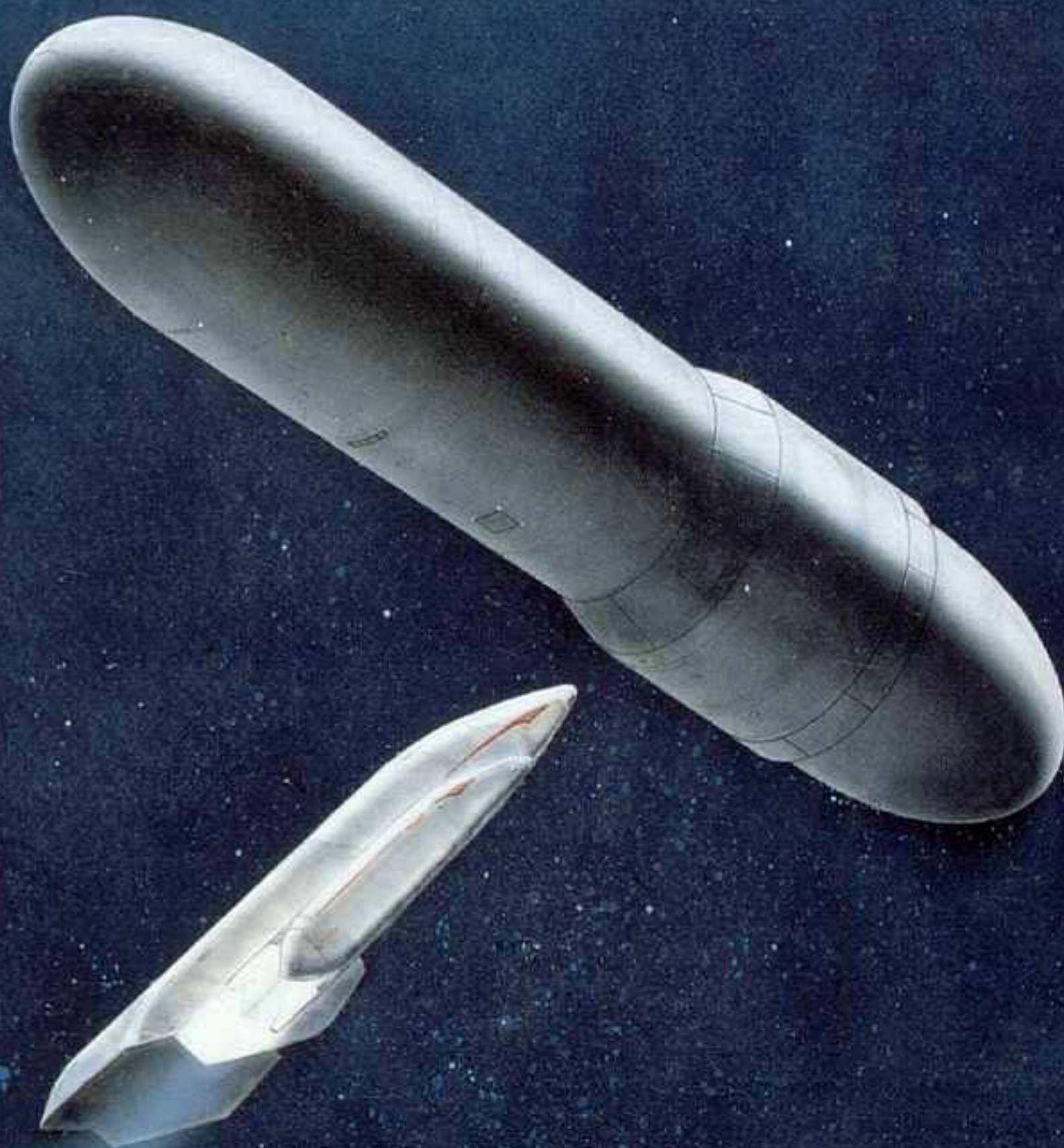


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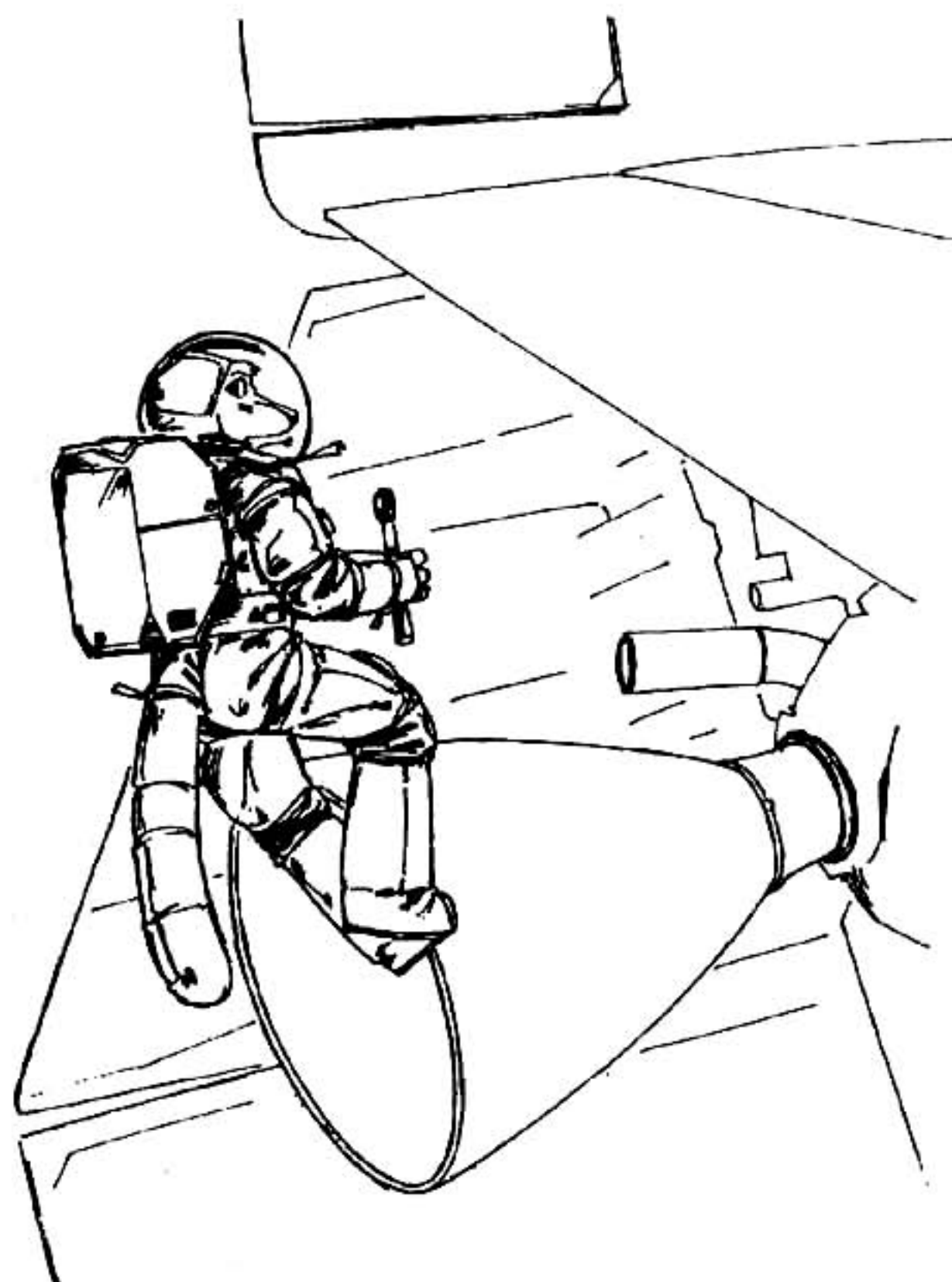
ALBEDO SHIP SOURCEBOOK



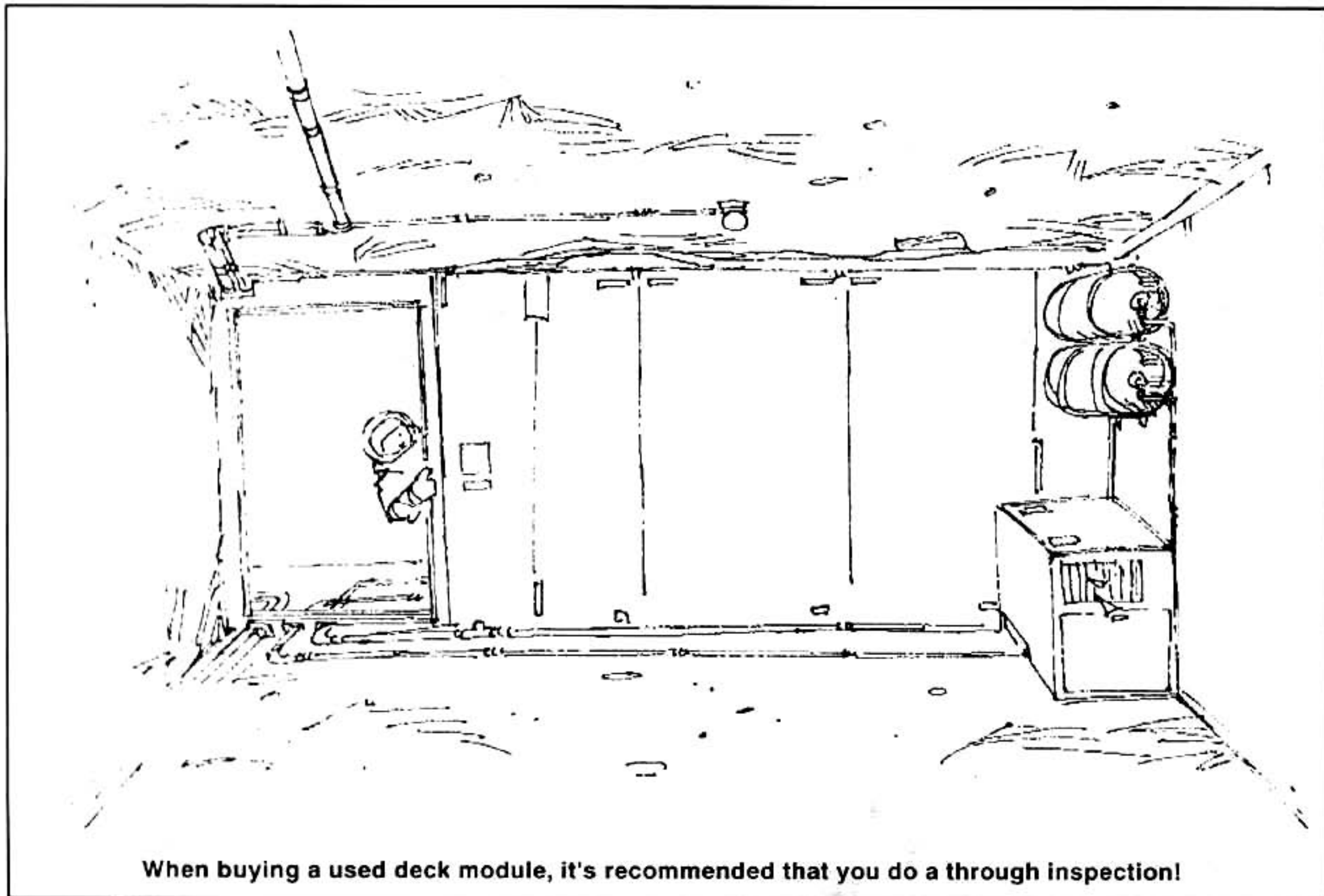
**By Paul Kidd
Art by Steven A. Gallaci**

ALBEDO

SHIP SOURCEBOOK



by Paul Kidd
art by Steven A. Gallaci



When buying a used deck module, it's recommended that you do a through inspection!

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Portions of the discussion on jump space are reprinted from *Vortex* Magazine. Thank you, Cris Williams and *Vortex*.



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INTRODUCTION

The Albedo universe is an environment of scattered, relatively low-populace worlds bound together by a network of interstellar trade lanes. Given fusion technology, a workable jump drive and good structural engineering skills, the culture of Albedo has managed to create a number of space technologies suited to the needs of ongoing trade and communications.

Interstellar transport is both expensive and potentially slow, given the limits of jump tech. Most colonies are self sufficient once they pass their initial "teething" phases. Goods are largely produced locally from local materials, so importation of most consumer products is usually unnecessary as well as prohibitively expensive. Merchant shipping, therefore, largely handles only high priority cargos, luxury goods and passengers. Most importantly, starships create links of information, technology, culture and society which merge scattered planets into political entities. Information transfer is the main trade which plies the stars.

For those familiar with the comic book series or otherwise well versed in the background of the setting, the descriptions here will be consistent with the current continuity of the comic (as of Albedo vol.2 #.10) or with the standard time/date of approximately SD 200.

NAVIES

Major governments maintain considerable military forces to control their space lanes. Centralized training institutes create highly skilled professional crews who are then rostered into armed starships which undertake a variety of missions. In the ConFed, only the EDF operates space going warships. The means for conducting interstellar war are thus under the command of the ConFed central government, and not in the hands of local planetary forces.

Naval dispositions usually consist of individual ships on

routine patrols with reserved units dispersed among the major planetary systems. Formations can easily be assembled for special missions. In the EDF, such task forces are usually centered around a VLCSV (Very Large Command Support Vehicle) - a massive factory ship which acts as a carrier, repair base and troop transport to support the battle fleet.

A certain percentage of vessels will constantly be on patrol throughout a nation's spacelanes. Border patrol, anti-piracy patrol, the transfer of personnel and training cruises are continuously underway. Even in quiet areas of space, the occasional patrol is considered a benefit to local confidence and morale.

CIVILIAN SHIPS

The most commonly encountered vessels are those designed for peaceful survey or trade. Inner ConFed worlds and those worlds with limited private ownership of goods will often run state-owned starships and merchant fleets. Other vessels can be run by private individuals, often as mortgaged or leased equipment, or under contract or commission of a private party or the state. Some vessels are owned by mega-corporations - big companies with holdings through multiple star systems, even spanning the entire ConFed in cases, which train and operate crews in a manner similar to the space navies which protect them.

Typical ship roles include passenger transport, fast cargo couriers, and trader vessels. Common trade goods are data and patents (the "ideas" trade), and small, valuable cargos. Other "private" vessels include those specialized for planetary survey - often prospecting for resources or performing valuable search and mapping for new colonies.

In general, high levels of competence are required for merchant vessel crews. Space is dangerous, and no one likes to place their lives into the hands of half-trained personnel.

True Starships

Be they tiny scout ships or gigantic VLCSV's, all 'true' starships take much the same form: blunt ended cylinders equipped with fusion drives.

Usually circular in cross section, the ships stack deck levels or sections, orienting their decks for thrust up along the main axis of the ship. At the front and rear of the vessel, large fuel masses are stored. Drives consist of a ring of fusion reactors near the rear of the ship.

True starships normally have control, avionics and power generation systems integral to the main hull. The central hull consists of a number of modular decks which can be swapped around and changed at need, allowing these vehicles to be extremely flexible in their many roles. Cheaper to construct than aerodynes, more efficient with their internal space and simpler to control, these vessels are the most common vehicles in the spacelanes.

FUELS AND POWER SYSTEMS

Fusion technology is advanced enough to produce compact, sturdy fusion reactors, which provide the energy for all ship's systems. The actual fusion reaction is by injecting a high speed stream of liquid hydrogen into a series of energy beam foci, achieving pressure/energy levels high enough to create a standing fusion event/shock wave. The energy release is coupled to working fluids that are superheated and then do work.

Ships are propelled by using the reactors to make high-velocity streams of now vaporized working fluid which are directed through nozzles to produce thrust, much like a conventional chemical rocket. Unlike a chemical rocket, using fuel and oxidizer to make a stream of reaction mass that is directed through a physical nozzle for thrusting velocity, the

fusion propulsion arrangement uses a magnetic nozzle to drive the reaction mass at more extreme velocities, getting more thrust out of less fuel.

The ship also has reactors that provide electric power by driving working fluid through magnetohydrodynamic (MHD) generator coils. The exhaust from these reactors can be directed as maneuvering jets or to provide propulsion thrust, but at only one tenth the efficiency of the primary drive engines. In either case, the key reactor components, beam generators, focusing hardware, hydrogen pumps and accessories, are all modular and interchangeable. So if damaged, parts can be swapped fairly simply. Only the major thrust-bearing hull structures cannot be easily repaired in the field.

The waste heat from the small Sterling electric generators that use waste heat from the reactors is either radiated to space or heat sunk into the ship's mass or environmental systems.

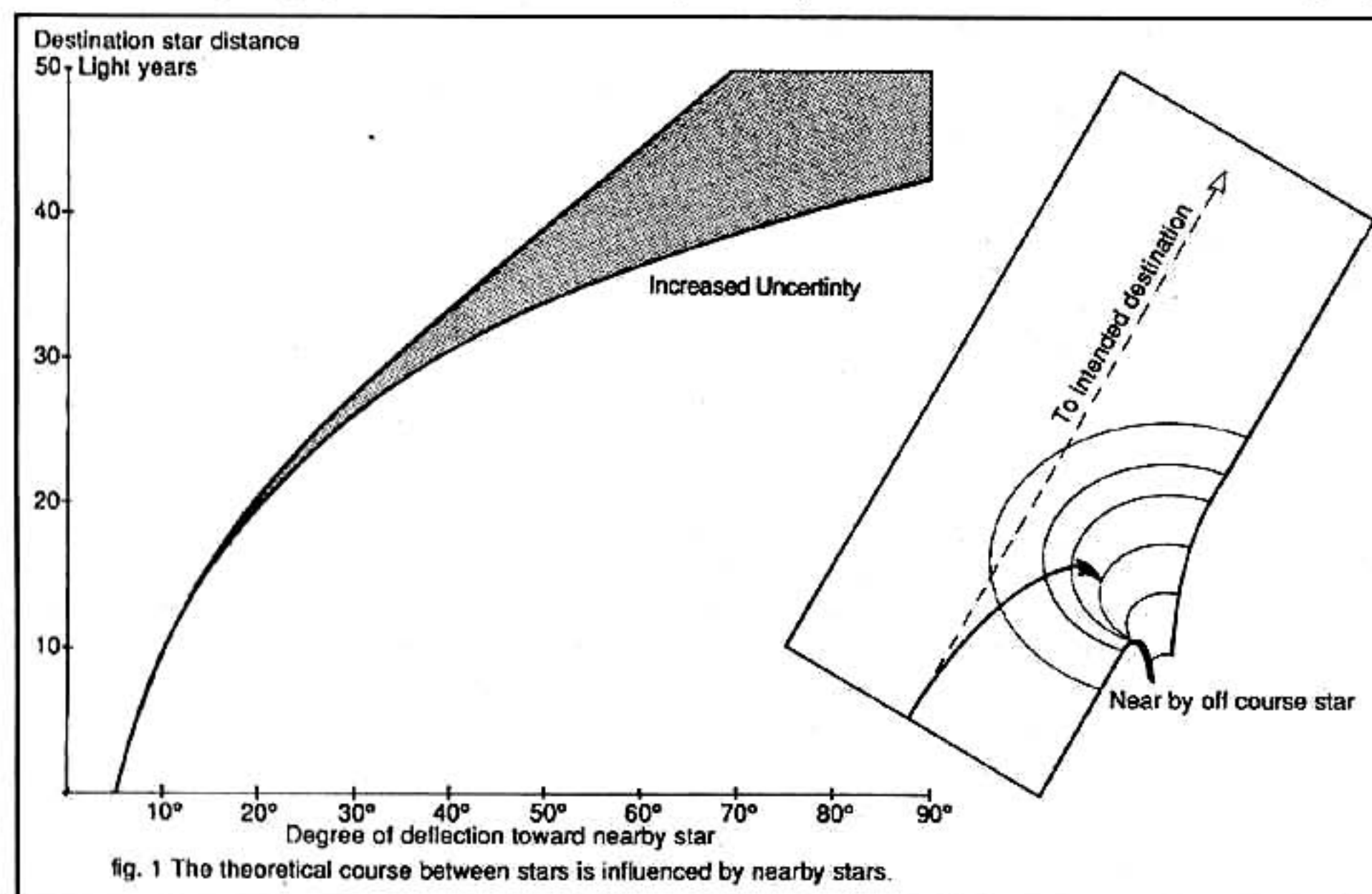
Emergency power can be drawn from batteries or oxygen/hydrogen fuel cells. If the ship is at a reasonable distance from a star, photovoltaic cells or solar collector/Sterling electric generators can be deployed.

The reaction mass/working fluid is usually liquid hydrogen. On a starship, it is stored in large subdivided and stress-stabilized fuel tanks fore and aft, to double as bulk mass protection. In the newest generation of ships, to take advantage of improved reactor efficiency, plain water is used instead. Water has the advantage of greater mass per volume, 1000 kg. per cubic meter versus only 71 kg. per cubic meter for liquid hydrogen. As thrust is figured by weight, one needs little more than a tenth of the fuel tannage for the same performance with water as fuel.

JUMP

To travel faster than light (necessary for practical interstel-

lar travel) Albedo starships need to be equipped with a jump drive, which takes the form of a system of generators lacing the skin of the ship. 'Jump' is the common name for this interdimensional transfer technology. In short, it allows a ship to jump from the real universe to a transit universe and back, taking advantage of the loose relationship between these universes to instantly jump many light years without actually accelerating or otherwise traveling through the intervening space. Ships entering new locations in this way will have exactly the same vectors and speeds as they held the moment the ship entered jump. It is therefore easiest to accelerate towards the target in real



space, jump, and enter the system already falling towards the desired end-point of the journey. Then the ship only needs to decelerate to arrive safely into port.

