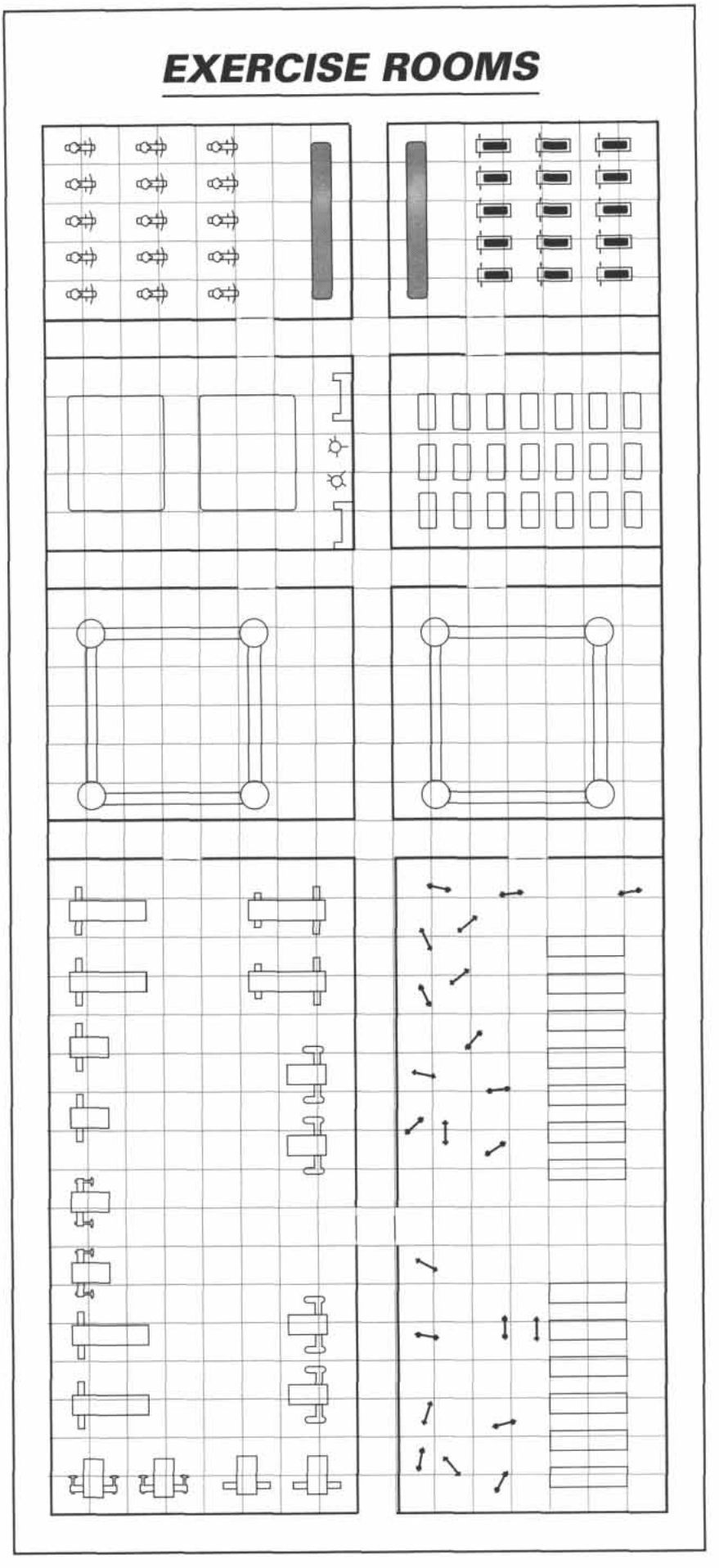
Swimming has never lost its appeal. It has been estimated that 90% of all carbon-based life forms began in a salty sea. Three pools are shown in this model. Of the two at the top, one is always designated for open swimming, the other for those who wish to swim laps. The pool at the bottom is for divers. It has three boards. The low dive (top) is level with the raised side of the pool. The medium diving board (center) has five short steps leading up to the platform. A tall, fifteen-step ladder gives access to the high dive (bottom).

So many ships' officers enjoy swimming, both for exercise and as a sport, that frequent intraship competitions are organized. Some ships even have swim teams, and when two ships with swim teams meet in space, intership swimming and diving competitions soon follow.

Liners, for insurance reasons, have lifeguards and close the pools when a guard is not on duty. Officers, however, are not subject to those rules and can swim anytime, "but at their own risk." After hours in the pool, anything goes. A bizarre form of water sport, which combines teams battling over a ball with the release of an electric Itayalican eel, is popular in some quarters.







Exercise Rooms

Some form of exercise room is found on almost every vessel. Physical fitness is generally required, if not by regulations, then by the captain. The rooms displayed here may all be found on a large liner, but different combinations of them or even individual rooms may be found anywhere. Not shown are the drinking fountains, bathroom, and shower facilities that always accompany workout rooms.

At top (right) is a stationary bicycle room. These frame mounted bikes allow a good sweat-breaking workout while watching a vid or reading a book on the small screen in front of the cycle. Of course, terrain images can also be viewed. On the right is a treadmill facility for unlimited walking or jogging with the same view screen arrangement. Below the bike room is a martial arts studio complete with two large mats, training dummies and other equipment. Instructors in the exercise center lead regular physical conditioning sessions for different groups.

In the center are two sparring rings. These can be used for wrestling, boxing, and a variety of martial art practices. Referees are normally required, but off-duty personnel frequently stage their own bouts. "No Holds Barred" or sword and knife fights, supposedly banned, remain the favorites of certain military and mining types.

At the bottom are two rooms normally used only by those with some special training. On the left is a weight machine room. The machines are actually gravity inducers that provide resistance through small units working with the ship's own artificial gravity. The room at the right is a free weight room with benches and appropriate gear.

Most liners strive for a balance between dedicated semi-professional types and those who view physical fitness as a hobby or pastime. Military and commercial vessels know the value of fit crews and allot as much space as can be spared from a ship's other functions for health conditioning.

Locker Rooms and Showers

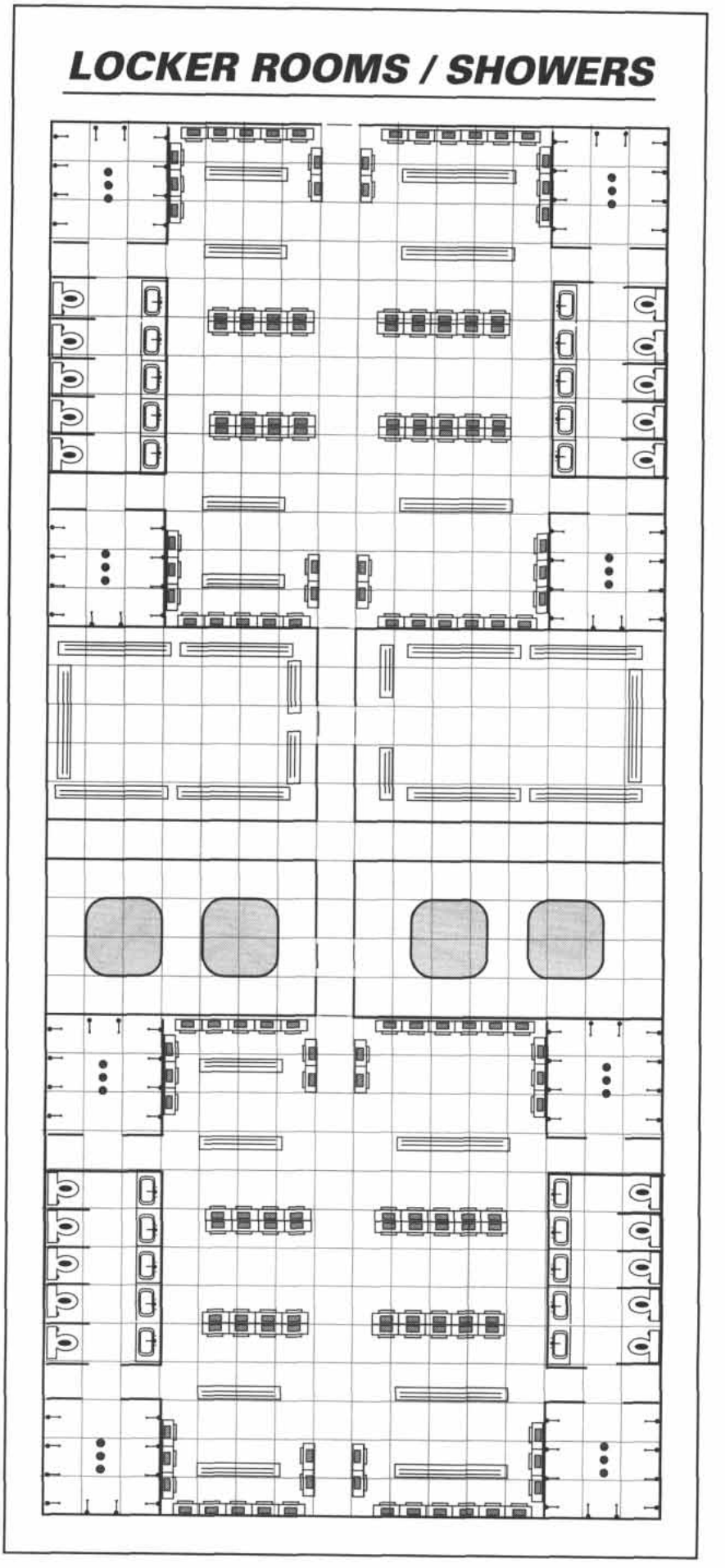
The architect is cautioned to place these facilities as close as possible to the various sporting courts, exercise and personal improvement centers. Ideally, each location should have a door opening onto this complex, but failing that they should be centrally located and easy to reach.

At the top and bottom of the example are large locker rooms with benches and standard plastic containers for clothing. Four shower rooms are furnished, one in each corner and separated by toilet facilities.

In the center are special rooms designed to let exhausted athletes to "work out the kinks." Left is a sauna, complete with wooden benches, induction-heated synthetic rocks, and cold water hoses. To the right is a more traditional steam room, equipped with enough lamps for it to be used as a heat room, if that is what the passenger desires. Below these rooms is a complex of four large whirlpool tubs. The tubs have water jets to be aimed at specific body parts to provide hot and wet treatment to aching muscles.

The whirlpool, sauna, and steam rooms are so popular, even with the sedentary, that most locker room attendants refuse to allow anyone who was not working out to use them. The crew, of course, is always exempted. The whirlpools, and saunas in particular, have become gathering places for off-duty bridge officers whenever they are closed to the public.

All of these facilities serve a far greater purpose than mere recreation. Physical fitness is important, yes, but a greater good is served by the release of tensions during extreme physical activity. Ship owners, admirals, and captains are aware of this and these kinds of plants, no matter their size, are almost universal. Healthy bodies may not create healthy minds, but navies universally believe that they do.