While jump has given civilization access to the stars, it has done so with limits. In theory, a jump can be unlimited in its range; however, in the transition between universes, gravitation influences both the coming and the going. As a ship goes through transition, its relationship to both universes is soft, and it is disproportionately affected by gravity 'wells' (see Figure 1). Also, in specific moments in transition, stellar gravity wells reverse themselves, repelling the jumping ship away from the departing star and making arrivals close to the destination star touchy (Figure 2). This repellant effect prevents a ship from doing a mini-jump within a system, as the attempt would likely place the ship halfway to a neighboring star. A middle-of-nowhere space between stars would not give a ship the kick-off point which a gravity 'hill' does. Careful transition tuning would be needed for the ship to be able to jump onward to another star.

Another factor related to gravity wells: jump-outs too close to a major mass tend to leave some matter behind. That's not a problem if it's just a few stray electrons, but it's a major disaster if half the protons of the ship and everyone aboard got left behind (Figure 3). This risk also applies in proximity to lesser masses, such as planets, or even large ships if they are at close range. The reverse is true for jump arrival; it takes considerable jump finesse to get a ship to arrive anywhere near any appreciable mass.

Ships also have to deal with jump field interference. Pre-jump field activation causes resonance in the inter-universe environment. If a dissonant field attempts jump, it initiates not the change in state which encourages jump, but a change of state that disrupts nuclear binding energies, disintegrating the ship. Unless two ships are very close and have their jump fields exactly in phase, neither one can safely jump. If several ships are to jump from a single area of space, they must jump one at a time, or spread out at some millions of kilometers distance from each other. Even then, ships would risk jump interference. It is

almost impossible for ships to arrive anywhere near each other.

Jump-out navigation is fairly simple, as it is always exactly away from the center of mass of the departing system. Arrival control is achieved by careful manipulation in the rate of transition, which plays off the attractive and repulsive effects of the destination star's gravity. Timing is critical in mid-jump as the ship cannot exist in the other universe very long. Some of the physical laws are different there; for instance, elements heavier than carbon spontaneously fission. Survival depends on a slight inertia in matter to retain its original universe characteristics for the few nano-seconds it is necessary to be in the other universe. The transition phases are longer, but still measured in micro-seconds.

With these limits, jump travel is limited to the nearest star along the intended course of a usual range of 5 to 30 light years. Most routes therefore have to go through several intervening star systems to get to a destination which might at

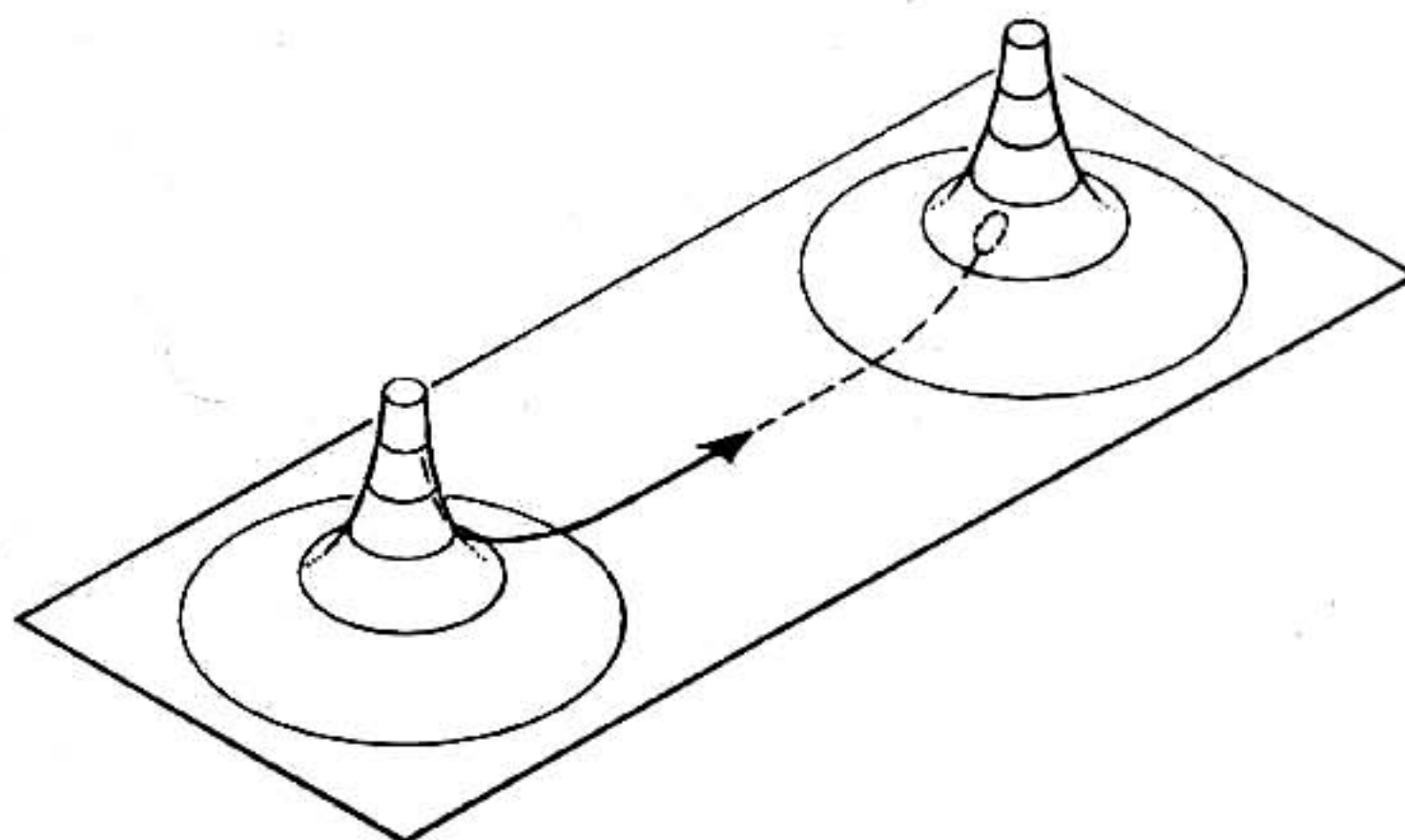
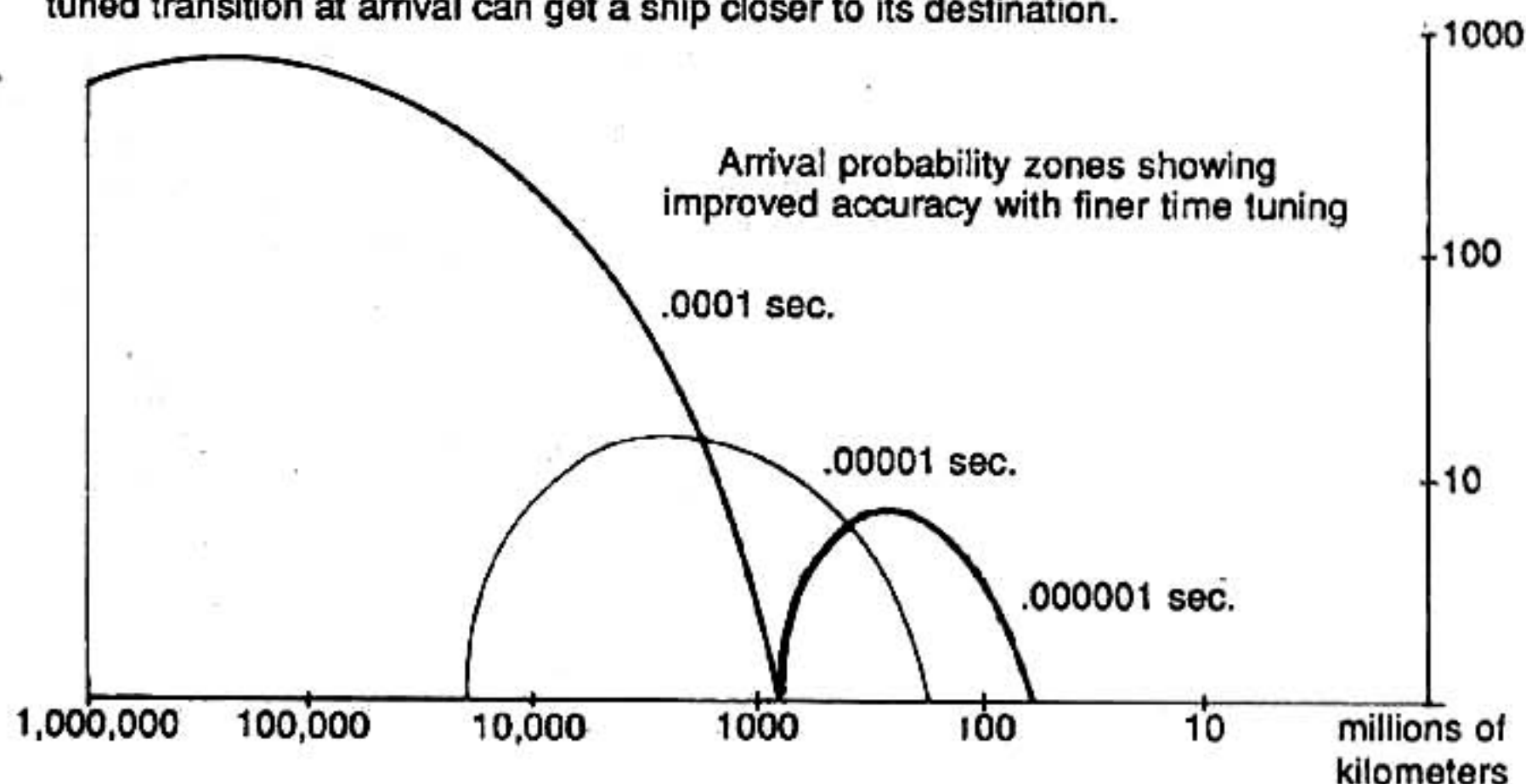
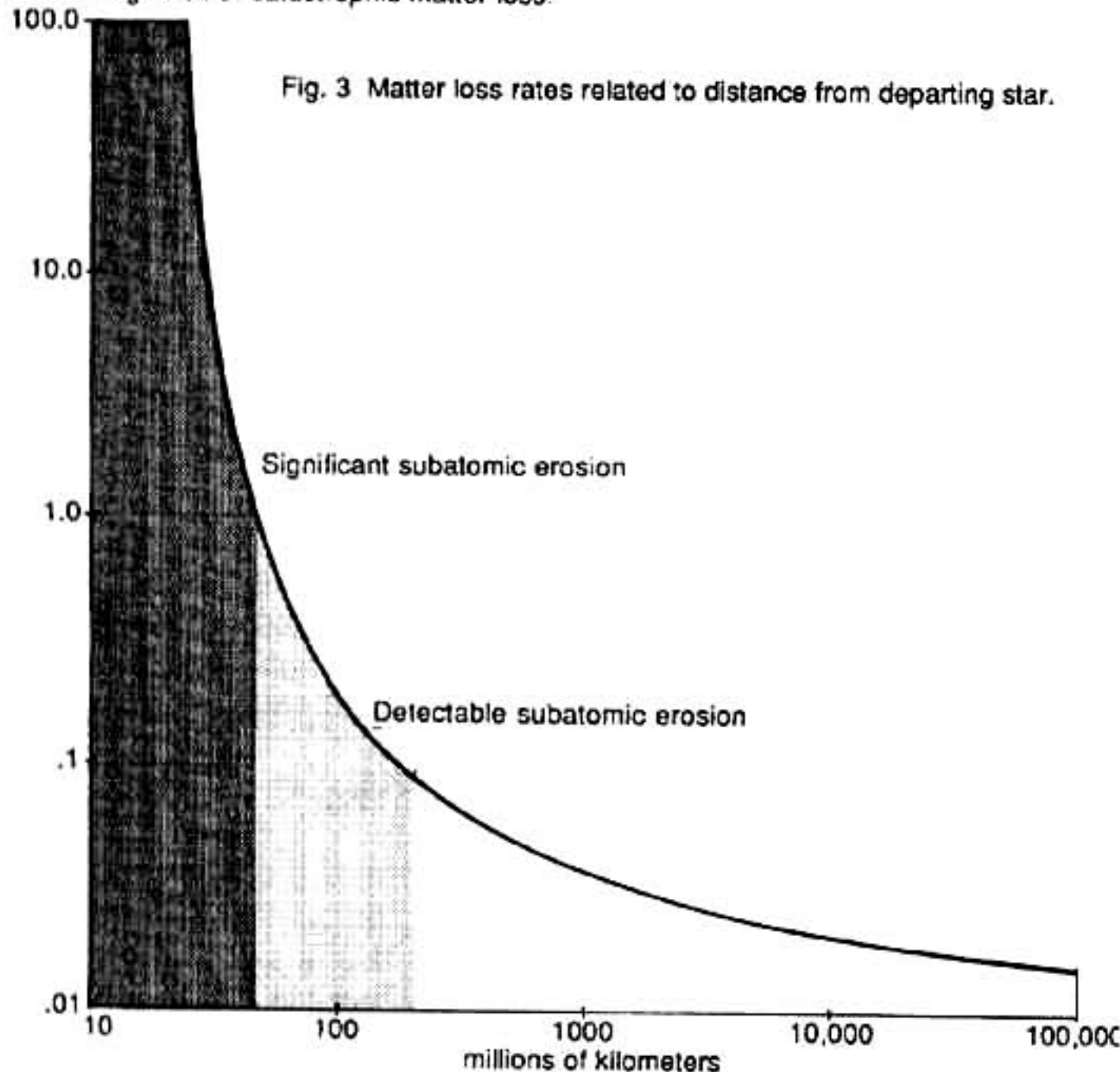


Fig. 2 During transition gravity wells can act like gravity "hills", thrusting a jumping ship away from its departure point, and repelling it away from its destination. Fine-tuned transition at arrival can get a ship closer to its destination.



Percentage risk of catastrophic matter loss.



first glance appear to be a simple straight course. As known space is fairly full of stars, no experiments for truly long-range jumps across empty zones in the galactic arm have yet been possible.

All ships must therefore accelerate out of the dangerous gravity well of a star system before attempting to jump. This safe zone is known as the 'jump point'. Accelerating from a planet to the star-system jump point can take weeks, depending on speed and distance necessary. During the weeks in which the space ship travels to and away from jump points, the traveler's most urgent needs are to get along with fellow passengers and to avoid the prickles of boredom.

Please remember that there are no antigravity or artificial gravity/anti-acceleration technologies. Ships move at velocities which their living passengers and crew can handle, and ships are designed with free fall movement and acceleration orientation in mind.

Emergency or 'hard' jumps

In emergencies, ships may attempt an early jump, activating their jump drives before reaching the safe minimum jump point for the star system. Emergency jumps can be made within a band of 85 to 99% of the normal minimum jump point distance from the gravity well's center. Any attempts to jump at closer distances to the well will result in the death of the crew, if not the total destruction of the ship, if not the death of the crew. (See the 'Rules Addenda' section at the end of this book for more on 'hard jumps'.)

DETECTORS

Ship-based detection equipment includes mass detectors, radio reception, and electromagnetic detectors (capable of registering radio, microwaves, x-rays and magnetic anomalies), as well as equipment capable of registering heat, radiation and impacts upon the hull. Radar and Ladar provide active systems whereby a ship may deliberately search for other objects in space.

Most important of all are the ship's telescopes. One or sometimes two computer-enhanced optical systems allow the search and inspection of other vessels, planetary surfaces or stars. Hooked into powerful computer records systems, these form the basis of a ship's navigational systems.

In effect, ships can detect the tell-tale drive flames of other vessels, homing in on these to allow full inspection via telescope. If a ship does not care about being seen itself, it can use Radar and Ladar to actively search the area around it. Alternatively, ships can power down and lie quiet, or even actively take steps to reduce their ambient emissions, making them virtually undetectable unless their opponents resort to active searching systems.

Mass detectors allow planets and stellar bodies to be found; ships telescopes then provide more detailed mapping, while EM detectors search for radio, power generators, heat plumes and other evidence of settlement. Ships thus have a full array of sensors capable of providing a great deal of information to starship crews.

COMMUNICATIONS

Most shorter-ranged communications are via microwaves. Broad band communications allow general messages to be received and sent. Messages may be either audio only, or audio visual, depending upon the sophistication of the sending/receiving equipment (e.g., Basic vacc suits will only be capable of sending voice messages and basic telemetry).

Where the locations of both sending and receiving stations are known, tight beam communications can be used. These use beams of microwave or laser signals to transmit data. Since the scatter of the beam is minimal, this means more secure transmissions can be made.

Since all communications are slower-than-light, remember that there may be a slight time lag between transmission and reception. Ships can be in communication with planets or with each other throughout the length and breadth of a single star system. Time lags range from a few minutes at the distance between most planets and the system's jump point(s), to a few seconds between vessels passing one another in transit.

COMPUTERS

Every vessel has an AI computer system integral to the ship itself. These computers are distributed processing networks - meaning that their components are scattered all about

the ship (there is no 'computer room'). The computer can be accessed by simple voice request from any position on the ship. Every room will contain an access terminal allowing more complex interaction than mere conversation (e.g., programming, showing diagrams, reception/recording of video messages, etc). Access codes will limit the facilities open to crew and passengers alike; only accredited crew will be allowed to interfere with the actual running of the ship's computer.

The AI is programmed to simulate a personality. As such, it acts as a counselor and confidant, and an adviser or sounding board for ideas. The AI monitors the mental state of the crew, comparing reactions against psychological models kept in its files. Thus if a character shows signs of stress, depression, mania or psychosis, the computer will be able to spot the signs and alert the ship's medical personnel. The computer also monitors security and onboard safety.

ARMAMENTS

Ships in Albedo mostly utilize 'ordnance' armament. Homing missiles called Autonomous Combat Vehicles (ACVs) are fired out of the ship and are guided into offensive and defensive patterns. Capable of coordinating with one another and the launching ship, these missiles attempt to collide with their targets, causing massive damage in the process by sheer kinetic impact. The missiles veer and intercept one another, acting as missiles and anti-missiles until either stores are exhausted, or the battle is decided.

Secondary to missiles are beam weapons and point defense armaments. Lasers, particle beams and masers can be used to attack enemy vessels, but only if the beams can gain time to slowly chew their way through a target's armour. They are unsuited to the fast head-to-head encounters so typical of combats between those who are attacking star systems and those who defend them; they are, however, useful weapons in stern chases and orbital encounters.

Point defense cannon of many types are used as a last-ditch defence against incoming missiles. Point defense armament usually consists of hyper-velocity automatic cannon supplemented by the ships beam weapons. These have a secondary function of deflecting potentially dangerous debris away from the path of the ship, especially at higher velocities.

Ship-to-ship armaments are deadly. At the high velocities used in Albedo ship combats, it takes only one good, solid hit with an ACV to utterly vaporize a target. Starship combat is no task to be taken lightly.

Only military ships carry armament. Civilian ships can be equipped with limited beam or point defense weapons as an aid to mining, or navigating areas filled with debris - but anything beyond a certain number/caliber requires proof of need to government authorities: time to make an Admin or Spin Yarn roll!

INTERNAL ENVIRONMENT

Ships are kept as pleasant and practical as possible. There are no blinking lights or dripping pipes in evidence in most areas. Walls and ceilings are covered in access panels,

usually color coded deck by deck to help crew orientation. Decor and even little garden plots will be arranged to alleviate the crew's sense of claustrophobia.

Ships are designed for easy access and habitability both under thrust and in zero-G. Velcro patches and recessed handles on walls, ceiling and floors allow maneuvering grips during periods of weightlessness. If necessary, certain corridors can be rigged to blow a breeze, causing zero-G traffic to gently flow in the required direction.

Work areas are compact and efficient, allowing easy access under both thrust and zero-G. Emergency vacc suits are always at hand beneath each work station. On warships, work stations are 'hardened', giving a measure of cushioning and armored protection to the crew.

JUMP-CAPABLE AERODYNES

Aerodynes are fusion-powered lifting bodies capable of operation in space and within an atmosphere.

More expensive and less space-efficient than true starships, aerodynes have the advantage that they can take off and land upon planetary surfaces. Since most true starships have small shuttle aerodynes on board, and since most planets have customs and quarantine restriction preventing vessels from landing directly on their soil, jump-aerodynes only become practical in some specialized circumstances.

Jump-aerodynes come in two general forms, a fairly aerodynamic lifting body wedge, capable of economic high speed atmospheric operations; or a more boxy version of only limited aerodynamic form, meant more for getting through but not really flying in an atmosphere. Propulsion is via a fusion reactor or two, providing thrust like a starship's main engines. For in-atmosphere operation, an arrangement of intake venturis draws in air for extra reaction mass, creating a larger, cooler, slower, and much quieter exhaust stream. These vents also can alter the direction of thrust for vertical take off and landing, though a more conventional horizontal take off is common. A cockpit/control room, avionics, etc are placed in the fore-part of the craft. A central cargo bay accepts modular hull sections, allowing the vessel to take on cargo, passenger cabins, instruments or weapons.

Decks use a dual-orientation system, allowing cabins to be used both while the ship is at rest on its belly, or under thrust along its main axis, though how many features are truly dual oriented depend on what portion of normal operations are in which position. This feature is also common to the standard aerodynes which do interplanetary shuttle runs.

STANDARD AERODYNES

For operations within atmospheres, from atmosphere to orbit, and within limited interplanetary space, non-jump-capable aerodynes are the work horses of space. Ranging in size from tiny air cars to massive transport vessels, they serve in dozens of different roles.

Endurance in vacuum is not always spectacular; these vessels lack the impressive redundancy of systems and elaborate life support enjoyed by actual starships. Typical

endurance for a simple surface-to-orbit shuttle aerodyne might not be more than 150 hours or so. Long range interplanetary shuttles are designed for more endurance time to match their mission requirements, usually 20 to 50 days, or even more in emergencies. Vacuum endurance can be boosted for special missions - but usually at the cost of cargo space.

HEAVY LIFT BOOSTERS

These are very large fusion-powered surface-to-orbit craft, intended to lift large cargoes, often into the thousands of tons. The engines are modified starship thrusters, arranged for air-breathing like an aerodyne, and the appearance of the craft is like a very stubby starship. They can land vertically as well, and are often used as portable stations or habitats. They can be used as interplanetary craft, providing there is enough fuel or time to do so practically, though such tasks are usually assigned to exo-atmospheric ships.

EXO-ATMOSPHERIC VESSELS

For planet-to-planet use within a single star system, several different more-or-less ungainly craft are constructed locally to fill local needs. Incapable of atmospheric re-entry, but cheap to produce and cheap to run, these vessels are used to shunt heavy industrial cargo from one place to another. Often consisting of a simple drive section to which

massive cargo pods are strapped, these vessels are typically extremely slow. Higher priority cargoes will travel by starship or aero.

A second type of interplanetary vessel simply consists of a starship type hull without jump capability. Slightly cheaper than starships, these vessels are used for faster transfers of cargo and passengers from planet to planet. The thrusting performance for these ships is identical, if not better than a true starship, and their services and features can also match.

As a heavy lift booster is in effect, a very shortened ship hull, it can be upgraded with extra hull sections and fuel storage to interplanetary ship configuration. However, the air-breathing capable engines are less efficient than a true starship thruster, and have only about 10% of the performance. On the other hand, a starship engine group cannot be used for a booster, as the main thrusters don't work in an atmosphere and the generator/thrusters are not as efficient yet have such a fierce exhaust velocity as to be a danger to all concerned.

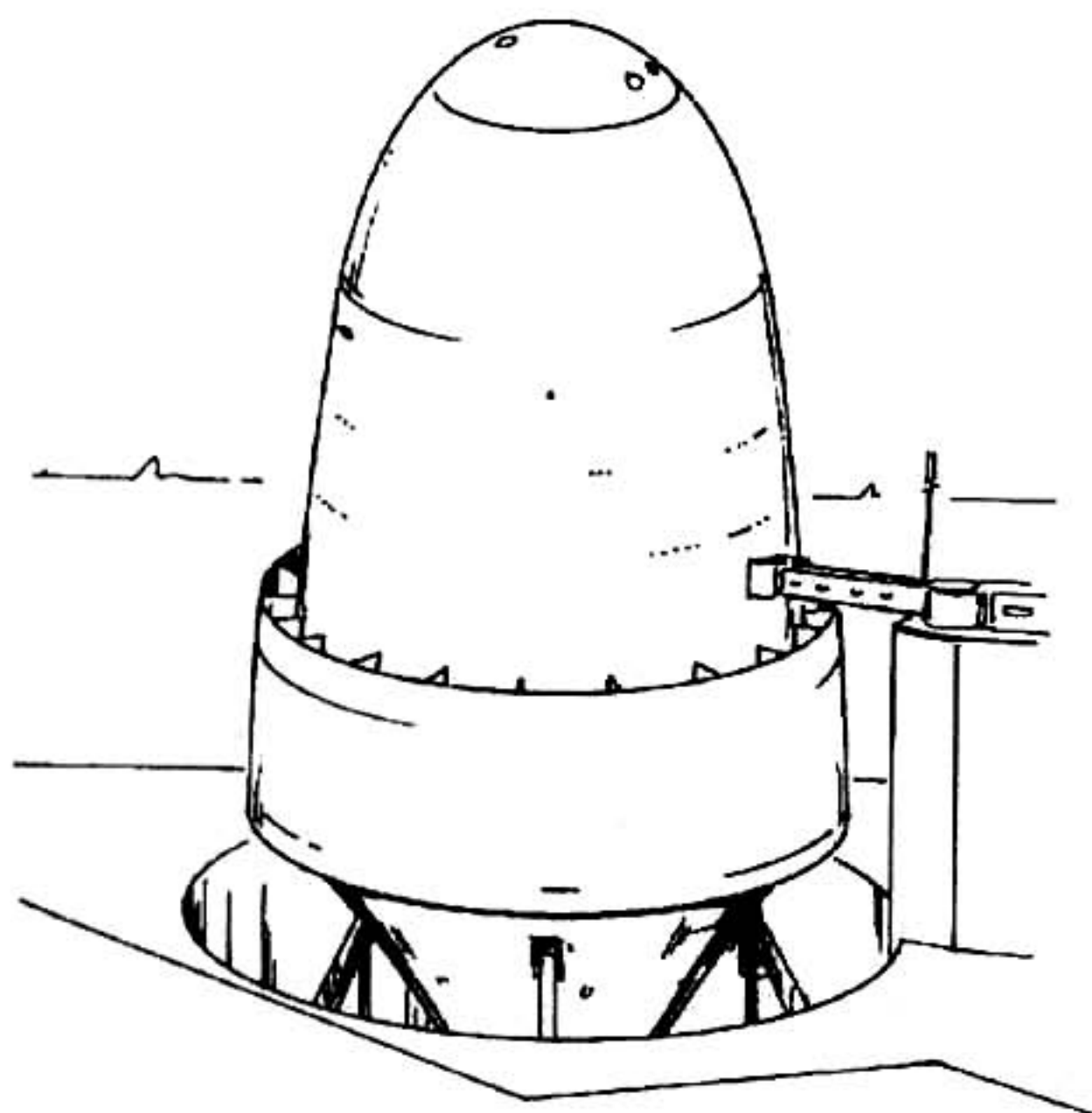
GROUND-TO-ORBIT SHUTTLES

Shuttles consist of short 'winged' lifting bodies, powered by fusion engines: a fairly old but still popular design. These vehicles take off from airfields like a conventional aircraft. Then they either simply climb up to orbit at a comfortable rate of acceleration, or immediately go vertical for a more ballistic launch. With their load delivered, the vehicles drift gently back into the atmosphere and glide back down to the ground. The pure fusion rocket is fairly noisy and less efficient than the air-breathing aerodynes, but the system is the simplest to operate, making this the cheapest and most reliable system for ground-to-orbit transference. All but the smallest of shuttles are usually too bulky for transport in starship hangars.

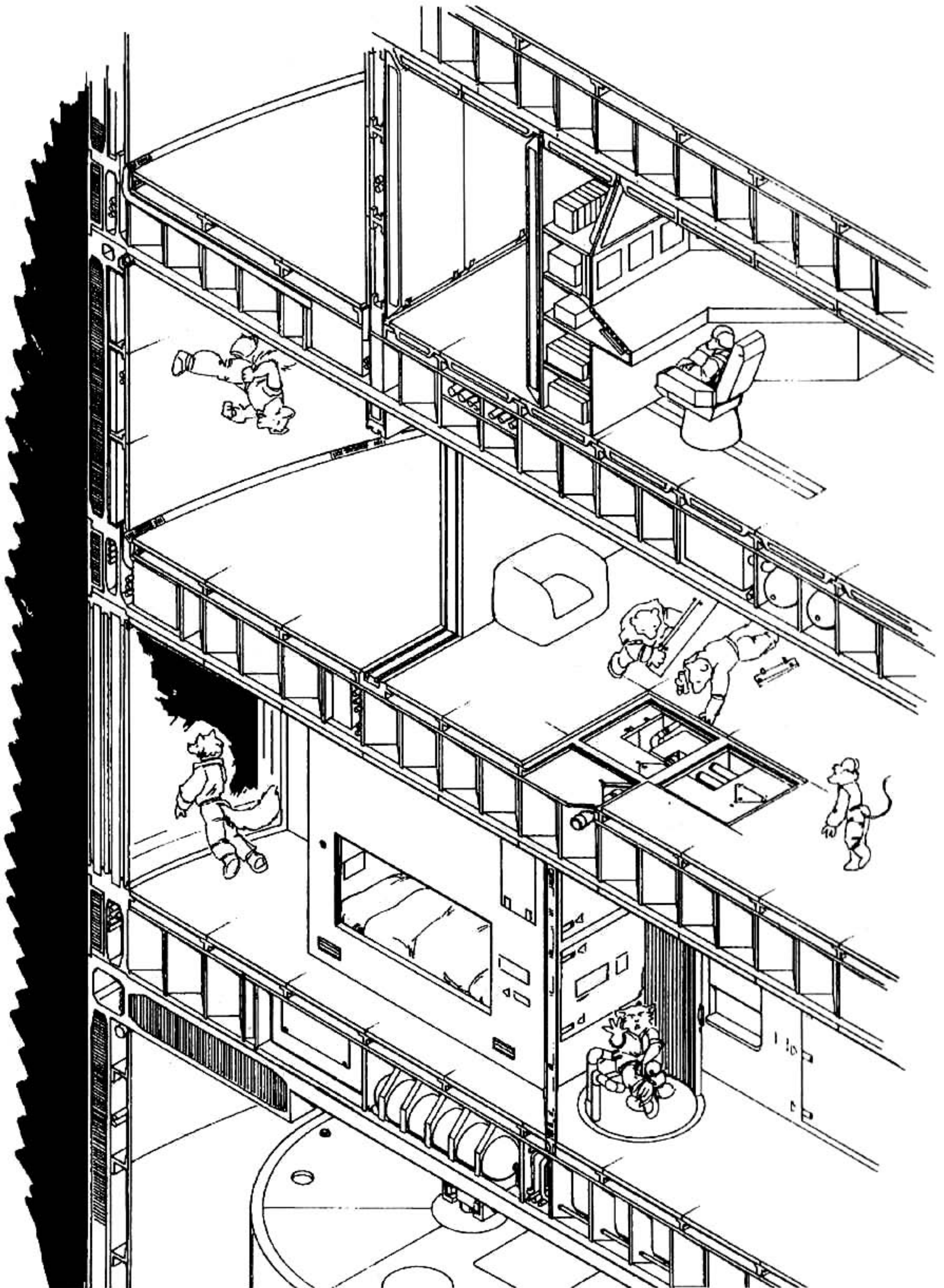
EXO-ATMOSPHERIC SHUTTLES

Exo-atmospheric shuttles are sometimes used for the cheap transfer of cargoes within zero gravity areas. Capable of only slow speeds, they are generally loose, spidery structures designed to maximize cargo capacity and minimize cargo transfer times. Since most cargo is already sealed inside standard volume pods, these need merely be clamped onto the shuttles central core and the load balanced against thrust.

Typical capacities for these vehicles are from a few hundred to several thousand tons. They are almost never transferred from system to system, but are assembled for specific roles or routes. Exo-atmospheric shuttles are usually made on site, and use the cheapest, most readily available construction materials or pre-fab kits.



This Page: Heavy Booster
Opposite Page: Cutaway View
of a Starship



Starship Travel

FINDING TRANSPORT

Runs between systems will vary depending on the population and importance of the planets involved.

The cheapest means of transport is to use free trader vessels. Since passengers are often 'opportunity cargo' for these vessels, they are susceptible to bargaining skills (a successful roll will reduce ticket prices by 5% per success grade). The chance of finding passage on small merchant or free trader vessels is abstracted as follows.

<i>Starport Grade</i>	<i>Chance of Passage</i>
A to A	20% chance per day
A to B	10% chance per day
A to C	5% chance per day
B to B	5% chance per day
B to C	20% chance per week
C to C	15% chance per week

Alternatively, passage can be taken on a fully outfitted passenger liner. These liners travel on regular routes to fixed timetables, usually between A and B grade starports. The frequency of such flights would typically be as follows:

<i>Starport Grade</i>	<i>Frequency of Flights</i>
A to A	Once per week
A to B	Once per fortnight

The benefits of travel on a fully outfitted passenger craft are smoother passenger service, better and more lavish ship appointments, and predictable timetables. The disadvantages are the fixed costs of such travel, and the strict controls over passengers (more questions will be asked of prospective passengers than would be usual on a free trader).

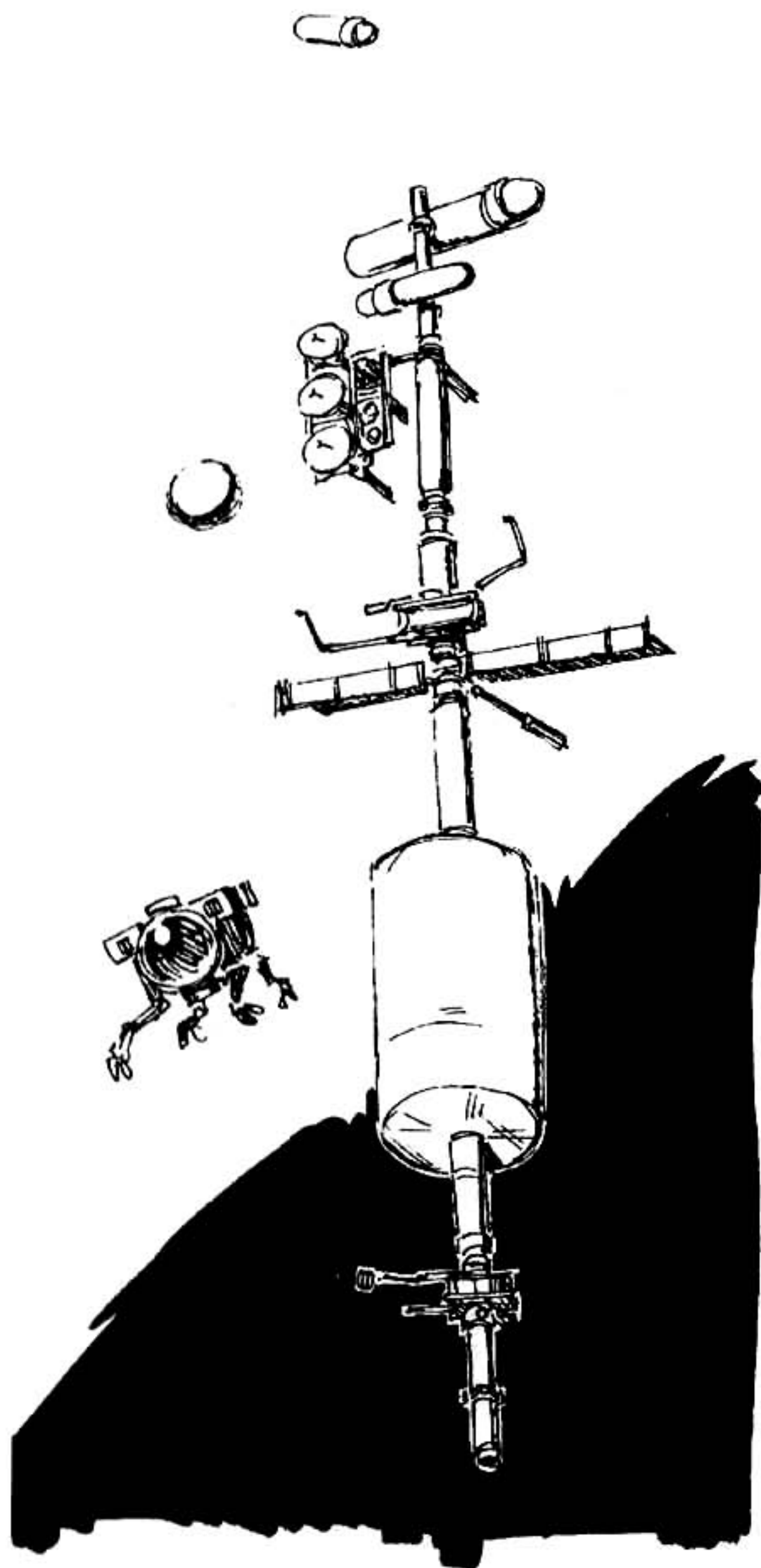
HIRING A SHIP

The one way of ensuring service exactly as and when it is needed is to charter a vessel. Chartered vessels will usually charge their operating costs (fuel, crew salaries and expendables) with a typical mark-up of 100%. Dangerous or outlandish services will carry a considerable surcharge.

In any given week, there will be a random number of suitable vessels open to offers of charter (i.e., more-or-less suited to the hirer's stated needs).

This is for typical needs - such as a chartered passenger vessel, survey vessel, or special cargo run. More outlandish or dangerous designs will have a substantially smaller chance of attracting interested vessels.

Alternatively, large companies or governments can be



Above: Docking at a Space Station

contacted with commissions, listing specific needs. There may be a waiting time while an appropriate vessel is found, and risky ventures will rarely be entertained.

Bargaining skill can be used to beat down the ship negotiator's price. Each success grade of the hirer's bargaining roll will lead to a 5% reduction in overall price.

Streetwise, Research or Current Affairs skills, or asking public information nets, might be other ways player characters

Starport	Typical Number of Available Ships
A	1 ship + 50% chance of 1 more
B	50% chance of 1 ship
C	25% chance of 1 ship

could find unusual ships. Say they needed a tanker or a ship modified to hold delicate biological specimens, then asking around, consulting the right news nets, etc, could change their odds of success.

SIGNING ON OR WORKING PASSAGE

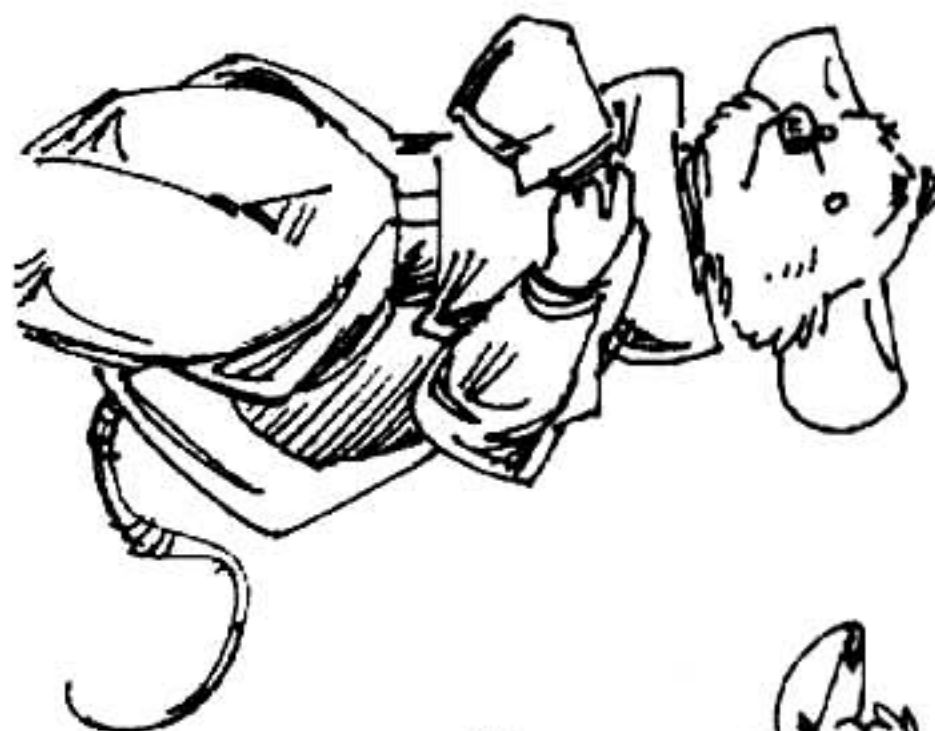
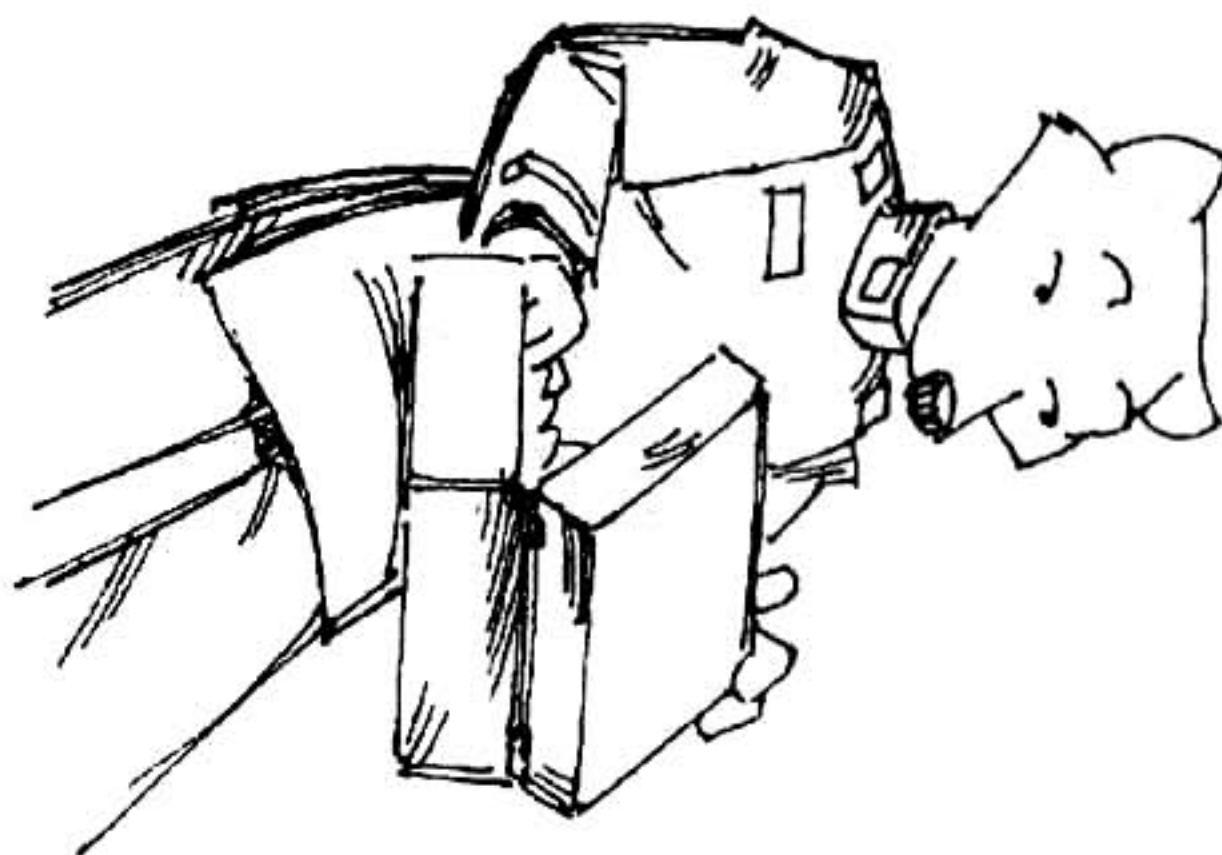
Characters with skills relevant to holding starship crew positions can attempt to find work as starship crew.