Observation Lounges

Ship's Lounge/Bar

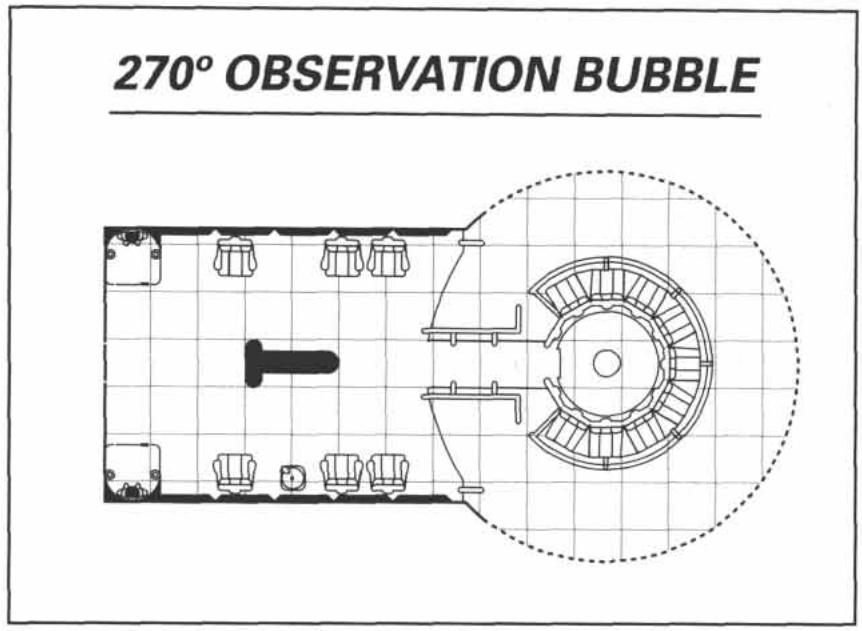
This larger lounge is within the ship's hull and artificial gravity does operate here. The windows extend from floor to ceiling, giving passengers the impression that they are surrounded by naked space — which of course, they are. There are pressure shelters top and bottom in case of a breach, and restrooms at either end of the bar. Near the center is a long two-sided display map showing 1) the ship's starting point, 2) current position (or theoretical position if in jump space), and 3) the destination star system. The ship's course and proposed course are marked with different colors so passengers can watch the ship's progress. The long bar can accommodate ten or more passengers with plenty of table space available. The bartender is also the manager of this facility and has on hand a variety of card and board games for those too well travelled to be fascinated by the stellar atmosphere. The tavern master also has a stun gun close to hand in case of trouble, although it is rarely used.

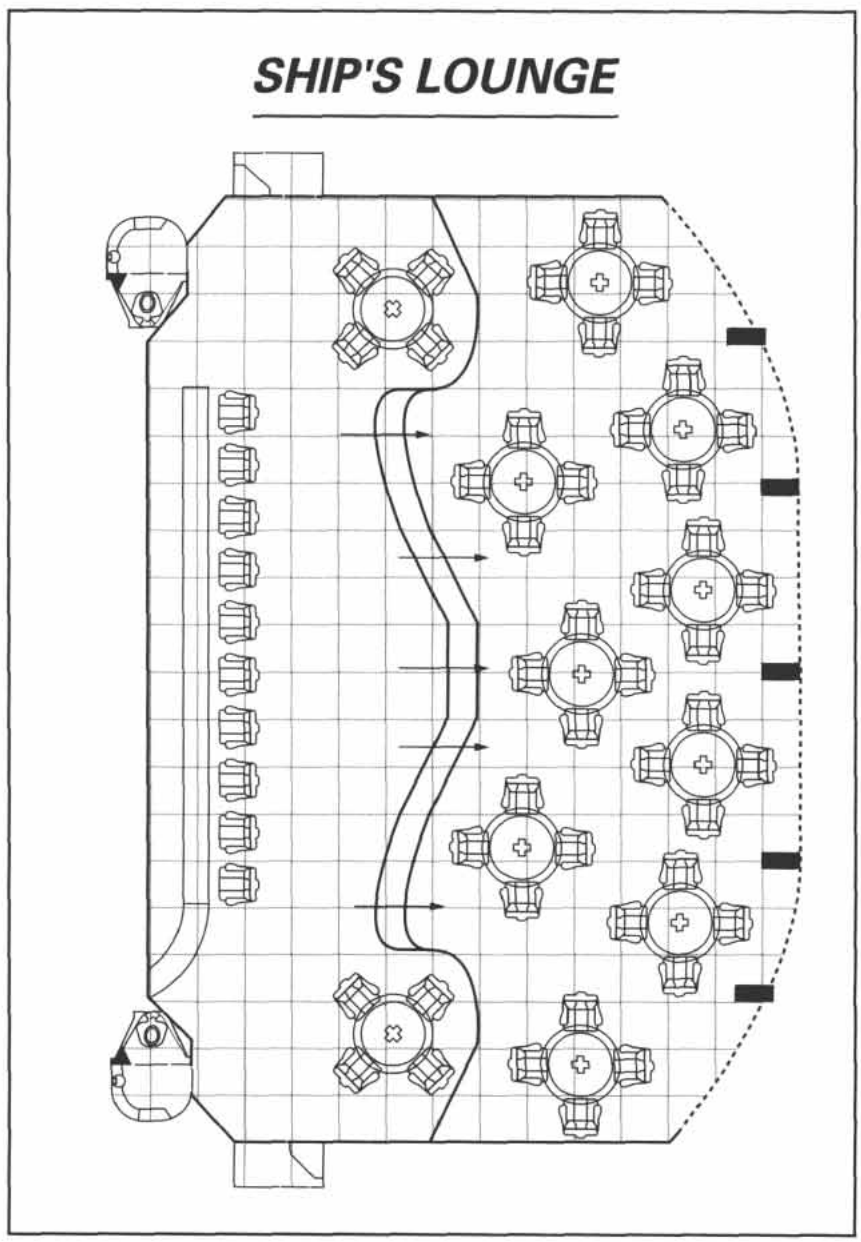
This is a good place to relax, but not to conduct business overt or covert. The 270 Lounge, as most are called regardless of official titles, is loud, boisterous, and very public.

270° Bubble

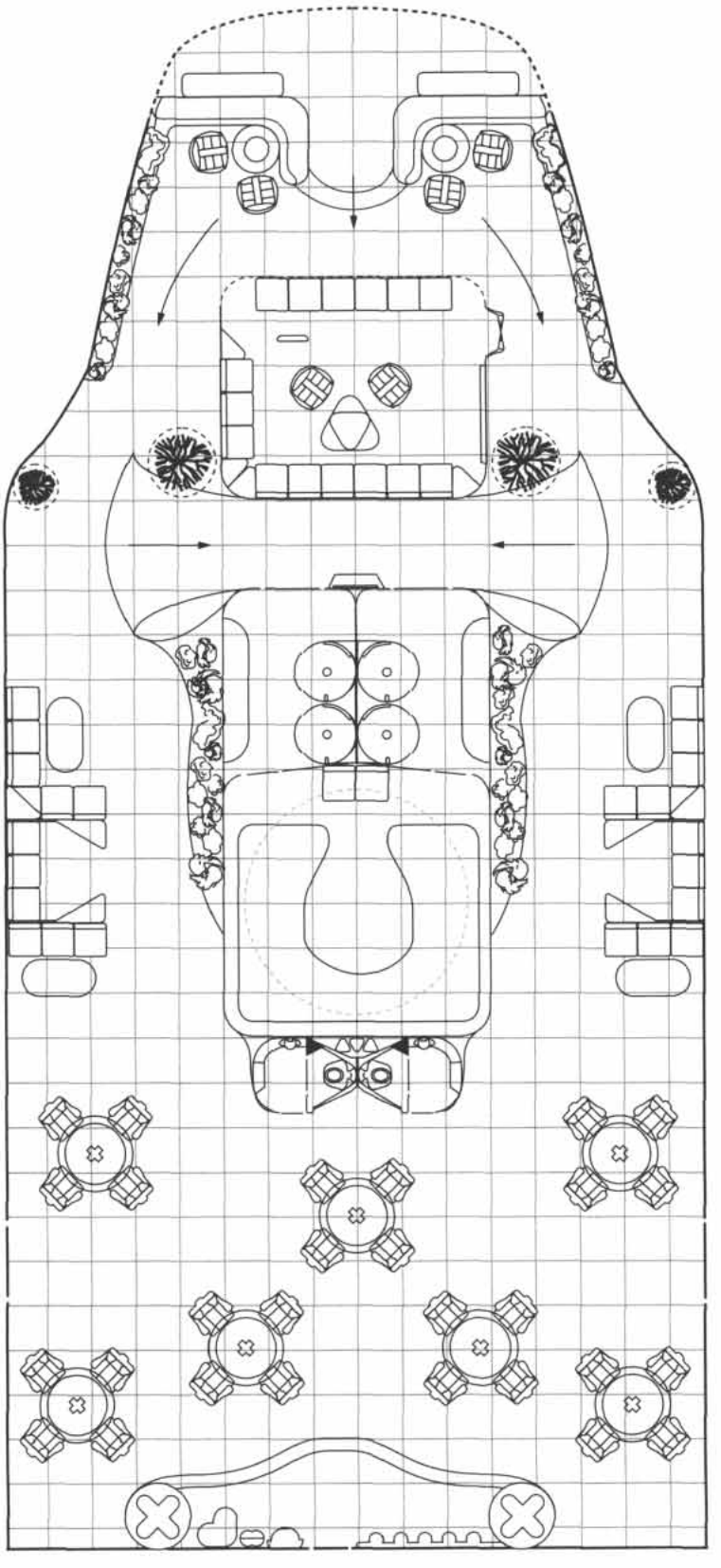
In the example shown here, the lounge is placed on the vessel's surface in a very low-G environment. Customers enter at the left, stepping off a ramp and guiding themselves to chairs using handholds placed along the walls. Two pressure shelters, one at each side of the entry, provide security if the dome is breached. Suits and rescue balls are available. In the center is a long kiosk exhibiting star maps; one side the current region of space, the other the destination system.

Placed under an observation dome that looks out onto the stars, the main ship's lounge is a place of refuge for weary travellers and a meeting place for lovers.





HIGH PASSAGE LOUNGE



High Passage Lounge

These places are endowed with all kinds of decorative names, but they all mean the same thing: High-Rollers Welcomed. A small transparent blister dome (top) provides tables deployed on demand from the floor, and comfortable couches for stargazers. A ramp leads up to the next level, tastefully appointed with planters stuffed with exotic flora. A private meeting room (near top and center) is available by reservation only. It features soft seating, a table mounted holoprojector, and a one-way glass wall that looks back into the blister lounge. The large circular planters are terrariums with bizarre plants in alien atmospheres. The semi-intelligent plants are all naturally phosphorescent and constantly change colors when they are being watched.

A ramp leads up to a small desk where passengers may reserve time in the lounge's hot tub. Below the desk are dressing rooms and showers for both men and women, and the hot tub entrance is just below.

Easy couches line the padded sidewalls. Tables and chairs are placed below for conversation or friendly games. The only bar here is a service bar and food prep station (bottom), no self-serve in this lounge*.

This sheltered lounge is the refuge of the wealthy. Here they can escape the noise and bustle of the liner and relax with a cold drink and good friends. At least one security guard is always on duty in this lounge, working as waitstaff or mixing drinks behind the service bar. Trouble in this idyllic environment is rare, but it has been known to happen. Old rivalries can flare and passions erupt, and the owners of the liner would rather not offend their best customers. Security personnel who work here are trained in the unarmed combat styles of several cultures. They carry no weapons, not even stunners, and depend on their skills to handle any problem passengers.