Vessels owned by established freight or passenger lines, big companies and the like will never simply hire on as casual labor at the docks; their reputations and efficiency depend on carefully schooling and training their crews according to company curricula. Joining the crew lists of these major companies requires an extended period of interviews and assessments - but long term benefits, promotion prospects and the like make this an attractive career proposition. The companies will often train personnel from scratch in return for a set number of years of assured employment (usually 2 years service for each year spent in training).

For those keen on picking up casual crew positions with smaller companies or independently owned vessels, use the following chart as a rough guide to the chance of finding vessels with crew vacancies.

Starport Grade	% Chance Crew Vacancy
A	50% per week
B	20% per week
C	10% per week

Winning a crew position will depend upon demonstrating competence at the requisite jobs. Characters must make a successful skill roll. The hiring captain will then attempt a 'Assess Personality' roll against the character, testing for dangerous character flaws or ulterior motives. The captain will usually be assisted by the ship's AI computer, giving a +1DRM to the dice roll.



Got any Vacancies?

Starports:

CUSTOMS AND QUARANTINE

A number of different grades of service are offered to star vessels by host systems. In general, all star ports are orbital structures placed in locations convenient to the planet which they service. Rather than a single structure, some ports will actually be a fairly extensive system of independent factories and habitats. Movement of vehicles in such areas is always restricted and monitored to reduce accidents and sabotage. Some planets keep considerable communities living and working in their orbital facilities.

There are three basic *grades* of starport facility;

A-grade

A-grade starports provide a full and comprehensive service. The local construction of starships and spare modules is continually in progress, so repair work, module swapping and starship purchases are easily made. The port offers full overhaul procedures; provides fuel, food and recreation facilities to visiting starships; and acts as a transit nexus for passengers and cargo. In the ConFed, many such facilities are sponsored by the ConFed government on the proviso that the facilities act as base facilities for ConFed vessels.

B-grade

B-grade facilities are less overwhelmingly complete. The port acts as a service center for ships, but has only a minimal manufacturing capacity. While fuel, food and maintenance overhaul are offered, there will be a limited stock of spares. Spare vehicle modules will be restricted in number and scope, depending on what has been swapped and sold from passing ships. Major repair work can be done, and there may be some limited manufacture of small standardized vessels.

C-grade

C-grade starports offer only the barest comforts. They can refuel ships with reaction mass and food, but lack the crews and expertise to overhaul vessels for maintenance. At best, they can help effect emergency repairs to damaged vessel in the hope of helping the crippled vehicle onward to a proper repair facility.

STARPORT QUIRKS

Many ports will also have quirks which the less formal navigation maps will identify using a standard shorthand notation. Some common quirks are listed below:

Bu - Bureaucratic

The system has stringent safety requirements for all vessels entering the region. Vessels must be able to demonstrate adequate maintenance, proof of ownership, and will usually have to pay a 100Cr docking fee. Departure from such starports usually takes three days booking in advance - though Admin skill rolls can reduce this by 1 day per success grade.

— e.g., Inner ConFed worlds are notorious for their bureaucratic starports.

Rs- Restricted substances

It is forbidden to either import or export certain items. Ships carrying such materials will have their cargoes impounded. If caught in the act of willful smuggling, both the crew and the owners are liable to pay considerable legal penalties.

- e.g., Many colony worlds have forbidden the importation of seeds and animal life forms. Alternatively, some governments may have signed some import/export rights over to specific companies, creating a legalized monopoly.

Mil - Military

The starport functions as a military support base. There will always be military personnel present, and usually one or more military vessels in dock.

- e.g., Tashtan station is co-funded by the ConFed, and is home to a small flotilla of Destroyers. Security on the station is tight, and incoming vessels are usually searched.

Tar - Tariffs

Certain substances are subject to heavy import or export tariffs. Cargoes of this nature will require licensing fees (usually 1000Cr to 6000Cr)

Lw- Lawless

Very rare in Albedo, but some ports do maintain traditions of colorful abandon. Poor safety standards and lax officials make it simple to secure certificates of maintenance, or to find cheap ship modules.

Qu - Quarantine

Most starports prohibit the direct transfer of passengers, crew or cargo from starships to the planetary surface. All incoming deliveries must be made to an orbital handling facility, which thoroughly checks the nature of the material before arranging transshipment to the surface. Also, passengers may be required to remain under observation for up to a week, depending on where they have come from or where they are going. There is always some sort of fee involved with this process (usually 1000Cr to 5000Cr)

Admin, Spin Yarn, Legal and Streetwise skills are all extremely useful tools which allow characters to avoid penalties, discover the quirks of their next up-and-coming port of call, etc.

Number of Ships in Port

The number of ships in port will vary depending upon the grade of starport, population of the system, importance to trade routes, etc. Typically a class A starport will have 2D6 interstellar vehicles in dock, in near orbit and en route within system at any given time. Class B starports will have 1D6 such vehicles, and class C starports will have 1D3.

MESSAGE TORPEDOES

Message torpedoes are used for the swift transfer of data between star systems. Consisting of outsized ACVs laden with fuel, message torpedoes usually carry only electronically

stored data.

Travel time is approximately one-fifth that of an unmanned vessel on a high acceleration passage, as these torpedos are able to endure an acceleration during the non-jump portion of their travels which would damage or kill a living being..

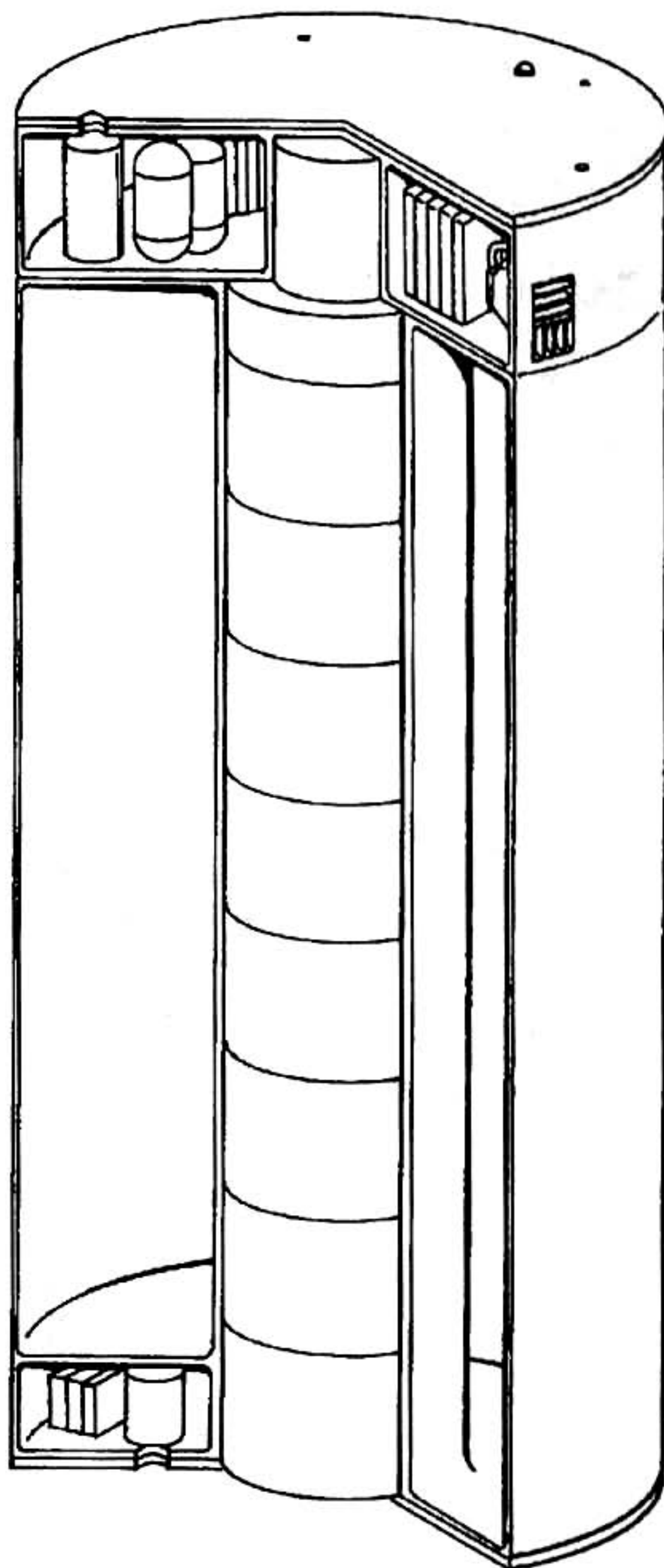
The price of interstellar 'electronic post' is 25Cr per electronic document, be it video message or data file, via ConFed communications services, or 35 to 100Cr for various privately operated providers. The cost does not so much reflect the price of data storage, but the excessive running costs of the message torpedoes themselves.

Some torpedoes can carry a limited amount of solid cargo (only material which can survive extremely high acceleration over prolonged periods). The approximate cost for transferring solid cargo in this manner is 5000Cr per kg.

The frequency of message torpedo services between star systems varies depending upon the size of the local population and the importance of the systems to the local information and trade networks. As a rough guide line, use the 'grade' of the starports to determine how frequently message torpedoes run between star systems.

Frequency of mail runs between starports:

<i>Starport grade</i>	<i>Frequency of mail runs</i>
A to A	Twice per week
A to B	Once per week
A to C	Once per fortnight
B to B	Once per fortnight
B to C	Once per three weeks
C to C	Once per month



Typical Message AV

Space Travel as a Passenger



Going into space, especially making an interstellar trip, can be a major undertaking, requiring considerable time and capital. For most individuals, it is a once in a lifetime adventure, and even the rich and famous would not be inclined to do it too often. A single round trip between two neighboring star systems might take three to six months and cost somewhere between 'a lot of money' and 'an entire life's savings'. However there are also interstellar vagabonds and the professionally restless, true veterans of the spaceways. EDF and ConFed officials also tend to travel a lot, in part to give them broader experience and spread their individual talents and influences, in part to keep them from getting too comfortable or establishing too strong a local tie. EDF and ConFed officials have to keep a careful balance between working for the success of a current assignment and loyalty to the ConFed as a whole.

The biggest step for most people is getting off-planet in the first place. Depending on the political or economic situation, it could be as easy as a quick call to a travel service and a big bite of one's credit account, to a nightmare of bureaucratic paperwork or even black market illegal emigration. While

referring to the world building charts in the basic game book (pages 133-141 in *Albedo, Second Edition*) can give some idea of the nature of access to travel in a system, they might not adequately reflect the intentions of the state or other factors in each individual case. You would expect that in general, the more open the franchise and the less state control over goods and services, the easier it is to travel outsystem at whim. There are exceptions, including one anarcho-syndicalist planetary district which allows emigration only by the consent of every citizen of an entire continent! Autocracies tend to allow travel only where it actively benefits the ruling group, and systems which are strongly pro-security will want to make certain that no lawbreaking will take place because of an offworld move, whether intentionally or accidentally.

In the inner ConFed and on other planets with in-depth security monitoring and other controls, emigration processes can be made simple by confidence in a network that assures identity and status. On the other hand, other more "loose" systems may require lengthy investigations to insure travel is not being sought under false pretenses. Some worlds may

have restraints on travel based on civil or social responsibilities; important individuals might not be able to travel until they can find replacements for their positions. Some clans may have prohibitions against members leaving before reciprocal obligations are fulfilled or may not allow separation at all. Then too, some systems have treaties with other systems that would regulate emigration and immigration, so that an individual may have to wait for a quota or until a specific opening is confirmed at his/her destination.

A complicating factor is the possible necessity of quarantine, to make sure no uninvited biology gets a ride. This can vary widely, depending on the relative biohazards on each world and what kinds of monitoring and subsequent quarantines may be necessary at any intermediate points, as well as at the destination. Some planets may claim to require a quarantine, more to hold the passenger in lock-up until further investigations can be made, than for any clinical reason. In such cases, it would not be uncommon for emigration requests to be rejected for "medical" reasons to camouflage repressive policies.

All of these factors can complicate departure (and make for a more interesting game) and have to be taken into consideration when arranging passage.

And don't think you can have a shuttle just zip down and make a quick pick-up. Almost every planet has some kind of traffic monitors and would immediately know that something was up and take appropriate legal action. And later, as the second ILR/ConFed war heats up, major planets would have large defensive beam weapon stationed around their systems and would not hesitate to use them on uncooperative ship traffic. Unauthorized take-offs and landings are liable to be considered (and treated as) possible occasions for smuggling and/or espionage. Government installations and the larger businesses in a system would take a dim view of either.

TRANSORBITAL FLIGHT

After arranging passage, actual lift-off would most likely be at a formal air/space port, using an aerodyne shuttle or heavy lift booster. On more remote locations, the lift-off site could be little more than a clearing for a vertical aerodyne landing spot. In any case, climbing aboard would be very much like getting on a conventional aircraft, and the passenger cabin would seem effectively identical to an airliner. However, details like the heavily padded upholstery on all surfaces, the zero-gee hand-holds and such would immediately tip one off. To accommodate the wide variety of physical forms that are likely to travel, the individual acceleration couches have pneumatic bladders that automatically custom contour to fit the passenger. For species that find a reclining position unfeasible, a more specialized supine couch is also available.

Each stage of the passage begins with safety instruction. Emergency decompression, crash procedures, anti-nauseant measures, and steward call procedures will all be covered. Each time. Gamemasters may play these out each time or simply have the characters roll to see if the procedures were understood. At each stage the matters covered will be slightly different. Even if no untoward event is to take place, travelers should be reminded that space passage is not without risk, nor

should it be done on 'automatic pilot'.

Lift-off in a regular aerodyne shuttle would seem just like an aircraft, except the initial acceleration and climb wouldn't ease off until orbit or station rendezvous. More economical boosts are more dramatic as the shuttle would lift off then climb to near vertical and rockets ballistically to orbit. This is quicker and less fuel-intensive, but subjects the passengers to up to several gees of acceleration. Similarly, a heavy lift booster would be more like a classic rocket, with an initial vertical acceleration of a couple of gees or so until orbit.

Orbit or a ballistic trajectory means zero gee (more accurately, free fall) and all the fun that entails. The most common problem is getting space sick. First time travelers would have a one-in-four chance of suffering some symptom (from headache, nausea, or dizziness to violent fits of vomiting or incapacitating vertigo or disorientation) during the course of the trip. While drugs can reduce the chance and severity of an episode, nearly no one is immune, and a veteran crewmember still has a one-in-six chance of a mild reaction. Flight crews are specially medicated as a matter of course. There are experienced travelers who never get over requiring an initial period of adjustment/misery each time they travel. The only time a traveler would get any relief from zero gee would be while on a spinning space station or while a ship is accelerating or decelerating. For passenger comfort, most ship's routes are designed to draw out the acceleration/deceleration phase as much as possible, though that may mean only a small fraction of a gee (one gee is approximately equal to 10 meters per second per second), which would give just the smallest hint of up and down.

Among other treats of zero gee is discovering a 'weightless' object still has its inertia (and its mass). It still takes as much effort to begin or end the motion of a person or object as if it/they were subject to planetary gravity. Once the object is in motion, or once it has been picked up, its speed is governed by its 'weightless' state. If you give your luggage an impatient push across the cabin it will seem to speed across the room. If it hits your cabin mate you may have a fight on your hands as it will hit with just as much impact as it would under gravity. Running into, or being hit by massive objects (or other passengers) hurts just as much in space as it does planet side.

On the other hand, things which are 'set down' somewhere and not secured have a high likelihood of floating in the circulating air currents, or due to altitude adjustments of the ship. If you have a habit of reading or listening to music and drifting off to sleep, you might find your booktape or vid player nestling against your ear an hour or so later. This can be disconcerting at best, depending upon what you were dreaming at the time. Liquids behave oddly in zero gee. They float in globules, each held together by a low surface tension which is easily broken. Each globule will then subdivide into smaller globules, each of which will float in a slightly different pattern. Stickiness and propensity to stain do *not* change in zero gee; thus most drinking and hand-use liquids are kept in squeeze tubes on space ships. Floating fluids or debris should be regarded with concern for important health reasons, as aspirating them risks choking or pneumonia-like conditions. 'Space cough' is not uncommon, due to accidental inhalations com-



The joys of zero-gee

bined with the build-up of fluids that happens with zero gee. On rare occasions, there are even fatalities due to accidental inhalations.

Depending on whether it is a high energy boost to a low orbit station, or a low energy ride to a high Clarke orbit, the trip can take less than an hour to a day or more. For a longer trip, some cabins may be subdivided into cubicles that would serve as sleeping compartments. They may offer other amenities. On the other hand, for high volume, short run commuter traffic, especially if it is low budget, the cabin could be packed with all the bodies the law allows, along with too much carry-on luggage that will quickly demonstrate how poorly secured it was once zero-gee is reached.

THE ORBITAL STATION

While it is possible to rendezvous with a starship directly, the more normal route is to stop at a space station. Often, another round of quarantines will greet the traveler, or at least, the station will be segregated, preventing contact between incoming and outgoing groups of passengers. Once again the characters will be run through an emergency depressurization drill and emergency evacuation drill. Everyone must participate, with no exceptions allowed. Emergency kits are generously distributed in every compartment and public space around the ship, containing sticky patches of air leaks and oxygen masks for toxic gas or partial pressure loss. For more dramatic press loss, individual vacc balls provide a temporary haven for several hours until help can arrive. The individual bunks in the passenger compartments as well in every PHM

are pressure tight and can serve as survival sites in an emergency. Providing that major ship's systems are working, unlimited air service is possible. Even if left to without these systems, at least seven to ten days of air are available, as well as emergency rations and water.

Travel arrangements are usually made so that passengers do not wait more than a week at the station. For civilian travel, the ideal wait is planned for two days, leaving a 'window', allowing for stowage of cargo and baggage, late-arriving passengers or cargo. The stay on-station can easily stretch to a week depending on to-orbit schedules, processing and quarantine time, and variations in the schedule of arriving starships (see navigation skill roll below). Passengers are often able to spend the wait indulging in leisure activities, making the last local-rate calls to their offices, etc. There are a variety of amusement places such as vid houses, dance halls, zero gee flight tanks, and rendezvous facilities which will painlessly remove any excess credits the passenger wishes to spend. Passengers who have left planets under less-than-ideal circumstances may have to wait aboard the station for considerably longer until their ship connection is made.

Station side facilities vary from rather austere quarters, as mentioned, to fairly nice individual accommodations. The bright side is that most space stations have long-standing hydroponics facilities. Including much fresh fruit and vegetables, the food is better than aboard most ships. How well amused the involuntary resident is able to keep depends on his or her skills in Mingle, Social Interaction, and similar skills. Most of the facilities aboard are either for resident staff (who

already have their own affinity groups and alliances set up for the long term) or for passengers in transit (pleasant, impersonal, and expensive). Net access is possible, as is access to non-security coded library data. If a long-term visitor uses a performance or interpersonal skill (a music skill, using Fast Talk ability as a raconteur, and such) to get better acquainted with the station staff, that visitor may win acceptance. You see, station staff spend an average of two years in a posting. During that two years they exist in a closed community with passengers processing through who don't interact with them except as service providers. A new face who is going to stay around long enough to get to know is a break in the monotony.

THE STARSHIP

Now at last the transit-weary passenger may board a starship. Accommodations here are usually two-person cabins with attached personal hygiene modules, emergency shelter in the bunk spaces, etc. A typical cabin contains everything the occupants might need. This includes its own self-contained life support system and emergency food supplies - a shower-cum-toilet facility, computer access, ... even a bed! Food and water supplies will last for weeks if carefully shepherded. More luxurious cabins have more space, usually maintaining two-person occupancy. Less luxurious accommodation has bunks stacked two deep to make four-person cabins. (This is more likely in a military ship.)

Recreation facilities are an essential tool in the never-ending struggle to prevent starship crews from going nuts. Gyms, common rooms, game facilities and the like provide a break from the drudgery of watch-keeping and private quarters. Many ships can develop quite sophisticated facilities, including "virtual environment" role playing games, regular music sessions, gardens and simulated environments. At least two different facilities, a mess and a recreational space, will be kept for crew only in passenger ships. Crew may have to eat in a hurry — and crewmembers need at least one place where they can speak their minds about passenger vagaries and demands.

Each habitable deck is usually equipped with its own basic life support systems; it is virtually impossible to have a single accident render the entire ship uninhabitable. It also means there are no air ducts to scamper through or other improbable conveniences. Most true starships will also have comprehensive recycling systems to reduce waste and keep water and oxygen in circulation. Larger or long range ships will also be able to produce their own consumables from biomass raised out of the recycling process.

In passenger quarters the ubiquitous 'flow flags', those strips of colored rag which monitor the circulation of air within a sealed environment and serve as an early-warning if they go limp, are by tradition highly decorative. They may be hand-crafted, stamped with a shipping line's colors, etc.

Almost as soon as passengers are boarded the ship will smoothly separate from the station and begin acceleration toward a safe jump point. This part of the passage is usually uneventful in terms of gravity changes and maneuvering thruster-burns. In cases where an entire ship has been chartered or assigned to a scientific or work-related mission,

space may be set aside as a workroom or office. In the case of individual travelers, Net access is still possible, with some time delays when the ship is far from inhabited worlds or relay stations, right up until the jump.

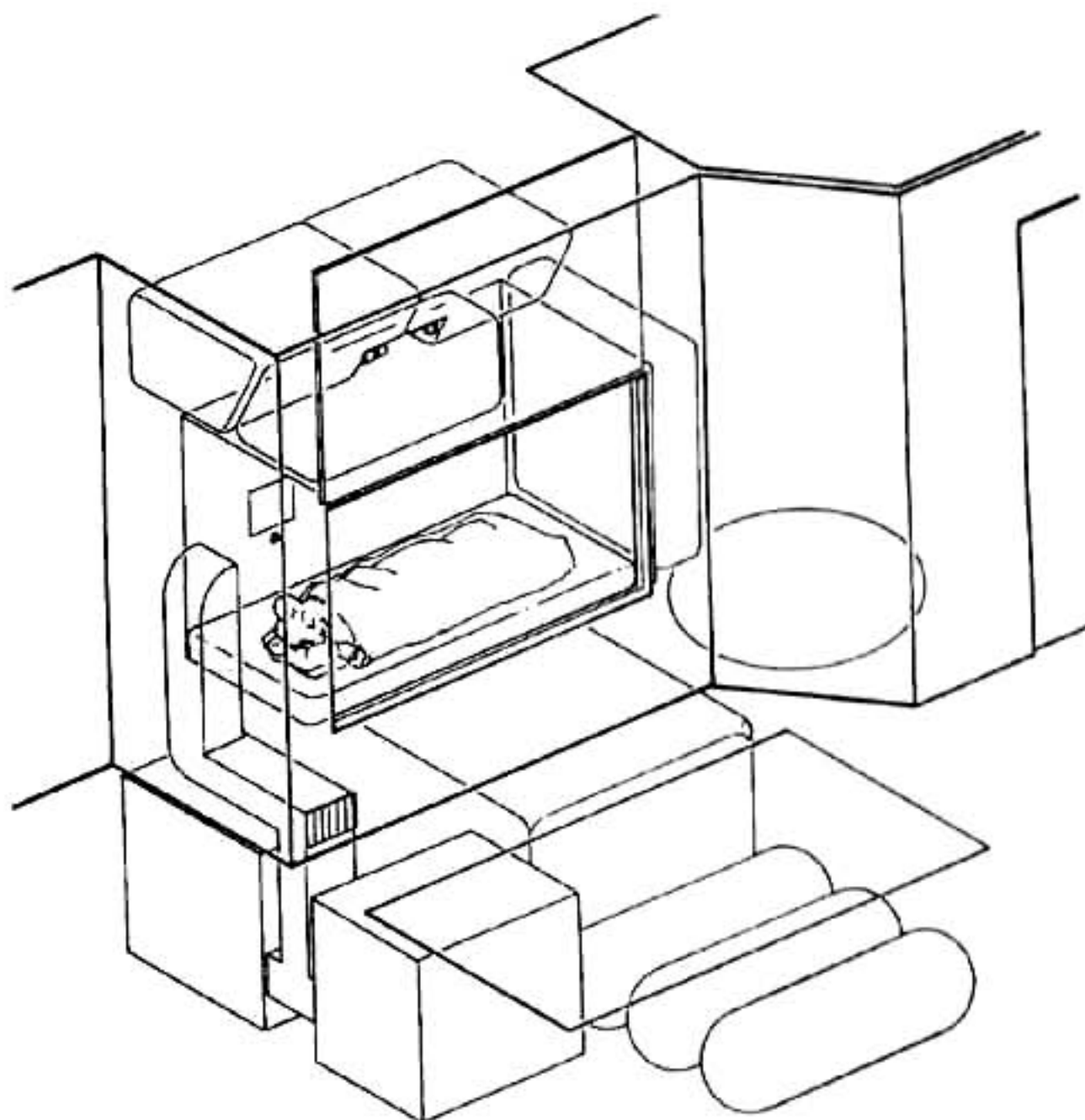
Ships travel at transluminary velocities through the use of a "jump drive", which is only operable well outside of a star system's gravity well (10 to 40 astronomical units [AU's] out from the system's center of mass). This distance could take two weeks to two months to traverse, depending on the economics of speed and distance (especially in comparing a heavy freighter with a tight fuel budget versus a "hell for leather" military craft).

The fusion reactor "jet" is fed through MHD coils before becoming exhaust thrust, and the energy thus generated is stored until enough is available to form a jump field (via the ship's jump field generators, which line the vessel's inner hull).

With the jump field formed, the ship drops out of the relativistic universe, reappearing at another point in the universe with no loss of time or velocity. Ships must jump from far outside of a gravity well, and the destination must be the next gravity well in line of flight. Ships which jump while too close to a gravity well will have only a proportion of their mass "go over" (starting with the lighter elements). To an observer, the ship will seem to blow up, smearing itself across a wide area.

Free Time

Free time during space journeys can be spent in a number of communal activities. Ship's exercise areas provide facilities for the ever-popular game of freefall 'tag', as well as 'grav-ball', a simple 'plant the ball on the marked space of wall' game that keeps starship surgeons constantly busy treating sprains and concussions.



Virtual reality role-playing games and competitive games are a relatively new field in Albedo, but are already gaining popularity as shipboard entertainment. Since these games can be accessed from virtually anywhere onboard ship, these activities have the added bonus of placing minimal demands on space and systems.

Simple 'socializing' is another popular pastime. Common rooms provide environments which encourage chatting, interaction and discussion. If local talents allow, demonstrations can be given of such things as music or art; lessons can be taught, and debates held.

Large passenger craft will usually have skilled crew who can aid parents in organizing children's activities, play groups and school. Providing care for younger passengers is one of the many and varied skills of 'passenger service' personnel.

Sex in Zero-gee has its adherents. While allowing a certain amount of freedom, participants must manage to tether themselves or keep a grip lest they ricochet from fittings or bounce out into a public corridor. Free-fall passion is considerably more difficult than it looks.

If desired, the ship's computer can act as a 'computer dating service', bringing together characters who are open to sexual liaisons during a voyage. Driven as they are by 'mating seasons', cycles of interest and species incompatibilities, sexual activity for critters on board ship is rarely a major concern.

A point of shipboard etiquette: Zero-gee traffic laws are fairly simple: Crew have right-of-way over passengers (since crew often have to be somewhere in a hurry). When heading "up" the hull, always pass on the outboard side of incoming traffic. No free-flight in working or habitat areas, and passengers are requested to keep one hand (or prehensile appendage) gripping a hand-hold at all times. All passengers and crew must strap into acceleration couches whenever 'ship maneuver' warnings are given.

Clothing Aboard Ship

In zero-gee, most passengers and crew will wear 'falling suits' - comfortable overalls which come equipped with velcro patches at strategic points to aid gripping onto walls and floors. Crew personnel will often wear vacc suit liners as a standard part of their shipboard dress.

Long hair is best kept bound up while on board ship. Characters undergoing yearly molt are usually advised wear fully sealed clothing from neck to toe for the comfort and convenience of other passengers.

Habitat areas are generally kept at pretty genial temperatures, rendering heavy clothing unnecessary. When the ship is under thrust, passengers and crew will often wear normal clothing - usually replacing shoes with soft sock-boots. Though nudity tabooed vary with the many societies, shipboard dress is usually required.

Foodstuffs

Standard shipboard fare places a priority on ease of storage and value for weight. There are only limited supplies of "fancy food" on board ship at any given time. Characters

who want to live the high life will have to bring aboard their own stores of gourmet food, possibly paying excess baggage rates.

'Turn over', or the midway point of a voyage (just after jump) is usually the cause for celebration. Fancy food will be broken out of stores, and a general gathering of passengers and crew will make a little party out of the affair.

ARRIVAL IN SYSTEM

Once the space ship arrives in the target system, communication begins with the planetary authorities, local offices, university liaisons, party advance teams, etc., as every passenger attempts to catch up on local conditions while en route to the planet. The AI aboard ship sends out a message which includes a benevolent 'virus' which integrates information from outside the system in the system Net while the system Net sends another information package to be integrated by the ship's AI. There is a tendency for the passengers to gather in lounge areas to watch system news and entertainment broadcasts. Local slang and the doings of various planet-sim and sports teams may be of great importance during future interactions with planetary residents. Any changes in politics, regulations, or enforcement policies which have been made in recent weeks are anxiously studied by new arrivals and immigrants. Passengers may wish to see 'Virtual Negotiations' under the crew section if they are in need of hiring local aid.

When passengers arrive at the orbital transfer station, they will undergo another quarantine and customs clearance. Medical screening will take place again. If they are trying to smuggle anything in, roll that section again from 'Customs and Boarding'. Restricted items may require another permit application, or another 'contribution to the Customs Office Benevolent Fund'. If the planet's political situation is repressive or unstable, passengers could find themselves delayed or confined at the space station. It's also possible for the destination planet to declare someone an Unwelcome Alien and refuse landing permission. (In most cases the peculiarities of the destination planet would be known to the travelers before they arrived. Planetary regulations do not come as a surprise.) The unlucky traveler would have to wait either aboard ship (if the traveler can persuade them to give a continued passage — try Fast Talk or Negotiation) or aboard the station until they can secure passage on another ship. Within ConFed space, the local ConFed Secretariat can mediate but does not necessarily have the authority to intervene in local immigration roles. However, ConFed citizens on station or shipboard have the free right of movement of any citizen. In unaligned space (or in ILR space) local authority may allow no exceptions. You guessed it, time for Negotiation and/or Fast Talk again. Bureaucracy skill may also come in handy.

For inbound passengers, in addition to the station's Emergency Drills, a Virtual lecture will be provided on peculiarities of planetary geology and ecology. As with the Emergency Drill section, if players make a successful *Reason* roll, then they were listening to this lecture and will later have a DRM modifier of +1 and a chance to remember pointers from

the lecture in challenging circumstances. These tapes are provided by the planetary authorities. Experienced travelers, or those who have made friends with them, may ask a member of the station staff if there is a staff-acclimation tape for this planet or system. If there is, station staff will usually allow a viewing of this as well, especially to players who give them reason to cooperate. Station staff are given a candid, in-depth briefing on local customs and protocol along with any peculiarities of the planetary government, folkways, and taboos. You don't want to use an innocent expression which turns out to be telling somebody in local slang that they are the nosewipe of your despised maternal aunt, after all!

PASSENGER TRAVEL

The Short Form:

(quick rolls to simulate player character travel experiences)

Customs and boarding

First check your baggage! Standard allowance is 25 kilos. Excess baggage will be taken, but at cargo rates (it's still pretty cheap, mind you...)

If restricted items are to be carried as cargo or luggage, correct paperwork must be filled out. Roll admin or legal skill for a successful permit application, otherwise transfer of the goods is refused.

Hidden "goodies" secreted in cargo or luggage will be found unless well hidden. Even well hidden items will be discovered by security search unless a 6 or less is rolled on 2D6 (DRM -2 if a bureaucratic, military or quarantine port "quirk" is in effect. DRM+2 if travel is to be made on a free trading vessel). Persons found smuggling personal weapons aboard will be arrested by local authorities.

Emergency procedures

Characters will be rehearsed in an emergency depressurization drill. Have each character make a Reason roll; if successful, then the lessons have been well learned, and a beneficial DRM of 1 will be applied if the character ever has to perform this task for real.

Fitting in

To see how relations with fellow passengers have gone, have travelers roll against their Mingle skill. A failed roll indicates that a miserable time was had: lower the character's Self Image by one for the duration of the trip plus 1 D6 days. Conversely, if the roll was made with a success grade of 2 or higher, then increase the passenger's Self Image by one. Crew morale acts as a DRM on this 'Mingle' roll.

Entertainment

There are several options for keeping busy while the space journey progresses: Passengers can pick one 'theme' for their voyage from the list below.

The character can socialize, play games, be the life of the party. (Roll a successful skill roll with Music, Dance, Art, or some similar social skill. Success gives

the character a +1 "contact" (see the rules addenda below) or raises Self Image by one point.)

A specific friend can be sought or wooed. (Make a successful roll in some sort of social skill. If successful, then have the 'target' character roll for the experience.)

Business deals or personal interactions can be spied upon. (Make a successful 'Snitch' roll to gather useful snippets of information.)

Business deals can be concocted, signed and sealed. (Characters can make bargaining rolls, etc., as appropriate.)

Skills can be practiced and lessons learned (Make a Stability roll. If passed, then the character gains +1 experience point due to study.)

ARRIVAL AND QUARANTINE

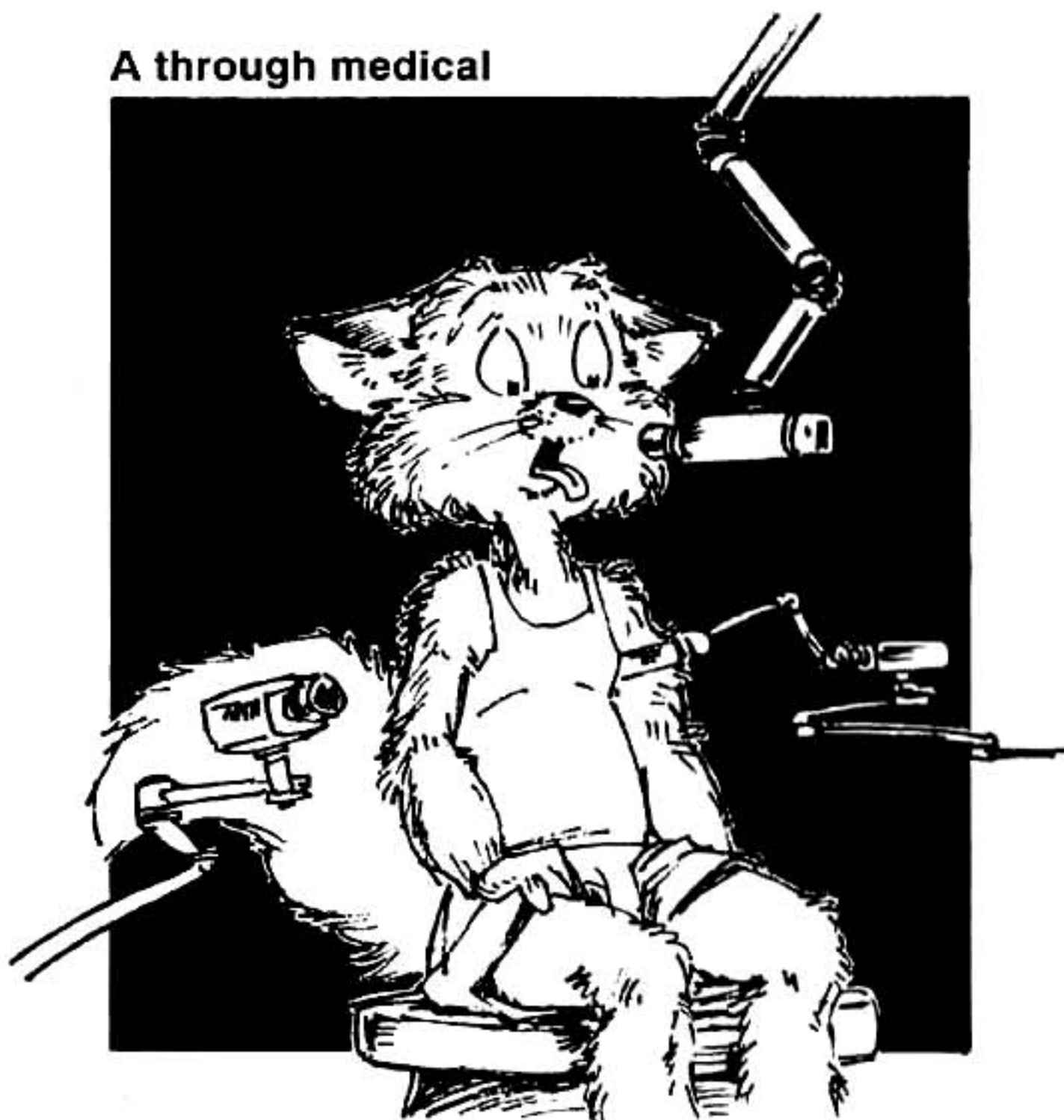
Business negotiations can be begun even while the ship is still in-transit (see "virtual negotiations" below).

Upon arrival at the target starport station, the character must usually undergo a medical check (revealing any medical problems, surprise pregnancies or killer alien viruses they might have).

If a clean bill of health is given, the character then must pass customs (once again, roll to see if hidden contraband is found - Roll 2D6, looking for a 6 or less for discovery by the authorities.)

Travel from orbit to the planet surface is all part of the ticket price. Have fun at your new location, and don't go petting any BEM's!

A through medical



Travel as a Crewmember

Crewmembers go through a short form of customs with their weight-restricted belongings. What takes a long time to endure is the ship's cargo customs clearance. Depending on the laxity of the system rules and/or system enforcement, crew may have to shift and open every cargo item in each hold, (more usually) one crate of each shipment, or simply show manifests and show that they have vacuum-fumigated the hold since transport of any biological cargo (foodstuffs, riding animals, seed crops, whatever). Restricted cargo must be taken on a case by case basis. Forbidden cargo, or smuggling, must be role-played unless the Gamemaster chooses to use the short form rules at the end of this section.

The crew's emergency drills are more elaborate than the passengers', because of course they include seeing to the safety of passengers and the security of cargo. On the other hand, crewmembers have repeated exposure to these drills, so they have a much higher chance of remembering exactly what to do in any given emergency. When it comes to Homeguard or EDF personnel, training will carry you through a crisis on a sort of ingrained-reflexive basis. You won't have to decide life-or-death procedures while in a state of shock, just fall back to your training. Martinet captains will sometimes stage emergency drills in mid flight to keep their people on their toes.

Normal deck to deck access is via the elevator shafts and on several of the engineering decks, ladderways as well. An emergency hatch is also available in the center of each deck if no other way is usable. In all cases, doors, hatches or removable panels will not open if there is a noticeable pressure differential between the two sides. Most doors and hatches are powered and computer controlled (indicated as arrowed lines on the deck plans), but sprung or otherwise balanced so that they can be easily opened manually if no power is available. While doors can be locked, a specialized pry bar can destructively force the lock, though not without alerting the security system. The same pry bar can force open a door with a pressure differential. While these tools are available on every deck for emergency purposes, access can be limited if there are security or safety concerns.

Normal crew accommodations would include individual bunk space (within the two-person cabins — see deck plans) which can double as a short term emergency shelter. Inside the bunk space/shelter are a computer terminal and access to the compartment's air and water stores. Through a removable panel, the occupant can gain access to emergency rations and a emergency vacc ball, as well as a respirator and first aid kit. Further digging will allow the occupant to get to the Personal Hygiene Module and connection with the adjacent bunk space, as these combinations usually pair two bunks with a PHM. The PHM has provision for zero gee showering and toilet, even in emergency conditions, but if the ship-wide waste system is inoperative, the limited storage of each compartment's holding tank could make for a noisome condition in time. The sub-compartment that contains the PHM also



has a small sink and space for appropriate personal items.

Crews' quarters have odds and ends of furniture like work desks, chairs, sofas or futons, all locked down or 'velcro'ed to the floor. Closet space and cubbyholes can contain clothes and personal items. Crew cabins are usually the standard two-person variety, though senior personnel may have extra desk, processing, or task-specific storage instead of a second bunk space. The ship's storage areas could have larger personal items if weight allowances or future posting options make it necessary or convenient to carry additional personal items.

Throughout all inhabited areas in zero-gee, all fans and ventilation grills have banners or 'flow flags' to show that air is being circulated, for if the air is allowed to be still, dangerous accumulations of carbon dioxide or other gases are possible. Remember, in zero-gee there is no convection currents of "rising" air, so unless there is something to keep air stirred up, it becomes motionless and nothing will settle out or dilute (there is slow mixing of gases by diffusion, but it is practically negligible). CO2/hazardous gas detectors are installed everywhere, and portable, battery-powered fans are available, just to be sure.

Water, for live use, heat exchanging, and waste, is also netted throughout the ship. Emergency supplies of up to 500 liters can be found in each compartment and temporary liquid waste storage of up to 1000 liters is also available. The main

recycling plant can take care of most organic material or simply distill water for reuse. In an emergency, there is hardware for alternate power applications for distillation and the crew would be familiar with its use. There is also hardware for electrolytic separation of oxygen and hydrogen, but this is a power-intensive process and is only efficient with surplus power from a reactor or solar collector.

Crew find passing the time during transit much easier than passengers do. Their time is occupied with their duties. They have some control over their environment, i.e., they do not feel transported by an agency they cannot influence. They also feel more at home on shipboard. For many, this is their real home. In their spare time, crewmembers may study to learn or improve a skill. They may befriend an interesting or knowledgeable passenger, and make a new contact for the future or learn a new area at a hobby level which can then be expanded to a skill by further study. For any roll made particularly well, they may increase Self Image (the negative is also possible). For any successful effort to maintain or improve crew and/or passenger morale, prestige aboard ship and possible promotion 'brownie points' should be noted by the Gamemaster.

Crew Tolerances and Needs

Small characters such as Mice and Shrews can tolerate a similar array of G-stress to that "enjoyed" by larger, lumpier species. It is assumed that the more powerful musculature of large, heavy characters will be balanced by greater mass. For any rolls or characteristic tests to check 'Gee tolerance', a characters *Endurance* is a better characteristic to test than *Strength*.

In the long run, it might be easier to be a mouse than a bear if you are planning on a shipboard life. The cabins seem roomier, the ceilings are taller, and taking a shower uses up far less of your water ration! Cruel umpires may want to use character frame size as a DRM for any rolls involving ducking, weaving, dodging - or even just long-term mingling and socializing with other crew.