* Note that all illustration arrows point to higher levels.

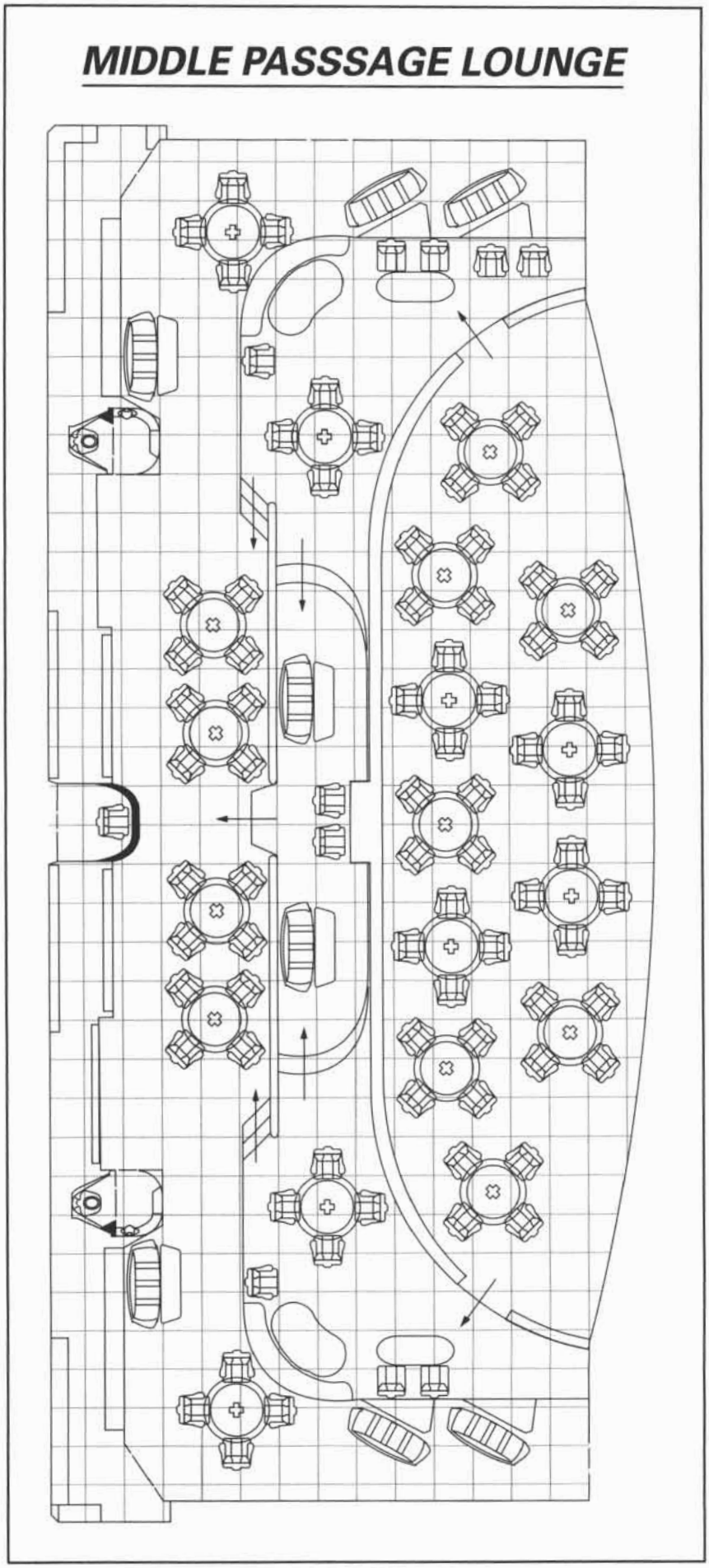
Middle Passage Lounge

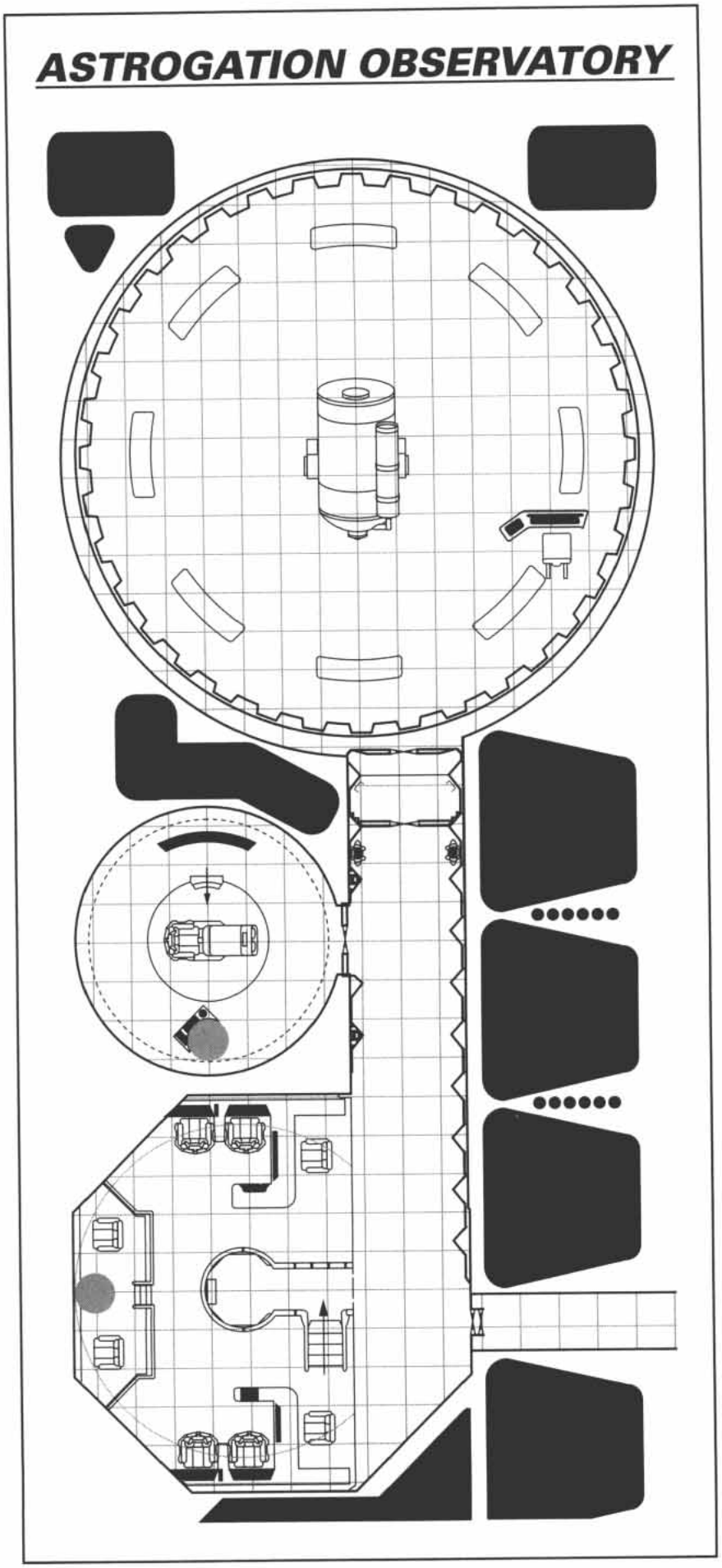
The middle passage lounge is less flamboyantly posh, but creates a relaxing atmosphere nonetheless. A gigantic holoprojection screen (right) extending from side to side provides entertainment for those in the Tridee Lounge. Food and drink preparation areas (left, top) keep the party spirit moving. An observation platform (center) provides a view of the holograph program while piping in the music supplied by the disc jockey in the mixing control booth (left). Toilet facilities are at near center and near bottom, left.

Weddings, promotions, and birthdays are celebrated here. Any cultural or ethic music can be provided from pipe bands to symphony orchestrations. Cozy but without refinement, middle lounges afford the budget passenger an evening's entertainment at a modest cost.

These places have the reputation of being hangouts for "saboteurs, agents noir, assassins," and for good reason. There is little security here, the majority of patrons being "just plain folks," and people with other agendas find it very easy to fit in. It is estimated that more illicit materials, conspiracies, and plots are hatched to fruition in these lounges than anywhere else aboard ships. Not only that, but more than one mutiny has started in the midlounge by crewmembers disguised as passengers than in any other single location. Revolutionaries too, find them comfortable. Few citizens enjoying a drink in a midlounge would dare report a conversation with which they had basic sympathies. The other difficulty here is the lack of emergency pressure chambers. Unwritten corporate policy dictates that certain classes of passengers are "expendable." Those here, although they are unaware of it, are precisely that, so little provision is made for their survival.

* Note that all illustration arrows point to higher levels.





Astrogation Observatory

There are two primary types of astrogation observatories. Those on liners have a remote dome with an eight-inch telescope. The image is projected into a wide lounge and an automated system tells passengers what they are watching. The example shown here, however, is complete observatory, such as would be found on ship engaged in the first time mapping of a newly discovered star system.

At the top is the main telescope, a five-inch Maksutov-Cassegranian that is integrated with advanced, high-density CCD receptors. The scope is maintained in a vacuum to preserve the optical coatings of the lenses and mirrors. While there is a manual control station (right), the scope is normally operated remotely by the astrographic computer during the initial survey. There is also a local star globe in this lab.

Below the main astrogation dome (center) is the secondary instrument station. This location carries a star chart display unit, a Schmit-Cass Binocular observation system that can be operated manually or remotely, and the same high density CCD matrix for hi-res imaging found on the M-C telescope.

The lower module (bottom) contains astrocartography, mapping and classification workstations; a large stellar cartography unit; a viewing and data retrieval center; and a 3D star map showing all astronomical bodies within fifty light years of the ship.

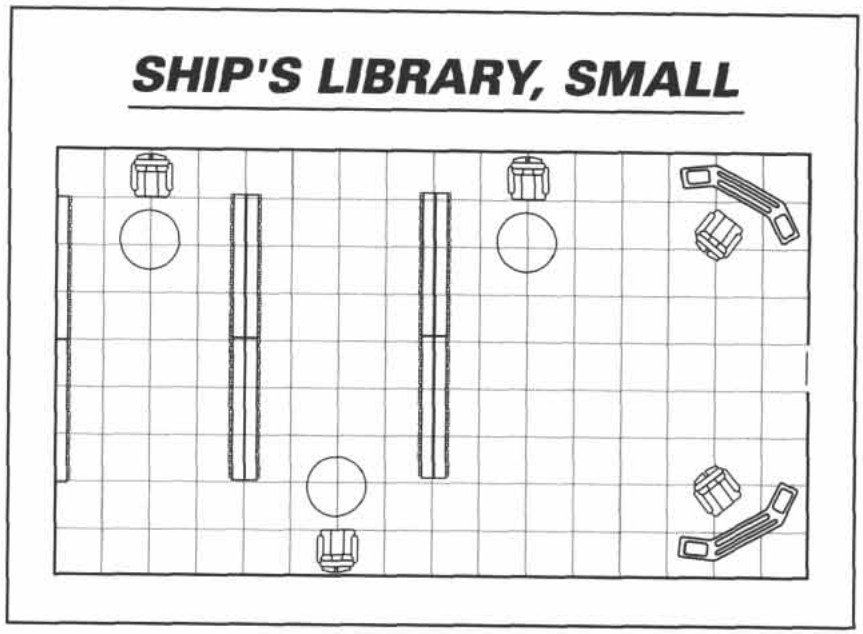
Research vessels and others employed in deep space work are often in space for years without coming into contact with another human being. A rare, but very real, disorder known as Celeste Syndrome has affected more than one such ship. Also called "Rose Syndrome or "celestialitus," it is a collective mental affliction that can lead to madness and total breakdown from a shared delusion. Legend has it that a ship called either Merry Rose *or* Merry Celeste *was found adrift and intact, but her twelve member crew had simply vanished without explanation, hail, or record.*

Libraries

Ship's Library, Small

Ship's libraries, regardless of size, do contain books. But printed books are rare and usually kept alarmed and under lock and key on special shelving in the center of the library. The real heart of the library complex is the several electronic data stations. Here, a researcher or a simple browser can find almost anything ever written by a civilized, advanced culture in nearly any language the reader chooses.