In starship environments, certain species have special benefits and needs. Claustrophobic or particularly solitary species may not take well to close confinement - although most critter species are adapted well enough to urban living to tolerate such conditions for a month or two.

Some species, however, are particularly suited to zero-gravity conditions. Arboreal mammals and marsupials such as Australasian possums, Arboreal Quolls ("Tiger Cats"), Tree Kangaroos, etc, effectively have five hands: The "thumbs" on their feet and their prehensile tails makes them capable of using two hands on a task in zero-G while still anchoring themselves with tail and claw. When "braced", they add +1 to their recoil control ratings in zero-G. They also receive +1 DRM's for any zero-G maneuver rolls where grip and self-propulsion are an issue.

Phalanger possums, flying squirrels and the like all have natural flaps of skin between their wrists and ankles. Likewise bats and birds have usable wings. In zero-G conditions within a pressurized ship, these can be used to modify flight courses, break to a halt or even reverse course. Give +1 DRMs to such

characters for all movement, dodging, etc under such conditions.

Mice and Rats have the benefit of semi-prehensile tails. By wrapping their strong tails about ropes, struts or poles they can "anchor" themselves into position, brake their falls, etc. This may occasionally come in useful during role-play.

Most critter species have very "humanized" feet. Cats do not have great retractile climbing claws. Bears do not have talons. Even so, many animals have quite strong feet, often equipped with gripping toes. Birds, bats, and some arboreal mammals can take a hold with their feet when situations demand - once again, this will often be of use in role-playing situations, can be a help when such tasks as zero-G construction and repair are being done.

The old superstition has it that Cats always land on their feet; so if deck orientation suddenly changes, give feline characters a +1 Dexterity DRM for their attempts to re-orient and fall safely.

EFFICIENCY ROLLS

On each journey of substantial length (e.g., from one star system to another), the ship's crew must test their skills by rolling an 'Efficiency Test'. The navigation, systems maintenance and engineering departments must all make a roll to check the worth of their departments efforts. Passenger vessels may also check the success of their 'Personnel Services Department'. This roll should be made again for each subsequent jump to another star system.

Each skill roll is made vs. the skill of the head of each department. For normal, unstressed circumstances (say, a quiet, low speed run into a well charted system), efficiency tests will be rolled as (skill vs. 10). For more stressful environments such as high speed runs or battle missions, tests would normally be made at (skill vs. 15). Worsening circumstances will dictate higher difficulty numbers. If the head of department is incapacitated during the course of this voyage or portion of a voyage, then three rolls must be made: one up to the point of the incapacity, one for the skill of the subordinate who takes over, and one for the original department head when/if a recovery is made which reinstates the original head.

If the department being tested is understaffed (see 'crew requirements' below) all efficiency rolls are made at a -1 DRM.

See also rules in the 'Rules Addenda' section regarding catastrophic failure. Since technology is so good and quality control such a priority, starship travel in the main is tedious and expensive rather than dangerous. Nothing is perfect; occasionally there will be a breakdown, mis-jump, etc. The odds of such a thing happening more than once in an individual's lifetime are very poor. If a critical incident in a game scenario is being played, obviously the skills of the individual characters and NPCs involved should be used. If a gamemaster has pre-rolled a catastrophic result and player characters perform particularly well, then character self-image should not suffer, while a rare mechanical failure should be substituted for operator error as a cause of the plot-necessary disaster.

Navigators

A successful navigation roll will reduce the time taken to reach the ship's destination by 5% per success grade of the roll. The reverse holds true for failed navigation rolls. This represents the distance from the ship's jump-in point to the target planet or station.

Systems Maintenance

A failed Electronics Engineering roll on behalf of the systems Maintenance department will result in a slight degrading of the ship's avionics, sensor discipline and computer systems.

If three grades of failure are made, either all at once or through gradual accrual, all sensor rolls will be made at -1, and the skill levels of the ship's AI computers will also be lowered by 1. These penalties will apply until the ship can undergo a maintenance overhaul.

Engineers

A successful engineering roll will give a 5% discount on fuel consumption for each success grade of the roll.

A failed roll will not immediately increase fuel expenditure, but it will reflect the long-term maintenance of the craft. Once a ship's engineering crew fails on three such rolls, the vessel's fuel consumption will increase by 10% until the vessel receives a proper maintenance overhaul. Fuel consumption increases can escalate to 20%, whereupon the vessel becomes seriously unsafe, and will be subject to catastrophic drive failure rolls. Port authorities will normally impound any vessel which is found to be in such an abominable condition.

Personnel Services

Passenger carrying vessels should also roll vs. the skills of their stewards, activities officers, etc. - the ship's Personnel Services department. Roll vs. the 'Mingle' skill of the department head. Success or failure grades will grant positive or negative DRM's on 'passenger recruitment' at the ship's arrival destination in the future.

Ships which go out of their way to provide attractive staff and courteous service will receive a +1 DRM on their Personnel Services Department efficiency rolls.

Captain/Mission Commander

The leadership skill of a vessel's commanding officer must be tested during each voyage (using Stability as the tested characteristic). A roll which fails by 2 or more success grades will require the vessel's crew to test for a lowering of their morale. If there is a mission commander (responsible for the vessel's *mission*, as opposed to being responsible for the vessel).

THE AI COMPUTER

The most important crew member is the AI computer. The computer is an independent intelligence in its own right, and is an aspect of the Net as described in the umpire's background information of the *Albedo* rulebook. The ship's AI net on ConFed vessels will be a part of the greater Net. These scattered fragments of the Net will be updated on current plans and thoughts of its brethren every time the ship jumps



into a new system, docks, receives information transmissions or accepts data downloads from other AI's.

Characters who are in contact with the Net may continue constant relations with the Net while travelling aboard a starship, with breaks only during actual jump.

Processor nets require authorization from command-level crewmembers to take autonomous actions (actions not directed by live crew), but show a high level of initiative within their operating limitations. The computer is accessible from and has access to all areas of the ship. Radio and fiber-optic communications also allow work parties direct access to the computer. For its part, the computer can look into any area of the ship via its internal sensors.

Crewing a ship is a partnership between computers and personnel. The ship's computer net is normally capable of running the ship with no need for a live crew. Live crew act as creative tactics planners and emergency back-up for computer systems. The computer net monitors the welfare of the live crew (physical and mental - psychological balance must be carefully maintained in the fragile enclosed environment of a starship), and can act as a counsellor for all manner of personal problems. These functions are available to the passengers as well, though they are not emphasized in glossy travel leaflets! The AI can be particularly helpful in cases of homesickness and panic at the thought of being so far from one's world and loved ones. Mini sensors throughout the vessel monitor the day-to-day actions and interactions of the inhabitants. All data entries into the ship's net will be assessed and evaluated. The ship's sensors are subtle and sensitive; they can detect the hormonal and physical changes brought on by stress or pregnancy, or alert medical personnel when a passenger or crew member is suffering from a temperature. When role-playing the AI, a gamemaster should remember that it adapts itself to each hearer, almost taking on a different personality for each. When addressing a group it takes a more neutral tone, but the sophisticated listener will hear undertones of different personality 'agreements' coming through. Conversely, a damaged AI may be diagnosed by the fact that it suddenly loses its intonations and personality overlays. If an AI *sounds* like a machine, it is either stretched to capacity by an emergency or damaged.

The computer handles a huge number of routine tasks on board ship. All calculations, structures and equipment are constantly monitored by the intelligent, self-aware computer. The computer works hand in hand with the organic crew as part of a complementary team. When a skill roll is made for the AI, it is based on the Computer Use skill of the senior engineer with that skill. What you are really measuring is "Did the wetware actually manage to influence the performance of the AI? If so, how?"

The computer can control most of the functions of the ship without aid from the "live" (or "wetware") crew. However, its abilities diminish if it has to perform several jobs at once. While it is capable of flying the ship, controlling missiles, firing lasers and helping a passenger edit their teenage angst-poetry, the ship's efficiency benefits if at least some of these tasks are handled by live crew. Also, for the sake of safety, though it can handle ship's functions, under normal conditions, the com-

puter itself will insist on having much of the critical function stations manned and have the wetware doing those tasks, in part to assure continuity of control in case of catastrophic processor failure, and to keep the crew active and engaged in their roles.

The AI program is just a program, but is very good, and users would find it easy to anthropomorphize it and believe it is "alive." However, it has built-in "reality checks" and would not get any radical ideas into its head. It would also not be a party to any criminal activity, and as that is a basic restraint of the core program all AIs have, any true pirate ship would have to have a home-made program, usually in the form of limited expert systems that can run routine functions, but would require wetware for commands and instructions.

ARRIVAL

Again, crewmembers have a much easier time going through customs than regular passengers. It is possible to have a history and relationships in the planet of arrival. This may positively or adversely affect your motivations and abilities to freely enter and carry items onto the planet's surface.

CREWMEMBER TRAVEL, THE SHORT FORM:

(quick rolls to simulate player character crew experiences)

Customs and boarding

Crew undergo far less stringent personal checks of luggage than passengers, plus they know the loopholes in the various systems. If a crewmember attempts to smuggle contraband, then they receive an advantageous DRM of 2 to their attempts.

Procedures for clearing customs with restricted personal items are exactly the same as for passengers.

For clearing customs with a forbidden cargo, even well hidden items will be discovered by security search unless a 7 or less is rolled on 2D6 (DRM -2 if a bureaucratic, military or quarantine port "quirk" is in effect. DRM+2 if travel is to be made from a decentralized system, a no government interference system, an anarcho-syndicalist system (though an individual inspector might decide to warn the destination authorities, there will be no official restriction on what *leaves* such a planet), or a system where there is 'discontent' or 'no interest' as a population morale statistic. If the crew is found to be smuggling weapons, or worse, if weapons are found as undeclared cargo, planetary authorities will cancel the voyage, put the ship in quarantine, and hold the crew for investigation pending trial.

Emergency Procedures

Like passengers, crew will practice their emergency procedures drill. Successful practice is shown by making a Reason roll - success gives a +1 DRM on any attempt to use emergency equipment and evacuation procedures in a life-or-death situation.

However, since these drills are a commonplace part of a crewmember's life, the advantageous DRMs for proper prac-

tice is allowed to accrue (up to a maximum of +3 on their rolls). This reflects the swiftness of a regularly practiced drill. The accrued DRM's will remain in force as long as the crew-member serves on vessels of a generally similar type and with more-or-less identical emergency equipment. e.g., the emergency exits layout of an aerodyne will be different to that in a 'true, starship, ILR emergency evacuation equipment is different to that used by the EDF, etc.

Fitting in

Exactly as with passengers, have crewmembers roll against their Mingle skill. A failed roll indicates that the journey has not been a social success: lower the character's Self Image by one for the duration of the trip plus 1D6 days. On the other hand, if the roll was made with a success grade of 2 or higher, then increase the crewmember's Self Image by one. Crew morale acts as a DRM on this "Mingle" roll.

Entertainment

Crew have the same entertainment opportunities as passengers. However, since their time is taken up with duties, crew make all rolls for "in-flight entertainment" with an adverse DRM of -2.

Performance of Duties

Characters should make a skill roll in their primary crew skill (e.g., vs. Navigation skill if they are a ship's navigator). Roll vs 15, and apply a -2 DRM if their department failed in its efficiency roll. A successful roll indicates that the character has gained 1 experience point.

Arrival and Quarantine

Once again, crew have an inside knowledge of customs procedures which can make it easier to smuggle contraband. Give crew an advantageous DRM of +1 on attempts to smuggle hidden items past security.

TRAVEL AND FUEL CONSTRAINTS

Interstellar travel is largely a matter of balancing time of transit against fuel expenditure. Swift journeys out to a system's jump point can be costly in terms of reaction mass.

A large proportion of reaction mass expenditure is spent in the earliest leg of the voyage on accelerations out of a star system, or in the final approach during decelerations into a star system; each journey includes a considerable period of 'coasting'. Most journeys will have at least two 'legs' - e.g. acceleration from one system out to its jump point being one



section, then deceleration into the target system being the second 'leg'.

A High Acceleration journey deliberately squanders fuel and abuses 'wet-ware' in order to minimize travel time. Only used in emergency, or by lunatic 'fast courier' vessels, the system causes wear and tear on vehicles and crew alike. See 'non-optimal tactics' in the 'Rules Addenda' section.

The following system is used to calculate each 'leg' of a journey.

How fast the ship can go and how much fuel it takes to do so is calculated from its propulsion efficiency rating. (final velocity achieved from entire fuel load) An average ship with a 100 km/sec. rating can split that for acceleration/deceleration. A higher rating will allow for either a faster transit or the use of less fuel. The rating is based on how much is paid for the propulsion system and how well it's cared for. The rating can be improved at a cost of 1000Cr for each 1 Km/sec. per 1000 tons of weight. Ship's crew performance (see 'crew skill

efficiency rolls' section) for the duration off a modifier roll.

TRADE AND COMMERCE

For those characters who can accept the physical and financial risk, a life amongst the star lanes can bring considerable rewards. Characters who wish to being a starfaring life are faced by three main problems: first, the finding of enough finance to purchase a ship; second, the design and outfitting of their vessel; and third, making the damned bucket of rust pay for itself

Starship Purchase and Finance

Loans

Probably the most common means of acquiring a vessel is the purchase of the vehicle via a loan. Loans may be taken from governments, banks or companies, or even from wealthy individuals.

To qualify for a loan, characters will have to indulge in about a month of endless paperwork, interviews and heart-break. On inner ConFed planets, good work records and a steady psych profile will prove the character's ability to turn the proposed business into a success. On outer worlds, other means will be necessary. The characters will have to provide a deposit, offer collateral, or find a steady local businessman who can act as a character reference or guarantor.

However, in order to secure a loan, characters must present a business plan - that is, they must demonstrate an ability to pay back the capital which has been advanced. Contracts or letters of intent from governments and suppliers will usually be needed as proof of security.

Ships are seen as a risky investment. Loan repayments for ships which will be used on proven trade runs in low risk areas will be repaid at about 10% PA; loans given for riskier ventures will climb to 15%, or even higher if the ship is to be used for prospecting and exploration.

It is suggested that characters can readily secure loans of up to 4 million credits. This is enough to provide them with a small, unassuming vessel. Characters may attempt Persuade rolls to try and increase the amount of finance offered to them

Contracts

Players may get partial or total financial backing, working on a 'lease-to-own' arrangement with a large company or a government. In return, however, the financiers will require ongoing service from the characters and their vessel. This usually equates to about 1 million credits of finance for each year of indentured service. Many small colonies will effectively enter into partnerships with ship owners to ensure vital shipments over their first few years of operation.

The actual cost of vessels is found by adding up all the component costs after designing the vessel. Character skills can effect price, at the umpire's discretion;

- Streetwise skill can be used to track down a bargain. Remember that old ships may have all sorts of cute little quirks that can be an adventure in themselves!

- Characters with Streetwise and Engineering skill can find

used parts and modules. These may not be quite as reliable as the new item, but a bargain at two thirds the price!

- Purchasers with Bargain skill can haggle down the price of their vessel.

- Negotiators with Broker skill can possibly whittle a percent or two off their loan interest.

Actually getting the ship ready to fly can be a role-playing challenge all in itself.

Running Costs

Skilled crew tend to come at premium prices. Essentially, Engineering, pilot and navigation staff are in demand, and so command high pay scales. General wages would be 1000Cr per month for those with average levels of skill, and 2000Cr per month (or higher) for experts and masters. Personnel Services and Ships systems Engineers are not quite so highly priced. Figure on about 500Cr per month, scales up to 800Cr per month for department heads.

Obviously, most small vessels will simply use a 'shares' system to divide profits amongst the crew and owners. Usual rimworld practise is to count the ship in for 1 extra share, which money is used for crew social activities and frivolous enterprises.

Fuel

Ships primarily use liquid hydrogen as reaction mass. Purchased from commercial refineries at starports, fuel costs 100Cr per ton. However, in some areas, especially where getting volatiles are more difficult, like an asteroid mining station in which water or hydrogen has to be distilled out of local rock, the prices could be several times that, and quantities may be limited.

In a pinch, fuel can be synthesized from raw materials such as water or naturally occurring gas. However, this can take time, depending on the resources at hand. A well-equipped ship with everything working can produce up to several tons an hour, where as an improvised emergency arrangement might be lucky to do a ton a day. But, as a ship might need 10,000 tons of fuel for a trip, it usually pays to just buy it.

Overhaul

Regular maintenance is essential for cheap, efficient and safe space travel. Bringing a ship in for an overhaul every few months is the best way to ensure that all systems are operating at best effect.

A typical maintenance overhaul takes a full week, and will cost about 1 credit per ton of vessel to cover parts and labor. Some busy ports may require maintenance checks to be booked-in some weeks in advance.

Repair

Damaged systems can sometimes be repaired. Other times they must be totally replaced. Repairable systems will require between 10% and 60% of their original cost in parts and labor to effect full recovery. This process can take 1 to 3 weeks depending on parts availability. For an extended example of repair work under zero gee, see *The Drift*, a module for Albedo. Note that upgrading costs more and takes as much

time as simple repairs.

Food

The typical character requires about two kilos of concentrated ration foodstuff to survive per day. The character will also drink about two kilograms of water, and will use considerably more water through showers, hygiene, washing, etc, all of which is constantly reclaimed and recycled from wastes.

Food costs 5Cr per kilo, or 10Cr per day. Water and food storage for the crew is already factored in to the mass of life-support areas of the ship. General recycling costs (fresh filters and system maintenance) will cost about 10Cr per month per person. This cost can be ignored, but crew morale rolls will suffer a DRM of -1 (it's called "getting your own back"). Sometimes small family or kin-type businesses get successful and expand. Then conditions which co-owners put up with are resented by hired crew, with resulting high crew turnover and loss of morale.

Making money

Prospecting

Many vessels make a living by scouting out deposits of valuable minerals, chemicals and ores.

There is no art to finding lumps of iron-ore and sulphur mountains; the trick is to find deposits of materials that are actually worth the effort of mining, refining and shipping to a far world.

Many prospecting vessels simply work under charter to major companies, who pay an ongoing retainer, often with bonuses for successful discoveries. A typical deal might be to pay for fuel, maintenance and food for the vessel, but only award 50% of the normal rewards for discovering useful deposits.

Any given uninhabited world has about a 1/3 chance of actually yielding a worthwhile discovery. It will take about a month of patient scanning to determine the presence or non presence of a potential 'claim'; the scanning vessel must then make a successful geology roll in order to determine the location and nature of the deposit. If the roll is failed, then the ship will either miss the minerals, or will wrongfully assay the deposit.

- 1 - Low grade ores or chemicals (nickel iron, fuel gasses, grade A-1 fishtank gravel)
 - 2 - Industrial ores or chemicals (Bauxite, Titanium, fissile matter)
 - 3 - Useful ores or chemicals (Tungsten, chrome, etc)
 - 4 - Unusual ores or chemicals (Ozmium, the shaving cream atom, etc)
 - 5 - Valuable deposits (such as crystals which are difficult to artificially produce.)
 - 6 - Extremely valuable elements (such as the rare metals used for jump-field webs)
- 1 - Extracting the ore will present a considerable engineering problem.
 - 2 - Extremely difficult to mine and ship.
 - 3 - A useful deposit which will be difficult to extract, requiring considerable investment.
 - 4 - A useful deposit which will require an extensive project

to extract and refine.

5 - Readily extracted, using common-use machinery and techniques.

6 - Easily extracted using simple scoops or otherwise inexpensive technology.

Multiply the score of the first dice by the score of the second. Now add one zero to the end of the sum for each pip on a third D six (representing the size of the deposit). This is the basic 'worth' of the discover if the rights are sold to a mining company.

If the mass of the system is higher than two, if the system is difficult to reach, or if the planetary environment is particularly hostile, then deduct 10 to 30% from the value. Negotiators with bargaining skill can haggle the price up (or down!) by 5% per success/failure grade.

Payment will usually take some time to process, since location and value of the deposit must be confirmed by the buyer, and legal documentation may take upwards of three months to become final.

Example:

On a brief prospecting tour, the 'Scurrilous Invertebrate' manages to detect a deposit of marketable materials on the surface below! Swiftly assaying the find, the crew now rolls a D six twice, scoring two ones: They have found a common ore, lodged in a manner which makes it difficult to access.

Still - it may be worth money. The crew now rolls a further D six to ascertain the deposit's size, scoring another '1'. The value of their find is measured by the sum $1 \times 1 \times 10$: exactly ten credits. Kicking herself in the tail, the captain chases her sorry crew back into orbit.

Scouting

The exploration of potential colony worlds is a task sometimes parcelled out to civilian contractors. Break-away groups will also sometimes pay money for information on a potential home. Sometimes contractors will pay for the discovery and mapping of worlds which meet particular conditions (e.g., colonies of bats or avians are often keen to discover those few rare planets which have a viable biosphere and a gravity low enough to allow flight).

Known space has a good scattering of potential habitat worlds; something like 1 in 40 systems have an oxygen-nitrogen atmosphere planet (though this incidence peters out somewhat in regions further removed from the Rim). There is only limited reward for simply finding such a planet - the task is none too difficult. The payback comes for the painstaking, difficult and often dangerous task of gathering enough information about the new planet to turn it into a potential home.

Specialized exploration and development teams will sometimes form to scout out worlds for clients. These teams will conduct extensive orbital, sub orbital and aerial survey. They will use test organisms to check for virulent diseases or parasites, and then (if the environment is safe enough) will begin a detailed analysis of soil, water, life forms - of weather and terrain, sea beds and mineral deposits. Exploration will cover every conceivable mode of transport from overflight and

cross country driving to extended expeditions on foot. Every plant, every spore, every bug, slug or arthropod must be observed, tested, catalogued and its position in the local ecosystem thoroughly understood. When all is done, full computer models of the planet will allow projection of weather. There will be recommendations for potential city sites, mines, farmlands, roadways. Dangerous cometary debris, sunspot activity, electromagnetic activity and gravitic effects such as tides must all be plotted and known.