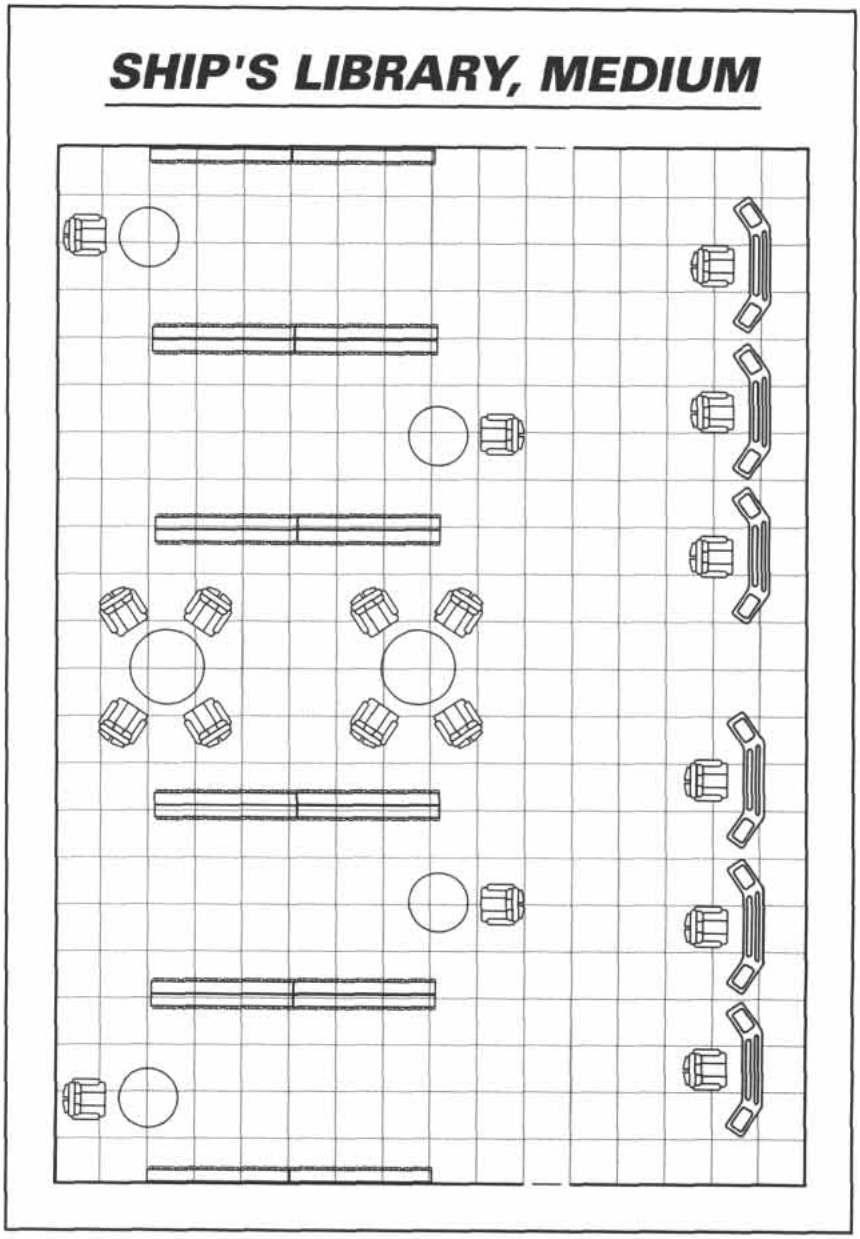
Libraries have always been refuges for the solitary and continue to serve them. Librarians are mostly cut from the same bolt of cloth, so these places are preternaturally quiet, where brief conversations are whispered even when only two people are in the room.

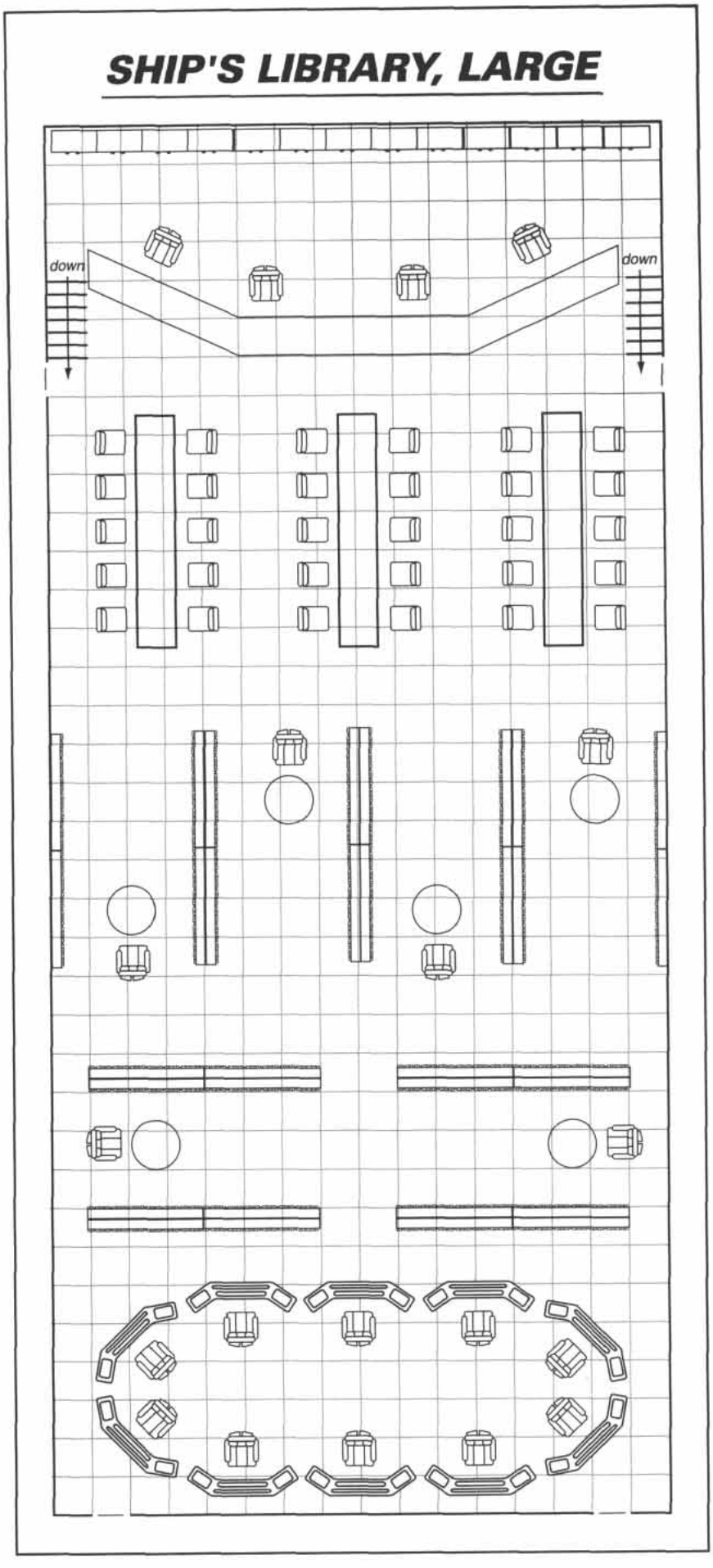


Ship's Library, Medium

Larger libraries are often sectioned into specific categories. While the data systems deliver information to any terminal, the needs of the reader may differ. Those who wish to enjoy fiction, comedy, or drama need only a comfortable chair in front of a view screen. But a ship's officer researching previous explorations in the quadrant to which the ship is headed may need room for a personal notebook, a printer for star charts, and a table to lay them all out. An artist or a draftsman could have special needs as well, and all of these are available on request from the librarian. Of course, printed books are present in greater number and printouts of the ship's Public Log are available for viewing.

Why a library at all, since almost everything a passenger or crewmember might wish to know can be obtained by accessing a terminal in the staterooms? The answer is that while many never enter between these walls, others draw a sharp line of distinction between their workspaces and their private quarters. Then too, there are those who wish to study and want a proper atmosphere in which to do so.





Ship's Library, Large

Of the three sizes of libraries given here, the large library is usually found only on liners and research vessels. Knowledgeable librarians armed with information catalogs covering every conceivable subject staff these libraries. Four such positions are shown here in front of a mammoth information bank that is cross-referenced and indexed in all known languages.

Long study tables and comfortable chairs are provided. Here, researchers and plain readers alike can examine data through pop-up screens imbedded in the table or pore over genuine books. In the center are bookshelves, watched and monitored by the librarians. Books may not be "checked-out," they must be read in the library itself.

Most librarians pride themselves on their hard-book collections and boast about their acquisitions. They are not about to let their charges go walking.

Below lies a smaller area containing the ship's Public Logs and some retired officers' private logs as well. Public Logs consist of public records: where the ship has gone, what commendations it has received, problems encountered and the official version of how specific predicaments were handled. Private logs should not be confused with personal logs. Private logs hold an officer's confidential reports of crew evaluations, assessments of planetary political situations, and other sensitive data for the superior officers' eyes only. Sometimes, long after the recounted people and events have faded from memory, these logs are placed on the racks. Personal logs are just that, and almost never open for public view. At the bottom is a sophisticated electronic research center, called The Den, capable of almost any task.

The computers in The Den are artificially intelligent bioelectronic analysis units (AIBEA) that can not only research specific problems, but analyze, correlate, and draw conclusions from a near-infinite amount of diverse data.

Media Center, Small

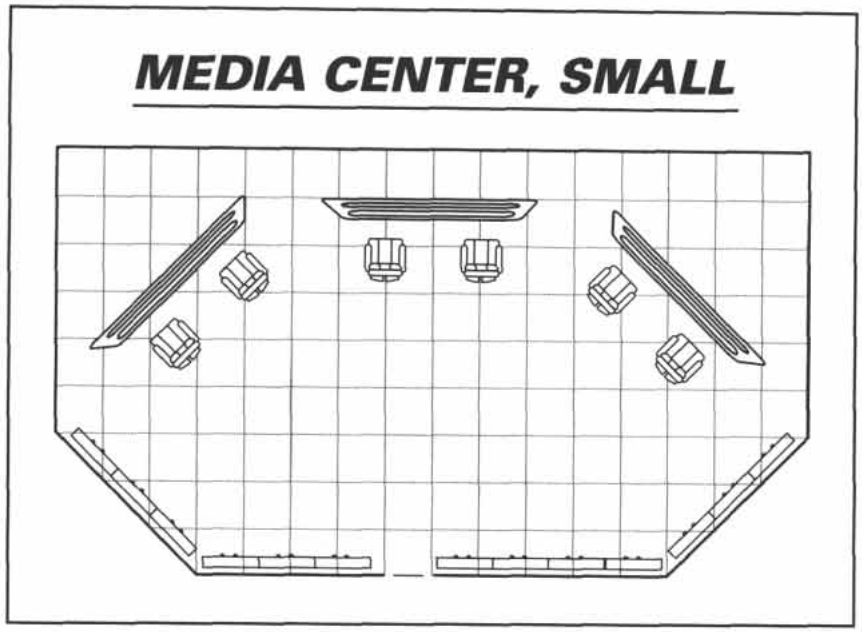
The media centers serve two purposes. First, they act as terminals to the InterstellarNet, allowing access to the data of thousands of worlds and enabling users to send e-mail all over the known universe. Secondly, they provide "news junkies" with up-to-date information about any worlds they are interested in. Small centers like these has data banks stored on readily accessible disks holding current, recent and historical information. Up-to-the-minute reports are available online.

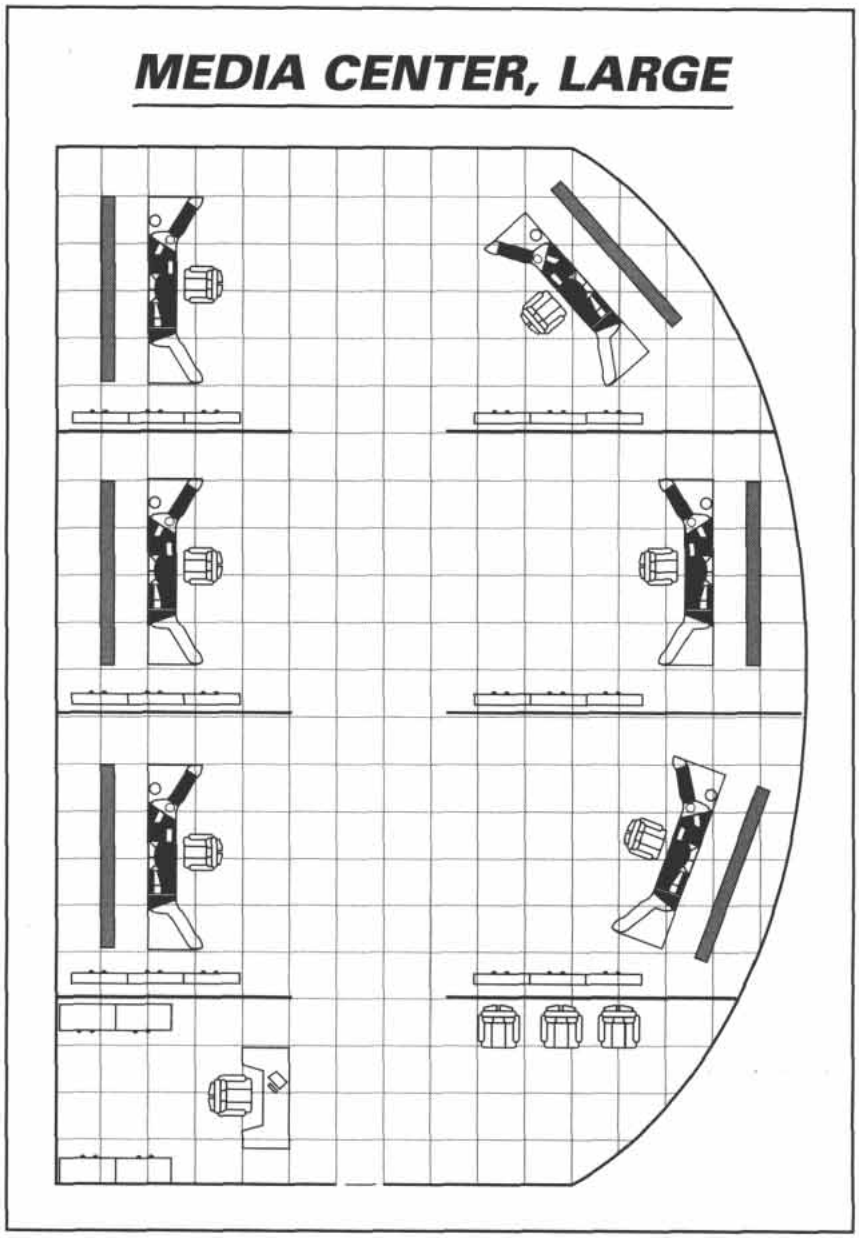
The perfect place to catch up on all the news from home, it's also an excellent place from which to monitor political events in any given system.

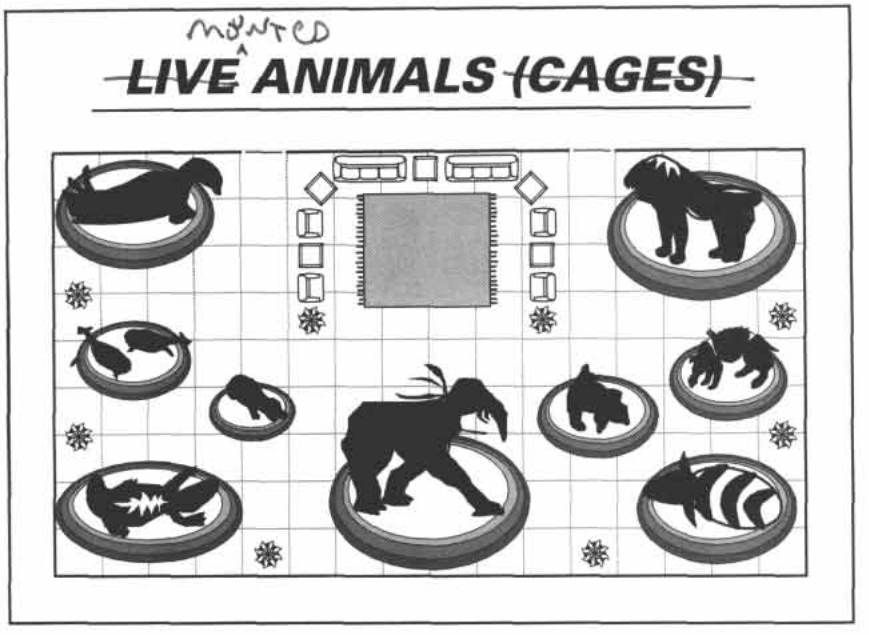
Media Center, Medium

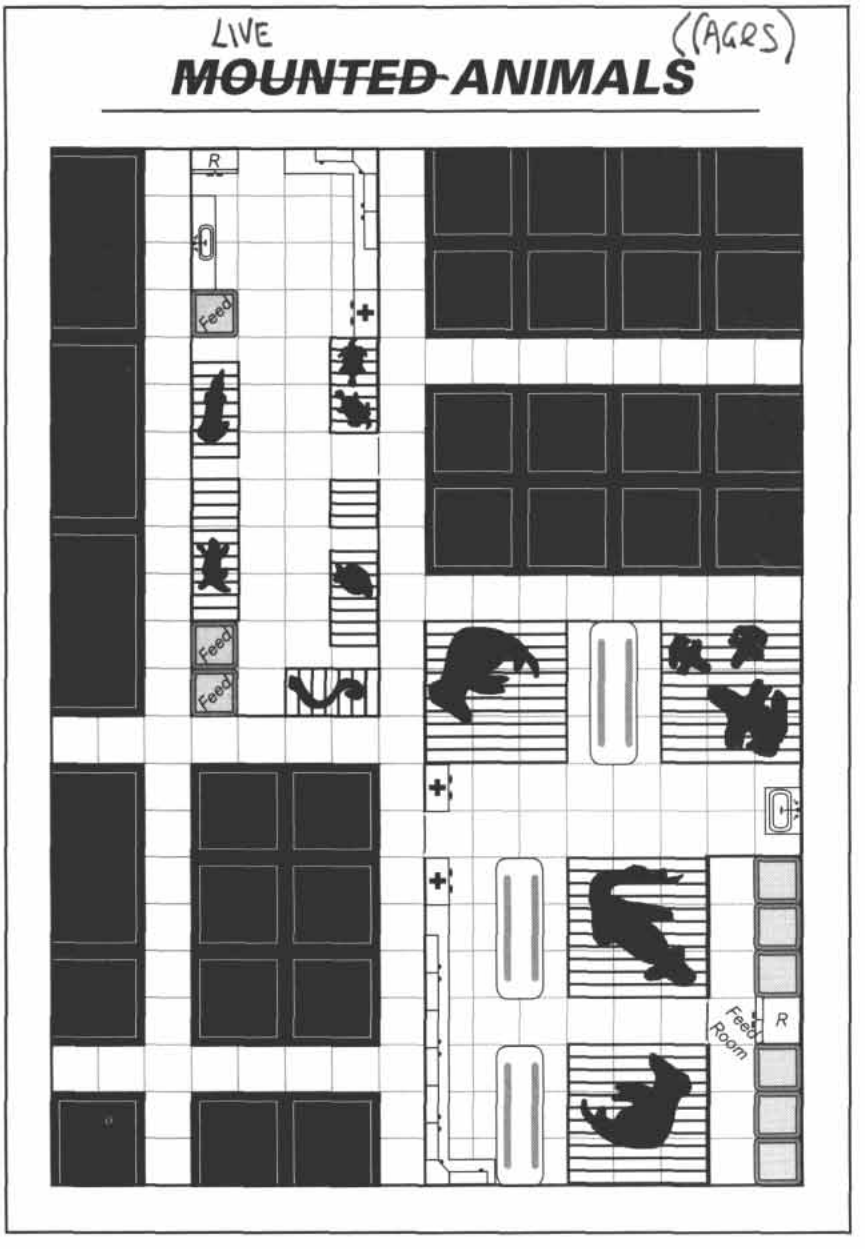
Larger centers have better and more comfortable facilities. In the example shown, the entrance leads into a reception and waiting area. Visitors to the media center must check in and space assignments are done on a first come, first served basis. The larger media booths have bigger screens and more desk space for notebooks, personal printers, and other equipment. Each station has its own bank of stored discs, blank as well as prerecorded general history, science, and literature programs. These centers are open around the clock and a staff receptionist is always on duty.

Rumors have persisted for centuries that this government or that agency monitors Internet communications in search of revolutionaries, crimes in progress, or banned material. While there may be a few planetary governments who do just that, to try to control a system with such traffic volume for a single hour that would take a supercomputer three years to calculate is ridiculous. A greater danger in space, however, is that onboard security personnel often exceed their assigned duty and take "preventative measures." Some of these do, indeed, include the monitoring of media centers. Liner Security Chiefs, anxious about saboteurs, terrorists and hijackers, are the most frequent listeners of such traffic.