Usefully detailed maps and information will require successful rolls against meteorology, geology, zoology, botany and medical skills. Orbital plots, system anomalies and approach pathways must be plotted using navigation skill and piloting skill. Computer models will require computer programming rolls - civil engineers must examine potential settlement sites and communications pathways.

The ideal team would remain on a world for one to three of its years to observe all possible biomes in all possible seasonal conditions. Roll skill rolls for each season or climatic period to see the accuracy of observations of the changing world. When the world is mapped in all of its moods, the task can be declared complete. At the end of this time, the explorers will have adequate models of weather, useful land and will know the dangers of the environment. Carefully sanitized test units will have revealed which foreign plants and animals can be introduced successfully, and which might be a threat to the local environment. Medical teams will hopefully have uncovered those parasites, viruses and local bug-eyed monsters that are dangerous or beneficial to introduced life, and will have prepared plots for the effect of settlement on local life forms and weather.

Each world will have its own unique horrors or attractions. Remember the simple ecosystems in Albedo; worlds advanced enough to have flowering plants and land going insects are relatively rare. Roll on the ecology chart in the Albedo basic rules to establish the complexity of the local biomes.

This is a long term and extremely intensive project. The survey team will have to include large numbers of specialists to fill out the various departments, and will also require numerous assistants (perhaps an expeditionary force reaching a maximum of 100 personnel by the end of the project). Investment in equipment will obviously be extensive; aircraft, ground vehicles, scanners and laboratories, test organisms, sampler drills, and housing. All in all, it should take approximately 1000 tons of very expensive cargo. The investor will usually provide these tools, will pay an extensive amount for a finalized survey report (somewhere in the eight figure mark would seem appropriate). Clearly there will be lucrative side-contracts for supply shipping to the expedition, as well as couriers taking samples and computer models to distant laboratories for proper examination.

Passengers

Perhaps the best paying, most regular and reliable trade is the simple transfer of passengers.

Passengers typically pay 10,000Cr per head for travel to another system.

Recruiting passengers is done by advertising for two weeks ahead of departure date (ships with known schedules and agents in port may advertise before their arrival). This recruitment project will then provide the ship with a random number of willing, paying passengers.

To find the number of passengers recruited, roll 1D6-1 for each level of population (as detailed in the population code of the planet, using the basic Albedo 2nd edition rulebook).

Ships which have discharged passengers on the world from which they are now seeking passengers must learn to live with their reputations. Apply all relevant DRM's for Personnel Service Department efficiency to the recruitment rolls.

Some passengers are effectively contraband. Political refugees or persons escaping from work contracts will obviously pay extremely well for fast transport with no questions asked. The only way to discover such dangerous (and lucrative) cargo is via streetwise oriented skills and applied role playing.

Cargo Runs

Some ships make money by carrying cargo from one world to another. This is actually not a common trade; most habitable planets are capable of supplying all their own needs.

'Hot' Cargo

Some goods are, however, needed by newly establishing colonies (who are still importing equipment). Colonies or companies will hire vessels to transship cargoes from one system to another. These priority cargoes will bring good rates (1000Cr per ton) for speedy delivery. Special emergency deliveries (at high acceleration) could also be arranged by special negotiation (2,000 credits per ton or better).

Finding these commissions will require a research roll. The commission will usually be to transfer a total tonnage of cargo, rather than hire on a trip-by-trip basis. Large capacity vessels therefore take on these commissions with a higher rate of economy. Typical commissions would be for 1D6 x 1000 tons in goods.

'Dead' cargoes

Ores and low-priority industrial cargoes yield very low pay rates. Industrial companies will pay 500Cr per ton for the transshipment of such good. They will not require fast delivery, meaning the cargo vessel can travel at an economical rate of acceleration.

Roll 1D6 per level of manufacturing capability possessed by the planet. Multiply by 100, and this yields the tonnage currently available for on-shipment to the cargo vessel's next destination.

Hunting for cargo will require a successful brokerage roll, with one roll allowed every week.

Luxury goods

Unique consumer goods, highly prized artworks, perfumes of foodstuffs - there are numerous items which can pay

their way as cargo for an industrious trader. These goods will usually be purchased by the ship itself for resale at target planets.

Typical purchase prices might be $1D6 \times 10,000$ credits per ton. Resale can only be made on planets which have a solid-enough economy to afford luxuries; resale value for a particular type of good on a set target world will be (purchase price + $[1D6 \times 10\%]$)

Gathering in luxury goods is relatively hard. Every month, there will be 1D6 tons available for each level of manufacturing capacity. Only about 1 in 3 inhabited planets actually produces trade-able luxuries (e.g., unique enough to be valuable off world).

The demand for special consumer goods is not high. Only 1D3 tons per level of population can be sold per month. Ships can try to sell stock to local warehouses for slow release, but this will be at a much reduced profit margin. If a luxury good is 'in supply' for more than half of every year, its local sales value will reduce by 20%.

Information Transference

Franchises, patented processes or inventions, new art works in the visual or literary media, and the like may be taken from system to system as 'weightless cargo', stored only on the ship's computers. One-of-a-kind statue and paintings fall into this category as well.

It is possible to buy the dissemination rights for an invention or process. Typically, these rights can be licensed out on target worlds for 10% of the original purchase price - although this price will climb to 12% or 15% if the process/item is desperately useful to the new customer (e.g., a tailored virus that cures a particular disease or parasite). On some planets, certain goods will be worth little or nothing (e.g. a neat new aqualung design will be hard to sell on a desert world). Bargaining skill rolls can be used to increase resale values by 1 or 2% per success grade.

On average, there will be a 50% chance of making a sale for a product on any given world. This represents the chance

that someone else has already sold the rights to the same product (or a similar product is already in evidence). Eventually the worth of a design will peter-out (usually two or three years after purchase). Until that time, it can provide a valuable source of income for a travelling merchant.

Salvage and Piracy

Given the odds of obliterating your target and turning its cargo into aerosol, Albedo offers very limited opportunities for ship to ship piracy. However, it can be done, and the salvage of abandoned vessels can provide a certain amount of cash. More common than ship to ship piracy is the simple raiding of settlements and installations. Armed teams obliterate local resistance and strip away any valuables. These sort of activities will immediately trigger a military response from ConFed (or ILR) authorities.

There is no 'prize money' in Albedo. The provision of tows or assistance to the needy is a matter of social duty, not of reward, although the costs incurred by rescue vessels will be paid in full. Captured or abandoned cargoes can be sold at their usual values. Damaged ship's systems will be worth from 5 to 30% ($1D6 \times 5\%$) of their original worth as scrap and spares. If player characters come up with ingenious uses for 'scrap' which gives it an improved value, their initiative should be rewarded. (Example: a shipment of specialized containers whose lids were shipped in a different part of the cargo bay. The lids were destroyed, which seemed to have rendered the containers worthless. An inventive character sold the containers to jewelry and electronics assembly firms for sorting their numerous components.)

VIRTUAL NEGOTIATIONS

Arranging passengers, purchasing goods, selling cargo and arguing with port authorities all takes time. Time, however, is usually something that ship's crews have in plenty.

Efficient communications allow ships to utilize their run time coming into a system for negotiations and advertisement. Using full visual imaging, a ship's negotiator can enter into business conferences with any number of potential clients and customers, seal deals and otherwise speed the flow of business.

If desired, a 'filter' can be run over the 'home teams' negotiator's image, smoothing out any tell-tale visual and voice keys. This will cause a negative reaction for any attempts to establish initial contacts, friendly relations, etc (many businesses consider this extremely rude). On the other hand, opponents trying to read visual and voice cues (trying to detect lie, assess personality, etc) will have to roll against one higher level of difficulty.

At the most extreme end of the scale, there are total simulations; no living creature ever communicates di-

Sample purchase prices for processes/information

Popular sports car design	1,000,000
An improved, low-tech engine for groundcars (very useful on low tech worlds, unwanted on high tech)	2,000,000
Neat new weapons designs (useful on worlds which are entering conflicts)	250,000
Gene tailoring process for increased crop yields	500,000
Music	1,000 - 10,000
Artwork	10,000 - 100,000

News and mail contracts are usually worth about 10,000Cr per trip. Governments and private carriers will only offer such contracts to ships with a proven reliability.



What's the news?

rectly with another. Instead, computer-generated simulations are used. Having an AI computer with proper psychological monitoring software 'coaching' a negotiator grants a DRM of +1 on all Bargaining, Detect Lie, Assess Personality and Persuasion rolls.

While it is virtually impossible to engage in 'streetwise' skill situations via communicator (although there can be some creative exploration of local computer nets), virtual conferencing is a valuable trading tool. Best of all, few illegal operators will ever use such a system; since their words are being recorded, and may be picked-up by unauthorized listening stations, only a rash negotiator would ever propose shady deals via com link.

CREW STAFFING REQUIREMENTS

While vessels can operate with only the most minimal supervision (even a single crewmember, or perhaps just running off their AI computers alone), it is safest to allow them a crew compliment sufficient to monitor the vessel's systems and effect running repairs.

The core crew of vessels are divided into essential ser-

vices departments (pilots, navigators, systems engineers, drive engineers and Personnel services). These departments have minimum staffing requirements depending on the workload imposed. If a department is 'understaffed', then the department's efficiency rolls are made at a -1 DRM.

On small ships, characters with a broad stretch of skill may attempt to fill in more than one position. Since they are racing from task to task, divide the character's 'crew manpower contribution' by the number of positions he fills. (So if a character is serving as a pilot, navigator and engineer, that counts as 1/3 of a crewmember in each department.)

MINIMUM STAFFING

Navigators/helmsmen

Multiple navigators can be useful for re-checking one another's findings and preventing minor errors, discussing creative approach tactics, etc. A rule of thumb is one navigator per jump the ship will make during its journey.

Systems engineers

The constant monitoring of ship's computers, plumbing,

minor devices, etc. is a wearisome and unending task. This department will require at least 1 senior engineer, 3 shift engineers, and an additional crew member per 5000 tons.

Personnel services

Rather than simply being 'space stewards', this department's duties include entertainment, peacekeeping, even psych counselling and the schooling of young children. In general, one personnel services crewmember will be required for every 20 passengers. Solitary or quiet races will require far less monitoring and service than boisterous ones. Transporting a hyperactive nest of shrews during their mating season is every service crew's vision of nightmare!

Other crewmember may also be required to fill special functions; Merchant ships will require a skilled negotiator or broker. Prospectors will need geologists and annalists. Ships might carry soldiers, shuttle pilots, and gunnery staff as part of their essential compliment.

Total crew complements will vary according to race and culture. While some very solitary creatures become oppressed by crowds (most avians would be in this category), herding or 'nesting' creatures like sheep, mice and rabbits will be uncomfortable if the crew too small.

All in all - typical crew complement is governed by the stability characteristics of the personnel. Subtract the average Stab. value from 20 to produce the typical crew requirement, adjusting down by 5 for particularly morose and solitary species.

Starship design

Starships fall into two main categories; true starships, and FTL aerodynes. Of the two styles of ship, the former is far more

common. Cheaper to build, more space efficient and easy to maintain, true starships range in size from tiny private trading ships to massive VLCSV invasion support ships.

On the other hand, the space-worthy aerodynes are the only starships which can actually land upon a planet's surface; true starships must use auxiliary vehicles for this purpose. Three main types of aerodyne hull are available, which come equipped with avionics, engines and control systems. A central cargo 'space' may then be filled with modularized cargo, passenger or other containers.

All 'small' vessels (cruiser size and lower) are produced according to modular construction techniques. Standard hull cross sections are used, an new sections of the ship can be added and subtracted at will. The following rules are used to buy and construct the types of starships most commonly found in the spacelanes .

BASICS OF SHIP DESIGN

As previously mentioned, a starship is basically a stack of decks with fuel tanks at each end. The decks are designed to be interchangeable for differing missions or maintenance, so some basic features like elevator shafts and major conduits have standardized arrangements. However, the exact layout of compartments and lesser features are more flexible. The details of how many and for how much will depend on some practical limits of size and weight.

The exact length of a starship can be fairly flexible, but a common rule of thumb is a diameter to length ratio of 1 to 5. On very large ships, the ratio may go down to 1 to 4 or less, as the increased ship's weight adds up faster than the practical number of propulsion reactors that can be fitted around

Decks, Weights, and Costs

(Weight by Hull Size)

Hull Diameter(1)	Medium Tank (1 x 1.5) LH Ton/Tank	Large Tank (1x2) Ton LH Ton/Tank	Standard Deck (2) Ton /Ton
24	963/135	1349/190	452/199
32	2283/321	3197/450	804/354
40	4460/628	6245/879	1256/553
48	7707/1085	10791/1519	1809/796
60	15054/2120	21077/2968	2827/1244
80	35684/5026	49960/7036	5026/3456

(1) The dimension as measured from the inside of the pressure hull, the outer pressure hull is usually about one half meter thick. The engineering section is commonly several meters wider in overall diameter.

(2) Section fitting as medium occupancy staterooms, complete with water and consumables.

the circumference of the hull. There is also the matter of how much fuel to carry. In an absolute sense, a ship at merely the escape velocity of a star system would eventually get out to a good jump distance, but it would take several years. So working up higher velocities for short transit times means more fuel. Most starships allocate at least half their total weight to fuel tankage and propulsion efficiency is usually listed as a function of how much velocity can be gotten from such a load.

But as liquid hydrogen is rather light, only 71 kg per cubic meter, the fuel tanks can take up most of a ship's volume. So, to start the process of designing a ship, the size of fuel tanks should be selected first, which will then dictate how many propulsion reactors can be installed, and how many decks' worth of weight can then be assembled with them. Fuel tank volume can be figured using the formula $0.5 \pi (1.5708) \times \text{radius} \times \text{radius} \times \text{the length for the end shape and } \pi \text{ times radius} \times \text{radius} \times \text{length for the cylindrical portion}$. Tanks are normally about 1.5 or 2 diameters long, usually with a simple hemispheric or parabolic end. The volume is then multiplied by .071 to get the weight of liquid hydrogen. The weight of the empty tank is 1% in tons of its volume in meters. A 24 x 36 tank would have a volume of 13570 cubic meters and hold 963 tons of liquid hydrogen. When empty, it would weigh 135 tons. Fuel tonnage minus tankage gives you the weight allowance you have left for everything else in the ship. To put it another way, fuel tonnage x2 = the entire ship's tonnage.

So, for example, a 24 meter hull, starting with 24 x36 and 24x48 tanks provides 2312 tons of liquid hydrogen as well as tankage weighing 325 tons, so there would still be 1987 tons of ship to match with the fuel (Fuel tonnage minus tankage weight gives tonnage available for everything else, but remember to add that tankage weight back in!). Then referring to the decks, weights, and prices section, you would need at least three decks worth of engineering space, 540 tons. Then how many propulsion reactors? A standard propulsion reactor generates just over 100 tons of thrust, (accelerating 1000 tons at 1 gee, or, rounding things up a touch, 10 meters per second per second). So how many propulsors are fitted will dictate how fast the ship can accelerate. It will not change the absolute engine efficiency, so the top speed will not change, but the time it takes to get there will. So, 4 propulsors would give a 4000 ton ship about 1 gee at maximum thrust, or if higher acceleration is wanted, more can be added. Then a few power reactors, and since they double as maneuvering thrust-ers, having at least four is a good thing. Then, since the actual reactor core is interchangeable with that of a propulsion reactor, and the surplus power makes the propulsion system work more efficiently, having an extra one or two around never hurts. With the remaining 1407 tons, you could get 7 full decks worth of space, 8 or 9 if you went for open cargo space or a hangar. But, how many crewmembers will you need to operate the ship? And how many passengers will you want the capacity to carry? When planning your starship, figure on allocating about 2 tons per person in air, water, food and miscellaneous stuff means that even 50 passengers and crew would cost 100 tons or more, even before any other cargo. (This is over and above the 2 tons per person worth of water in the environmental processing system). But if you went to,

say, 6 decks and maybe an extra high cargo space, the weight saving would give you that extra margin for both basics and real payload.

So, in the end, you would have a ship of about 4600 tons that is 24 x120 meters and costs about 3.5 million Cr in basic outfitting, more if you want extra features.

Here are the formulas to calculate the weights and costs of various features. The weight of a single deck is done with the basic formula for a volume of a cylinder, $\pi (3.1416) \times \text{hull radius} \times \text{hull radius} \times \text{height}$ (normally 4 meters for the height of a standard compartment or general use deck) then x 11 for the average weight of the structure.

The bridge-to-engine deck allotments are as follows:

For a fully equipped regular passenger deck, the basis for pricing is 1000Cr per ton. A more austere passenger deck, with fewer niceties and a bit less generous in space (effectively doubling the occupancy of each compartment) would go for 850Cr or so. Alternately, extra fancy accommodations have not practical upper limit to cost. An empty or nearly empty space (bulk cargo volume or large open public space) reduces the total weight by 40% or so (and reduces the cost of such space by 70%). Over-height cargo or hangar decks would start with the same formula, then add 10% to weight for each extra meter of height. For a hangar, add 50,000Cr for passenger boarding gear as well.

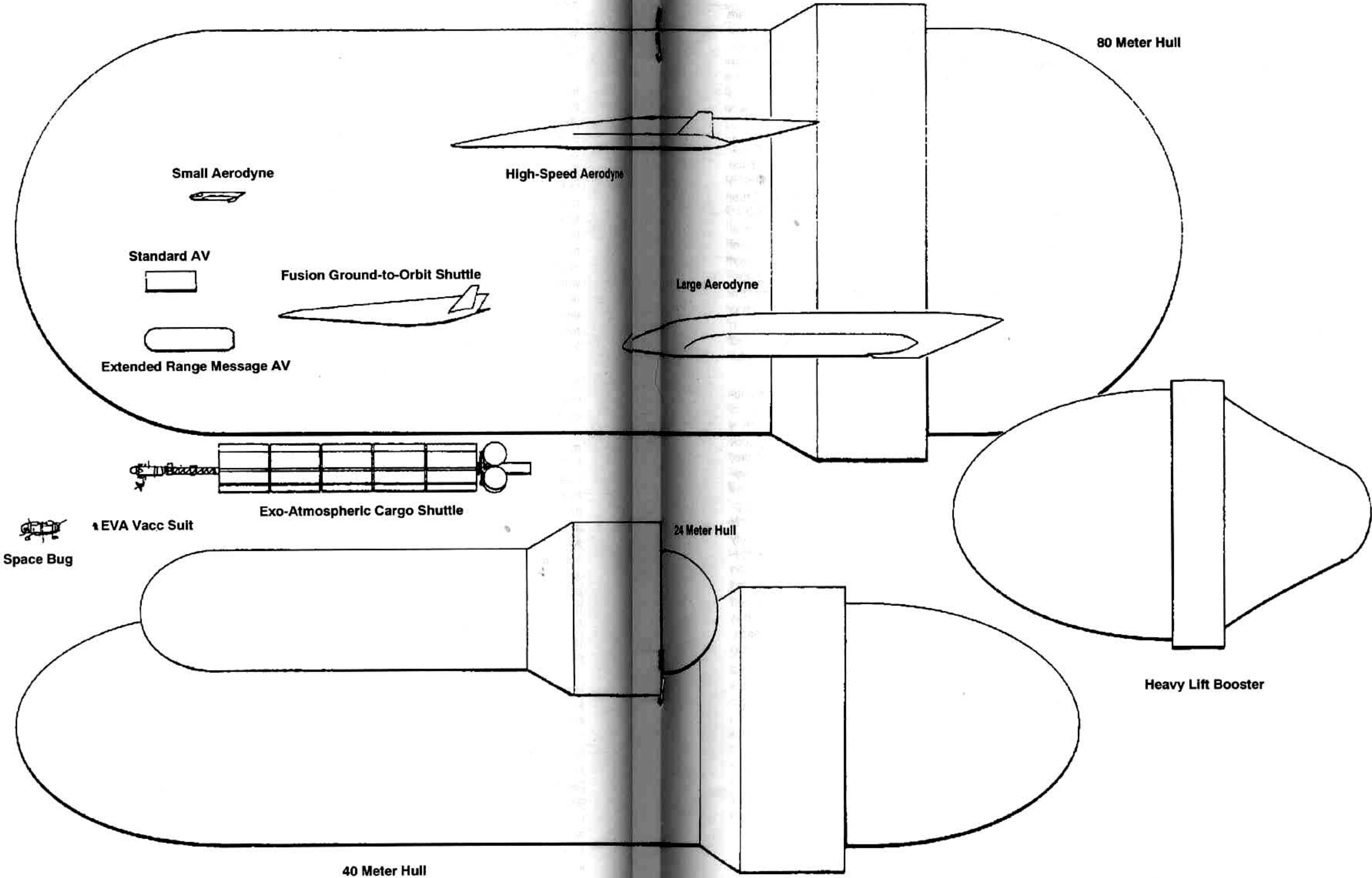
Other price variables include decks that are convertible, with rearrangeable bulkheads and other features. These can be more handy, but weigh 10% more and cost about 30% more when fitted out. If they are left empty, they will weigh out at the minus 40% level, but still cost 80% of a conventional deck.

Other special features for decks include ship's control work stations which add about 50,000Cr per position, and 50,000Cr per compartment, over and above the basic deck price. Surgical units go 200,000Cr per operating space, which includes a full medical support robot and all the miscellaneous hardware, and another 200,000 per medical deck in hook-ups and special environmental systems, over the base price of the deck. Decks with airlocks cost nothing extra and, while they do cut into revenue space, many passengers like the idea of having one close by. Mess decks cost about 20% less than the standard, but weigh the same when outfitted. Environmental processing decks, go for about the same as standard in price, but due to the large water tanks involved, add the extra weight of 2 tons/3 cubic meters per passenger in water and systems. However, on ships with only limited crew and passengers, the processing system can be fitted into an engineering deck.