Trophy Rooms

Mounted Animals

A ship's trophy rooms display fully mounted, long dead creatures. The specimens are acquired in several different ways. Some of these were killed while attacking excursion parties sent planetside for a day's picnicking. Game hunters shoot their shares on private expeditions and donate them to the trophy room. Some were merely found and purchased at bazaars in unpronounceable ports of call.

Trophy rooms can be a security problem. Some of these animals are rare, and passengers are not above carving hunks of hide, hair, or reptilian skin to keep as souvenirs. Pro-life groups and animal rights activists sometimes go ballistic when they learn of these places. Still, no one in authority seeks a ban.

Live Animals

Two kinds of zoos exist in space. The first, shown here, is aboard a capture ship whose primary purpose is to find, cage, and sell exotic creatures to planet side zoos, public and private, for large fees. Cage rooms are segregated according to animal size and feed stations contain rations for each kind of animal in the holding area. First aid stations, lavatories, and sinks for veterinary personnel are placed at convenient locations. The large black areas, currently not in use, are adjustable tanks, cages, and other housings for alien creatures with unusual needs. Aquariums with sealed enclosures and atmospheric controls for non-oxygen/nitrogen breathers, as well as high-pressure pens for heavy planet beasts are stored here ready for use.

The second type of shipboard zoo is found on some liners. Facilities are similar but more amenable, featuring view benches, table, chairs, and push-button recordings to tell passengers what they are watching.

Zoos are another security headache for liners; one escaped critter can panic an entire vessel. The capture ships often skirt the laws that control them. Endangered and rare species are frequently taken and then stored in holds or bays not usually visited by customs officers. These animals often arrive in poor condition.

Video Display Lounge

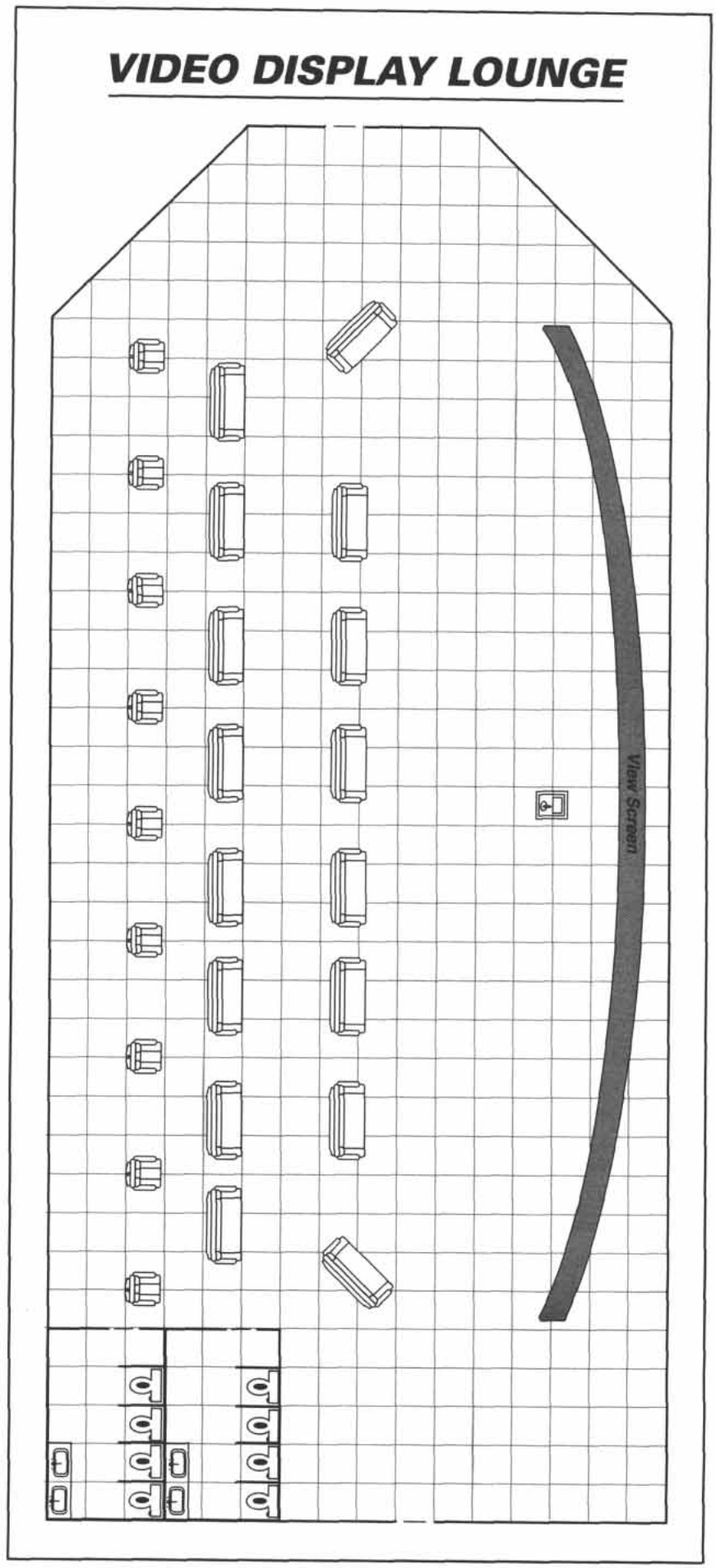
In an older lexicon, this room would be called a lecture hall. The large tridee screen and podium up front (right) is where the personality of the moment elaborates on a chosen subject. Seating is comfortable and arranged so that every guest has a good view of the screen. These rooms are open for public use, and interested passengers can sign up at the purser's office. Any subject with visual aides is game for an hour's presentation: a vacation, athletics, exploits among the tribal primates of whatever planet.

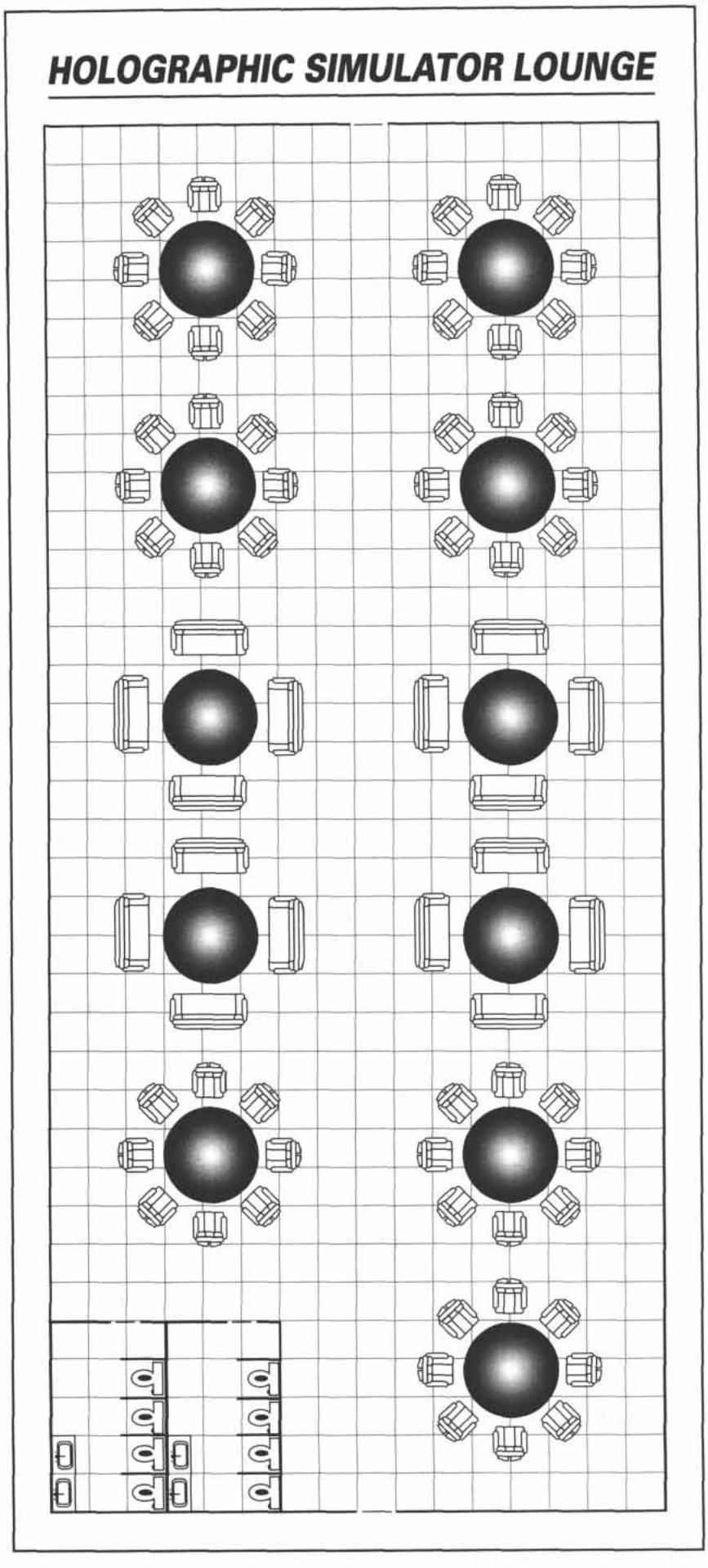
Celebrity hosts from a variety of fields often entertain with vid centered lectures. Some of them rent the space and charge admission in order to pay for larger staterooms that they otherwise could not afford. Others, such as respected (or at least popular) authors and playwrights who discuss their work, vid stars with production anecdotes to share, and professional tale-tellers who can spellbind children, are hired by liner corporations.

Corporations also use the rooms when they host annual cruises for their highest producers. Awards are presented, skits performed, and a video reviewing past accomplishments is shown. It's a small price for employees to pay for a free space cruise

Crewmembers, especially senior officers, are often pressed into service to talk about the places they've been and the things they've seen. The is not considered good duty and many officers take to hiding the video stills and action disks they took in order to avoid it.

While all of the speakers are quite earnest, some of these performances are unintentionally funny. Sample topics include: Needlepoint, Its History and Legend; My Summer on Trenamii or, Night of the Nunclees; Fifteen Good Reasons Why Psionics Should be Suppressed.





Holographic Simulator Lounge

Holographic simulator display three-dimensional images spherically. That is, the images can be seen from any position, any side. Each location around the sphere sees from a different angle and most of the directors and editors of holo sims are aware of this and compensate for it. No one, for example, continuously view a backside. This technology is so refined that there seems to be no limit as to how small or large an image can be projected.

The holo sim lounges serve much the same purposes as the video display rooms, but the presentations are much more sophisticated and appeal to a more intellectual audience. The setting is more comfortable as well, for those who come here can pay for their ease. One of the interesting programs on view here was a recorded interplanetary Startics Masters' Championship Match with live pieces acting out their capture or demise. It was so popular that it is still occasionally shown. Military history buffs and recreationists often show miniature combat or stage mock battles for others of like mind. The holo lounge is frequently booked by clubs and organizations for private "members' only" events. The liner management doesn't care what is shown here privately, as long as they paid for the use of the facility.

Sometimes, live performances are beamed to ships and shown in holo lounges for expensive admissions. Particularly popular are sporting events, especially those banned on certain worlds (gladiator combats, large animal fights, death matches, even traditional boxing is outlawed by many governments). For devotees of these sports, off-planet holo lounges are the only recourse.

Private gaming organizations commonly lease holo sim lounges for gambling activities involving more spectacular sports. Shuttle racing, for example, pits pilot against pilot in dangerous courses through asteroid clusters or "dipping" into the atmospheres of gas giants.

Live Trophy Display

More humane, and certainly more educational, this facility boasts transparent "cages." The walls are actually energy partitions to keep the animals inside while protecting the viewers. But what is even better is that Virtual Reality simulators, built into the cages, replicate the beasts' natural environments so well that the animals themselves are fooled. Even the distinctive orders of the creature's natural habitat are counterfeited. Feeding is automated through elevators rising up from the floor to deliver animal feed which, enhanced by VR, appears to the animal as a "fresh kill" or a favorite plant. Each cage also contains a video-monitoring camera (see next entry) and tranquilizer equipment in case the veterinary needs to examine a specimen.

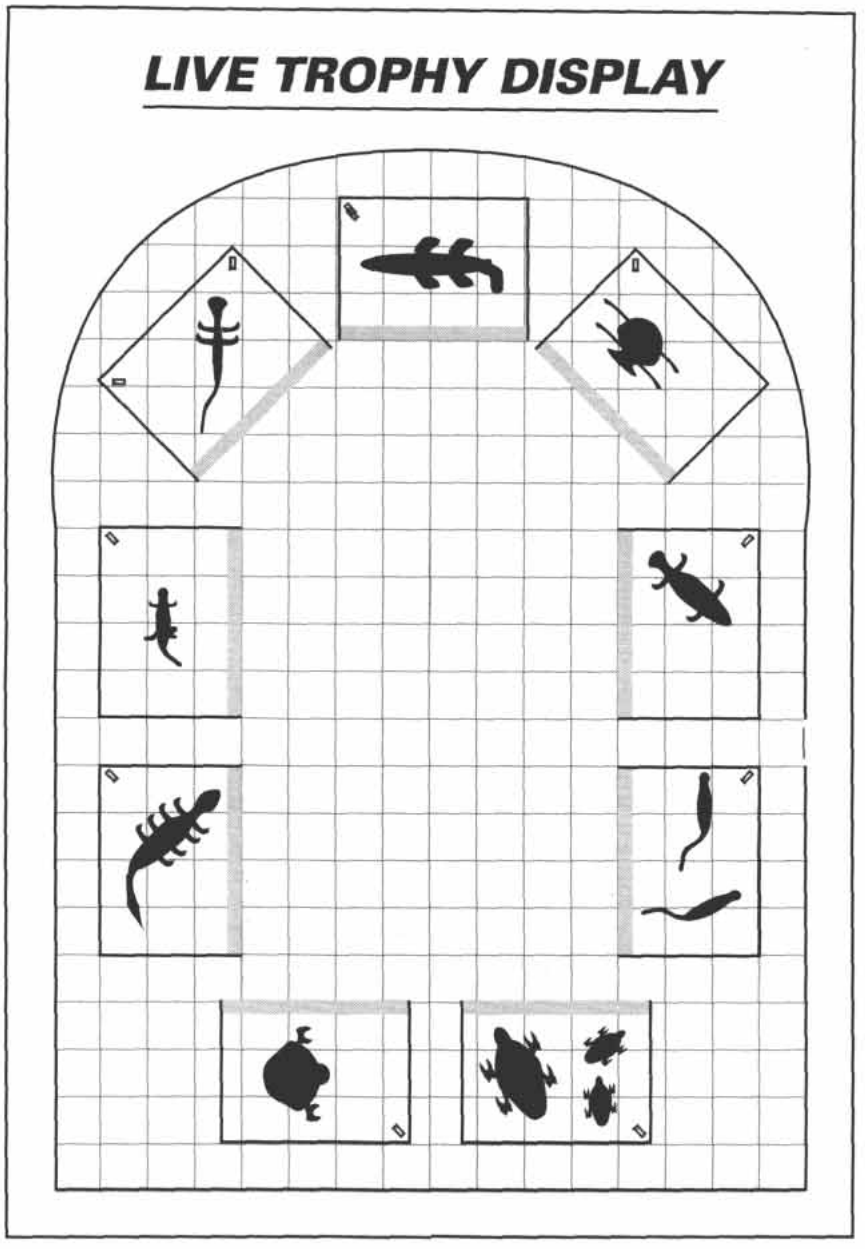
This is a "trophy room," after all, so recordings at each station tell the story of the beast and its seizure. A small plaque on each cage indicates the hunter's name and the capture date.

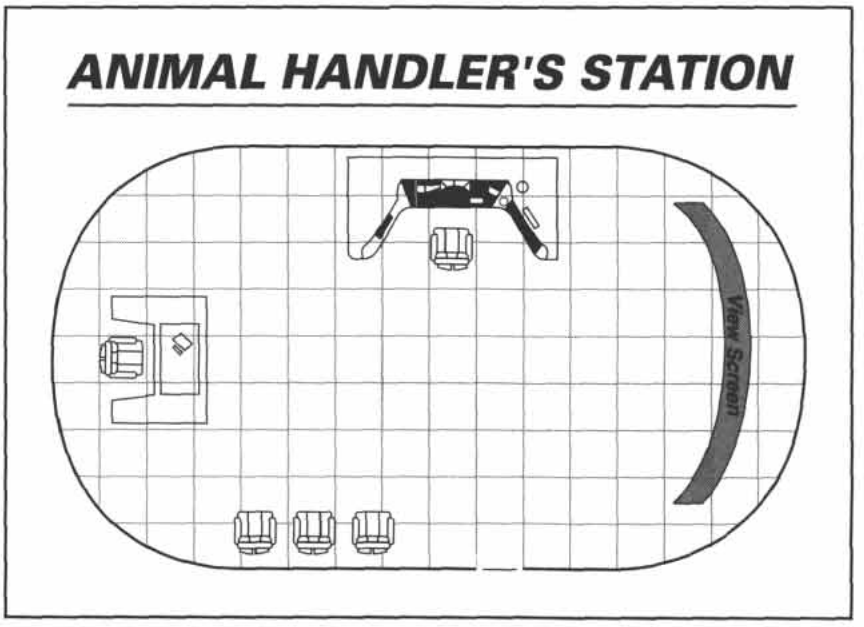
Of course, some injuries do occur when an animal attempts to race to a distant savanna only to bounce off a gently yielding energy wall. Security here is also less of a problem due to the live nature of the animals and the control station (next entry).

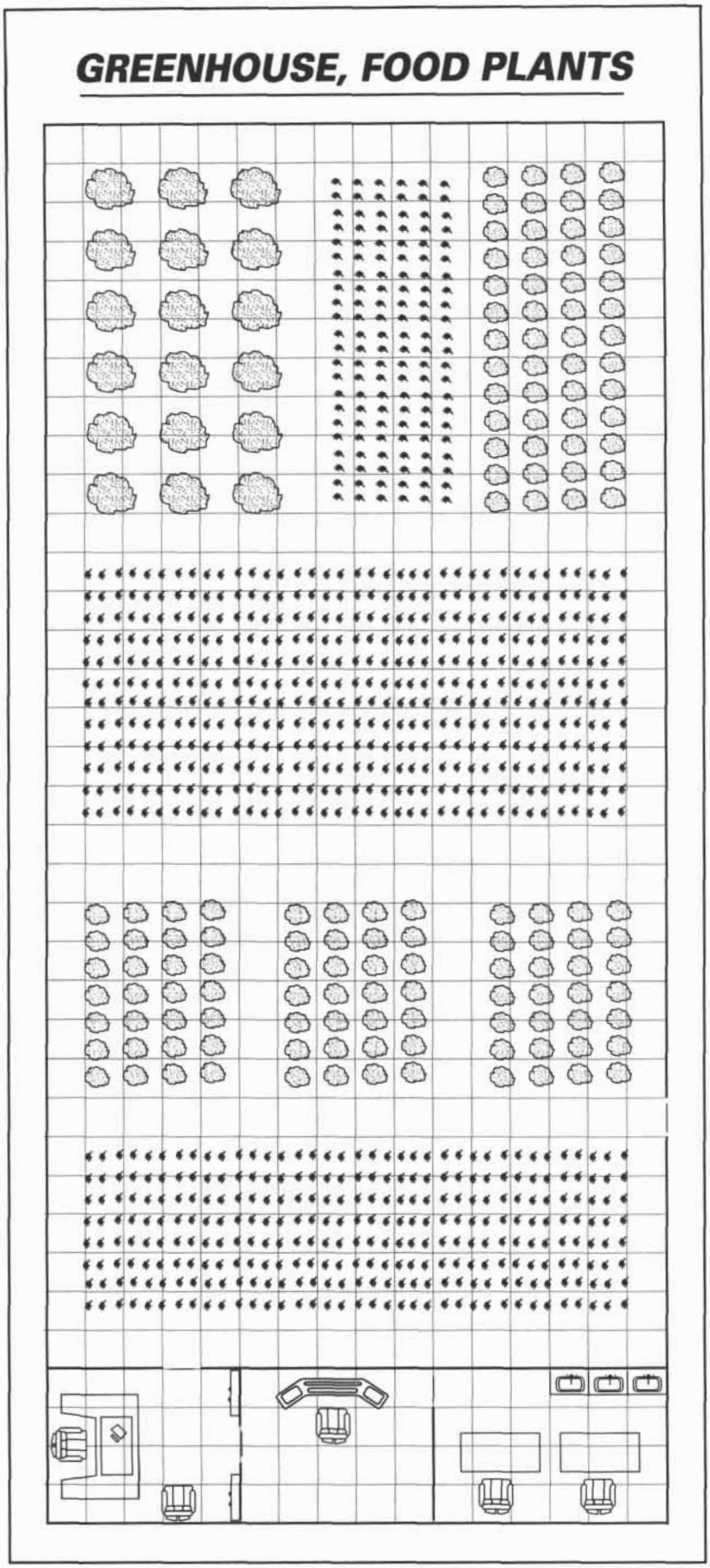
Animal Handler's Station

The animal handler's control station is tucked behind the walls of the display lounge and almost never seen by casual visitors. The handler monitors each animal's vital statistics, maintains the VR simulations, and remains alert for in-cage difficulties. The animal handler is responsible for alerting the ship's vet in case of trouble. The larger screen to the right has a separate screen for each cage camera set into a larger command screen. It has multiple-pictures capability and can enlarge or reduce any viewing area under observation.

Ship's officers often invite VIP's into the control station; teams of student vets are also regular visitors.







Greenhouses

Greenhouse, Food Plants

All ships require fresh fruits and vegetables for the health of the crew and passengers alike. While dietary supplements are fine, their effects tend to fade in the long run. The only good way to supply the body with the vitamins and minerals it needs is to grow them. There are two methods currently in use on starships: greenhouses and hydroponics.

A typical example of greenhouse technology is shown here. Rows of different crops are planted much the same way they have always been and harvested when they are ripe in the traditional manner, then the cycle begins again. The biggest difference in space is that small robots under the greenhouse supervisor's direction do all the physical work, tilling, harrowing, planting, watering, and harvesting.

The soil content is balanced for the specific subsistence of each crop and the sprayers supply plant food mixed with moisture at regular intervals, all in a perfectly controlled environment. Long inspection rows divide the crops and allow soil and tissue sampling by crewmembers.

The supervisor's office (bottom left) contains the logs for all crops ever grown on the ship as well as historical records for the seeds, samples, and cuttings of a myriad of different crops carried in the Cryogenic Seed Hold (adjoining, but not shown). This enables the manager to modify the ship's diet from time to time while maintaining the nutritional needs of the crew. In the center is the office of the monitor with a small lab to right.

The crops grown on board are dependent upon the ship's planet of origin, although a few crops like super-sweet corn are almost universally popular. Usually, because of differing soil requirements, crops are segregated by type; leafy green and yellow plants in one sector, tubers and other root plants in another, fruits in a third, and surface vegetables in yet another area.

Greenhouse, Exotic Plants

These greenhouses are rare, found only on a few commercial vessels and research ships. They are extremely hard to maintain, for the soil, nutrient, and even the atmospheric conditions vary, not from crop to crop, but from plant to plant. The model given is set up for vegetation from two different worlds that have completely different requirements. The methods employed to grow them and keep them healthy, however, can be made to serve individual plants, small aggregates, or large sections as shown here.

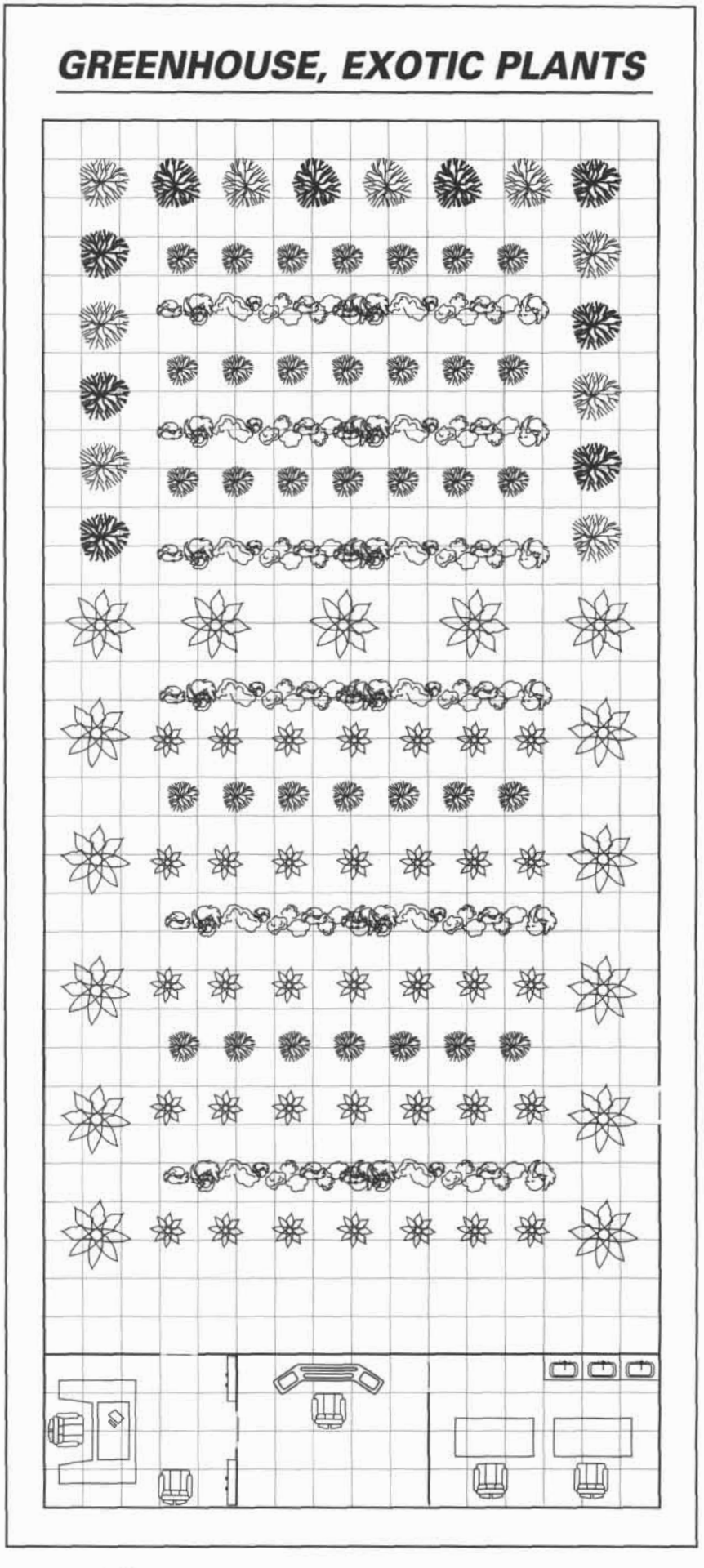
The top six rows of food and decorative plants are surrounded on three sides by bushes of the same planet. The area is contained in a spherical energy field that does not allow any foreign particles to enter or escape. These plants are from an arid, semi-tropical world. They require varying amounts of (artificial) sunlight, and divisions within the energy field provide this itself. The soil is kept uncontaminated and the atmosphere completely replicates their original environment.

The lower group of various star-shaped plants evolved on a heavy planet with a toxic atmosphere — at least to carbon life forms. The only forms of life that could (or did) develop had a crystalline base. These rare flora are widely sought and extremely expensive. The field-controlled atmosphere is deadly. What nutrients the "plants" need, chemical compounds all poisonous to humans and most other life forms, are supplied in aerosol form or introduced by specially fitted robots.

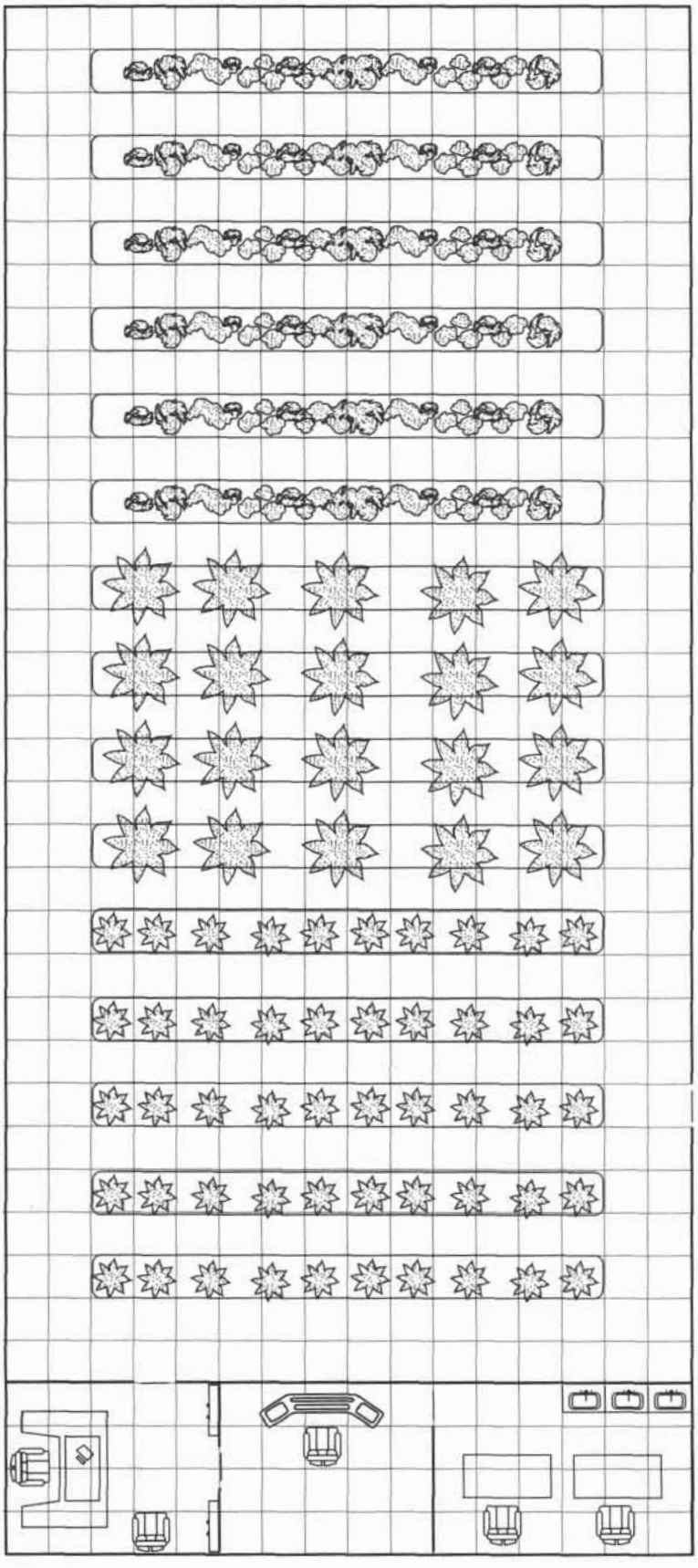
These are only two examples. There are thousands of different combinations that may be found.

The greenhouse manager (office at left) controls all of this activity through the monitor's station (below center). The small research lab (right) is meant for the study of exotica, but little practical knowledge is acquired from the more bizarre species.

There are private vessels out there whose sole function is to locate and sell rare and exotic specimens. Some single plants can be worth as much as an interstellar spaceship — and can be as dangerous as a fully armed destroyer.



HYDROPONICS GARDEN, FOOD PLANTS



Hydroponics Garden, Food Plants

Hydroponics agriculture has been practiced for thousands of years on countless worlds. In deep space, so much of room is taken by other operations; therefore it is often not possible to store enough food for a long-range journey. Furthermore, fresh produce is healthier than frozen or recombined products, and a hearty green salad can boost the spirits of even the most jaded mining crews. Plants grown here include greens and vegetables, tubers, and fruits. Most vessels, except for the very smallest, contain an area like this one.

Long, hemispherical agtanks contain a diversity of food plants in closely controlled nutrient baths. The suite of offices below monitors plants and nutrients carefully. The lab (below right) is where botanists on larger vessels create hybrids and manipulate the gene structures of many plants to produce better tasting, more nutritious food crops. The monitoring station (center) carefully watches different aspects of the environment: temperature, humidity for the entire garden, the nutrient bath contents and balance for each individual agtank. The plants are visually inspected every hour and any hint of deterioration or discoloring raises the alarm.

While pests are rarely a problem in these gardens unless intentionally delivered, diseases are a constant fear. A single undetected plant affliction, hidden in the stem of a lone plant, can plague and destroy an entire garden in a matter of days. When a diseased plant is detected, it is removed and the contents of the entire tank are sealed. The offending plant is taken to the lab and its malady researched. If condition was caused by a destructive pathogen, or if it cannot be identified, the whole agtank is jettisoned and the remaining tanks are vigorously inspected.

Hydroponics gardens on liners are kept under guard. If terrorists did strike a ship, this would be one of the logical choices.

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