Weapons fittings are usually restricted to short range point defense systems, auto-cannons or energy weapons. They run about 100,000Cr per installation and add not more than 2 tons in weight. An ACV deck, usually 12 meters deep, would rate half normal weight/volume at 1000Cr per ton, while a standard probe/message type ACV weighs about 20 tons and goes for about 250,000 each.

Albedo

Starships



Engineering decks, and for that matter, the whole rear of the ship, is usually considered as a package. Calculating the weight/cost of the unit goes thus: standard deck weight x 3 and price at 1000Cr per ton, then add the reactor assemblies which weigh about 5 tons each. Each reactor assembly goes for between 90,000Cr and 250,000Cr each, depending on efficiency and local market. An older make with a 500 km/s thrust assembly in a major port would be dirt cheap compared to a top-of-the-line 3000 km/s unit, out in the far rim, if one could be found at all. Really cutting-edge reactor/propulsion systems that give even better performance, up to 5000 km/s running on water instead of liquid hydrogen, are so expensive/restricted that only military or specially-commissioned ships have been fitted.

Laboratory decks are mostly of use to prospectors and planetary explorers. The lab contains the means to examine everything from soil and gas samples to life forms and viruses. While a lab deck isn't likely to weigh any more than a standard deck, it costs at least 500,000Cr for basic biochemical assay equipment, and 1,000,000 Cr or more for more advanced biohazard equipment. A separate airlock would also be a good idea. The size of a lab represents the sophistication of its equipment.

While the engineering spaces of most starships contain equipment that can create most small, common tools (or re-configuration of modular robots, etc.), there will sometimes be a need for the creation of larger, more complex equipment. A specialized manufacturing deck fills this need. A light engineering deck can use cad-cam design equipment and robot assisted machine tools to synthesize all but the most complex of items. The only proviso is that some sort of raw materials be on hand. Specialized manufacturing systems add about 10 tons to an engineering deck and cost 100,000 Cr. Raw materials and spare parts average 1000 Cr per ton, though specialized items, like robot parts, go for a lot more.

While even the smallest ships include a basic medical cabinet and sick bay in their habitat modules, a fully equipped, hospital equivalent medical deck can treat even the most severe battle casualties at state-of-the-art medical care levels. Patient capacity is governed by the medical deck's size.

A recreation deck consists of exercise areas and spaces devoted to frivolous pursuits, be they starship gardens, games areas or well-appointed common rooms. If a ship has at least 1 recreation deck for every 2 modules of deck, then crew morale rolls and Personnel Services Efficiency rolls will be

made at a +1 DRM. Rec areas also allow the practice of skills and the maintenance of the crew's physical condition during long space journeys.

SHIPBOARD WEAPONS

Warning: the rules given here for shipboard weapons are optional alternative rules to be used in place of the combat rules in Albedo, Second Edition. When our next sourcebook, the Albedo Systems Book, comes out the section on navigation and Combat Readiness will reveal the as-yet -classified definitive descriptions of weapons operation. These rules are an approximation given mainly for construction allowance purposes.

Given the nature of most ships as large, strong structures, designed to withstand the impacts of most normal space debris, there is very little that any practical weapon installation could do as an offensive weapon against another ship. True, an autocannon projectile could penetrate the outer hull of an average ship and make a fine mess of the immediate space inside. But to the overall function of the ship, that would be of little consequence, especially at any real range where even hitting the ship would be problematical, while targeting specific areas or repeatedly striking the same area to deepen the damage would be all but impossible. So, in the end, that is what an ACV is for, to smash a ship with the ACV's multi-ton mass. Ship-mounted weapons are instead primarily intended as a defense against incoming ACVs or largish normal space debris that would be difficult or inconvenient to dodge.

Kinetic weapons, usually automatically loaded, liquid fueled, fast firing cannons, are mounted in single turrets at convenient locations on the ship. A ship is fitted with a minimum of 2 weapons, installed on the engineering deck adjacent too the reactor deck for the widest field of fire. Additional weapons can be fitted, either added to the engineering deck complement or in a forward cargo deck for the best redundant arrangement and to provide the best overlapping field of fire from any approach. The weapons, usually around 80mm in caliber and firing 15kg slugs, are primarily designed to be (space-wise) close range rapid-fire sledgehammers that engage and break up large chunks of free-flying space debris that have relatively constant velocities and straight-line courses. Each weapon takes up one installation mount and an additional 18 tons (for a total of 20 tons complete). Magazine rechargers mass around 16 tons each, and house a complete resupply for one weapon (1,000 rounds)

Starship Combat Weapons Capabilities

<i>Weapons system brought to bear</i>	<i>Offensive capability (value of attack)</i>	<i>Defensive capability (value of defense)</i>
ACV	1 pt / system	1 pt / system
Beam weapon (starship)	1 pt / 2 systems	1 pt / system
Beam weapon (aerodyne)	1 pt / 4 systems	1 pt / 2 systems
Point defense cannon	1 pt / 4 systems	1 pt / system
Point defense shot launcher	none	DRM -2 / system

Another form of kinetic energy defense system relies on the dispersing of 'screens' or 'clouds' of small (0.5-cm diameter) high-density spheres around the ship. Although largely ineffective against large dense chunks of debris, it is remarkably effective against incoming ACVs (as compared to other systems). The basic idea behind this system is that to use the ACV's own extreme velocity *against it!*

When an ACV encounters the cloud, it would tend to do so at an angle to the spheres' direction of travel (i.e., directly best contact, the beam only imparts a superficial flash-vaporization/explosion against a surface, with only negligible effect on all but very thin-walled structures. Increasing the power of the beam doesn't really change the dynamics of the on-target effects, so there is basically one size of weapon.

What *does* make a difference is the length of time a beam can affect its target. The longer a beam can stay on target in a series of pulses, the greater the cumulative effect against that target. Of course, the target will also take more damage if a greater number of beams can be brought to bear. The one real advantage to beam weapons is that they are virtually instantaneous, even at thousands of kilometers in range, and they can stay on target for extended periods of time, slowly chewing at an incoming threat. For space debris, beam weapons can shatter or vaporize smallish material. If there is enough time, they can even push more obstinate objects out of the way.

When used for attack, beam weapons are usually directed towards relatively vulnerable targets – fuel tanks (aren't pressurized ruptures fun?), manoeuvring thrusters, the venturing, weapon ports / ACV bay doors (welding, anyone?), sensor arrays, and the like. Beam weapons installations are similar to the kinetic weapons installations, and are often interspersed with them to provide mixed coverage in the various fields of fire. A complete beam weapon installation masses five tons (3 tons for the weapon system itself, and two more for the weapon fittings).

Since beam weapons are regarded as less of an offensive risk, a commercial ship would have no difficulty in rationalizing a reasonable fitting of them. There are times and places that might justify a couple of small guns as well. More extensive installations are normally reserved for military ships or auxiliaries, though it is not impossible to get special dispensation from local authorities for the right motivations. It's also possible simply to avoid regions that might object or attempt to make an issue of it.

Where to Put It

Here are some standards to consider when designing a starship:

Elevator locations are always fixed, unless an entirely custom hull is being built. For safe and convenient movement, corridors are always at least 3 meters wide. Compartments and adjacent corridors and air-tight emergency doors should be arranged so that there are at least two exits from any compartment and that any single depressurized section of corridor does not block exits from adjacent compartments.

If you are designing a non-standard hull diameter, use the formula for figuring the volume, then use the standard modifiers for the different features. The modular system allows swift re-configuration of vessels. Modules may be purchased at any starport. Repair dock facilities will buy old modules at 70% of their new value (modifiers should apply according to condition). Installation of new or reconditioned modules can be offset with such a 'trade-in'.

A 'hardened' or military hull increases its structure DRM by +1, its maneuverability DRM by +1, and adds 20% of basic deck weight to all decks.

WHAT DOES IT COST?

Exo-atmospheric shuttles

The mass of exo-atmospheric shuttles is 1/10th that of their overall cargo capacity. Cost is 500,000 Cr plus 200Cr per ton of mass.

Exo-atmospheric shuttles can take on cargoes larger than their designed specs. Transport speed will be slower, and improper cargo balance may sometimes lead to accidents. Exo-Atmospheric Boosters

A booster's weight equals its total cargo capacity in mass. Cost is 10,000 Cr per ton.

Aerodyne Shuttles and Interplanetary Ships

Non-jump-capable vessels can be designed using the normal design rules. Aerodynes go for 2,000,000 Cr plus 100,000 Cr per ton. Endo-Atmospheric shuttles are closer to 1,000,000 Cr plus 100,000 Cr per ton.

Manoeuver Sleds

These EVA aids cost 200,00 credits, weigh 250 kg.

Heavy Cargo Handler

These EVA aids cost 300,000 credit, weigh 1 ton

Other prices

Service	Price
Transfer of cargo by orbital shuttle	Usually 1 credit / ton
Transfer of cargo from planet to orbit:	
By booster	200 Cr/ton
By aerodyne	500 Cr/ton
By shuttle	400 Cr/ton
Transfer of cargo, interstellar:	
Hot cargo	1000+ Cr/ton
Dead cargo	500 Cr/ton
Starship passage	
normal ticket	10,000 Cr/ton
Message torpedo postal charges	
message /document	25 Cr CoFed Svc
	35-100 private services
Per kilo of cargo	5000 C/kilo

Ship's Construction

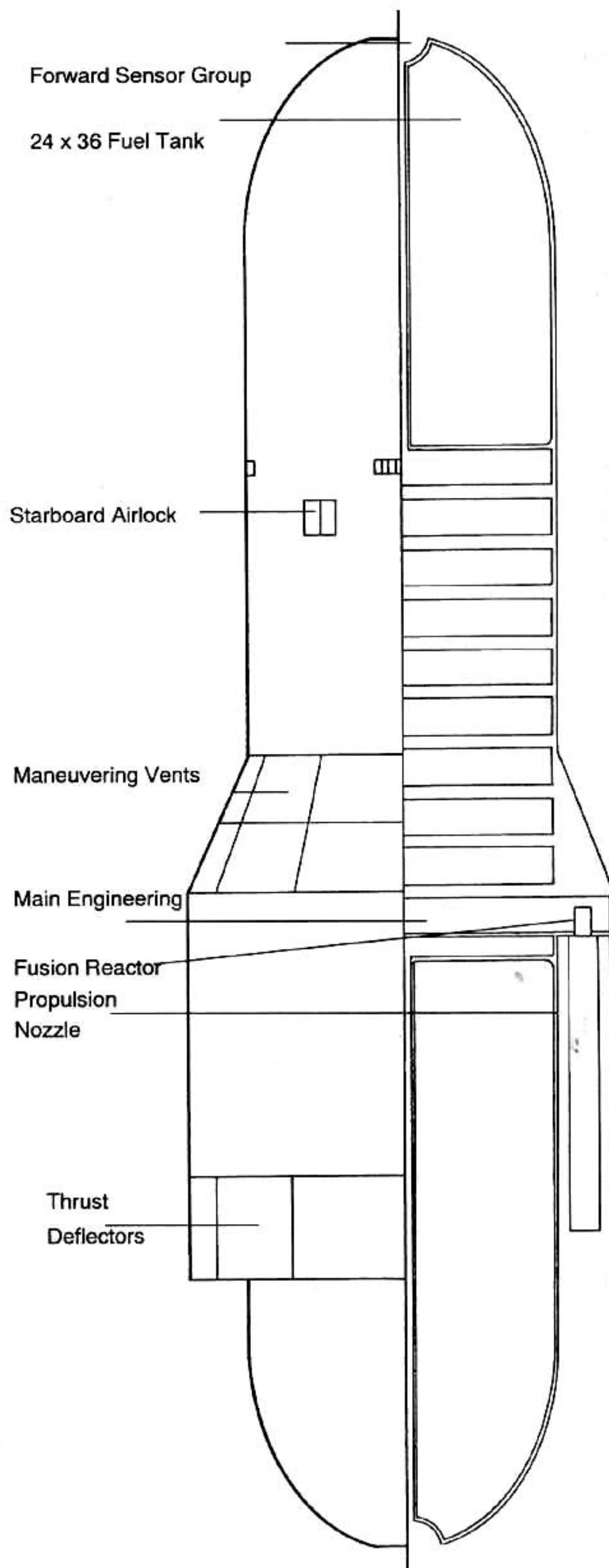
ON STACKING DECKS

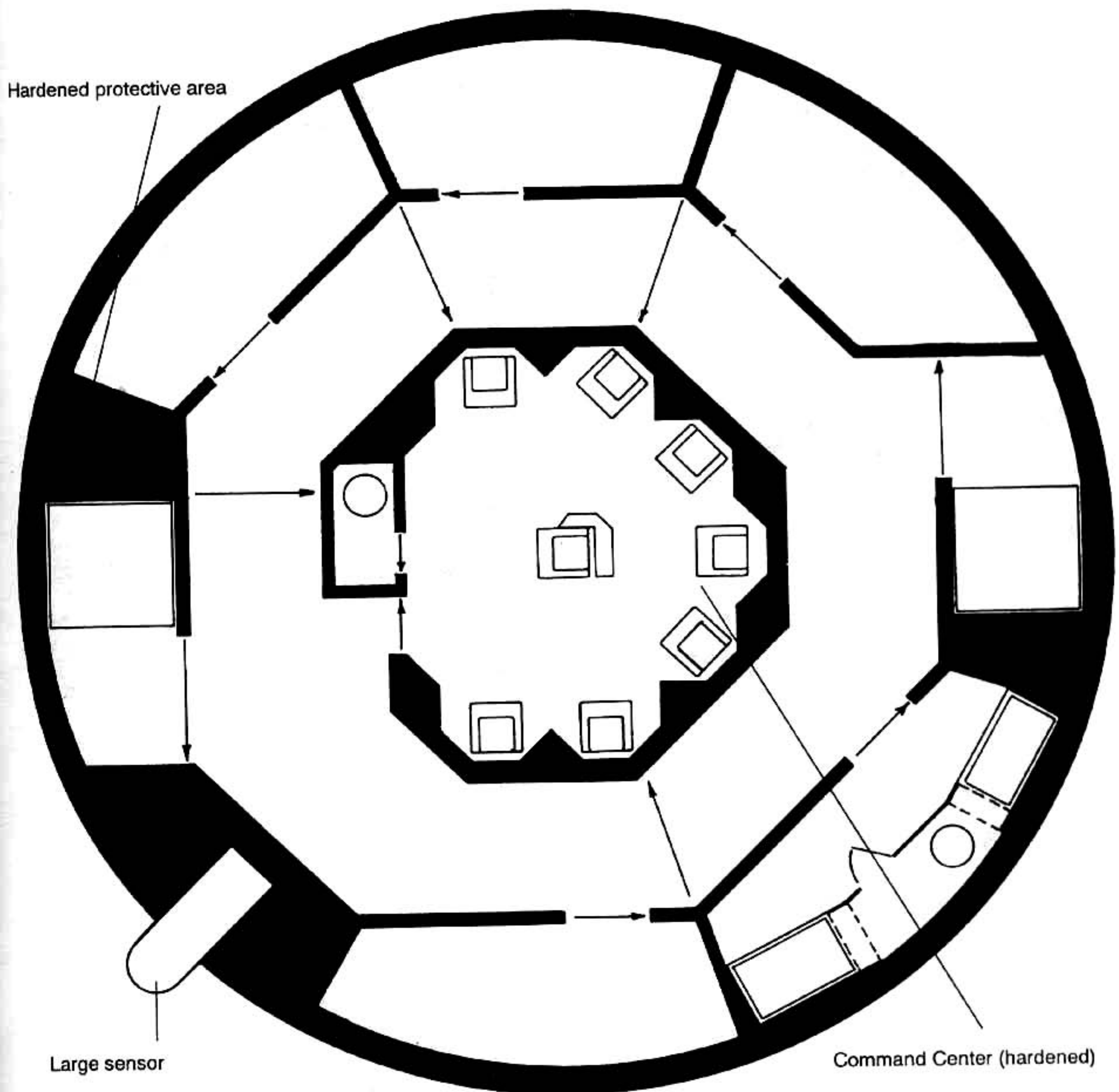
While it would seem that putting the command deck on top would be the natural choice, the necessity of protecting it from danger encourages having a few other decks between it and possible damage. The most likely form of damage is an end-on impact with the odd bit of debris. Though the chances of impact are very slight, the results can be catastrophic. So there are usually cargo decks or similar spaces which don't call for occupancy placed immediately behind the forward fuel tanks. These levels are also a likely location for point defense weapons. Below that, the command deck would fit nicely. In smaller ships, an auxiliary command deck is not necessary, but a small cluster of command work stations elsewhere on the ship never hurts.

There is no hard and fast rule on the mix of passenger staterooms, crew quarters, and the various service decks beyond that of common sense and convenience.

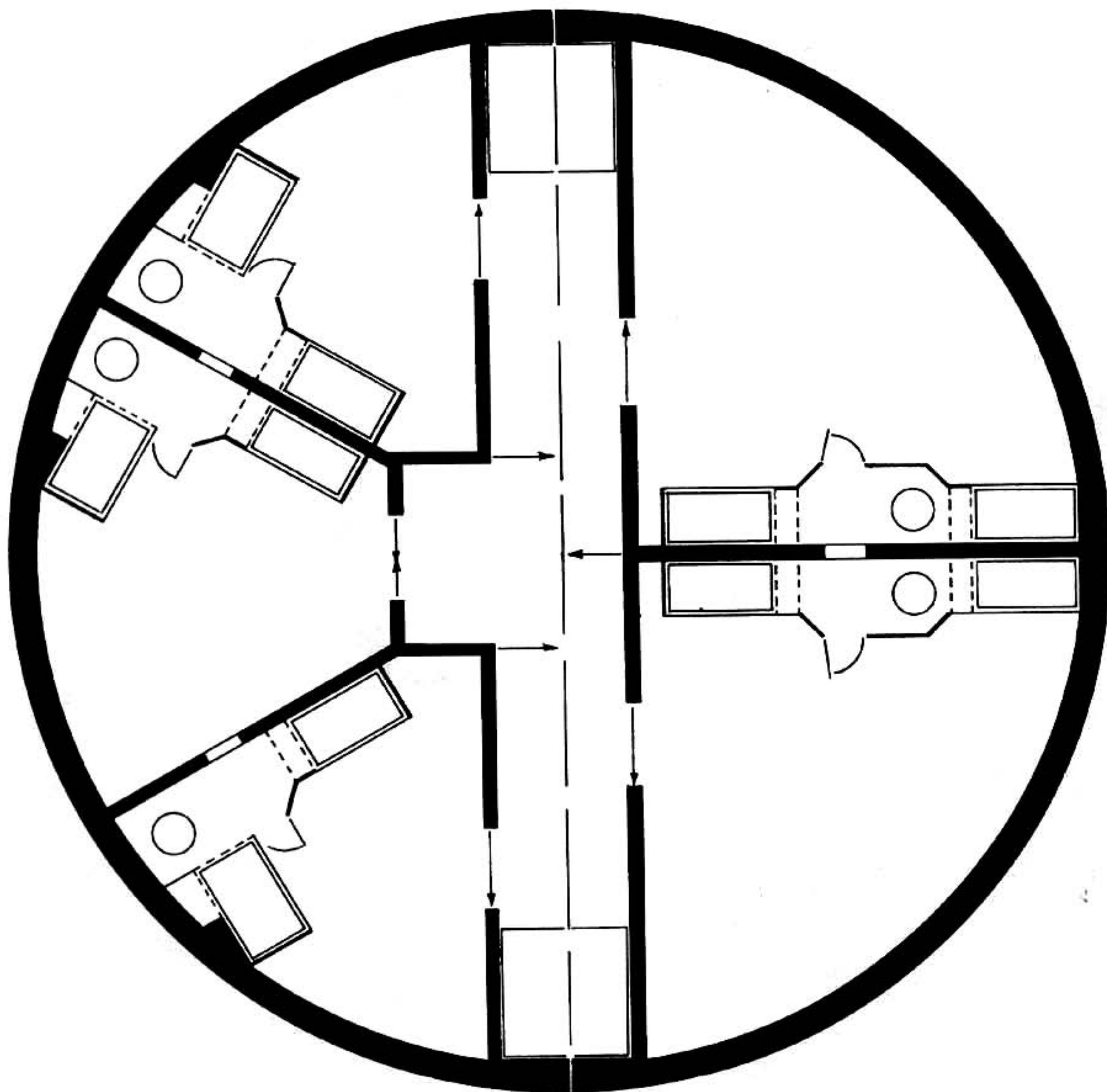
The engineering decks all go together, with much of the space used for spares and repairs, especially on ships that can expect to be well away from quick help in an emergency. On ships in well-travelled lanes, or ships with limited crews, the reduced demands on environmental systems and the availability of surplus space in engineering decks mean that a separate environmental systems deck is unnecessary as these systems can be fitted into unused portions of the engineering spaces. Alternately, these unused spaces can be filled with cargo or cut-rate staterooms. Other uses include extra environmental systems or even just extra water for those 'you never know' emergencies. *The Drift* discusses this in depth.

As a unit, each deck is mostly walls and floor. The ceiling of a compartment is just the bottom of the upper deck assembly with some panels to cover and seal the surface. Access to the inter-deck space is usually through removable floor panels where each compartment's environmental systems and emergency reserves are contained. As each compartment has power lines connecting and interconnecting the various systems throughout the ship. Getting from one deck to another can be done with elevators, but most of the time, to encourage exercise, especially at low or zero gee, the elevator shafts are left open as ladderways with inter-deck emergency doors half-closed to serve as landings. Many ships also have ladderways or stairways between decks, especially on larger ships where the elevators may need to be in continuous use. Ladderways are also common in engineering spaces.



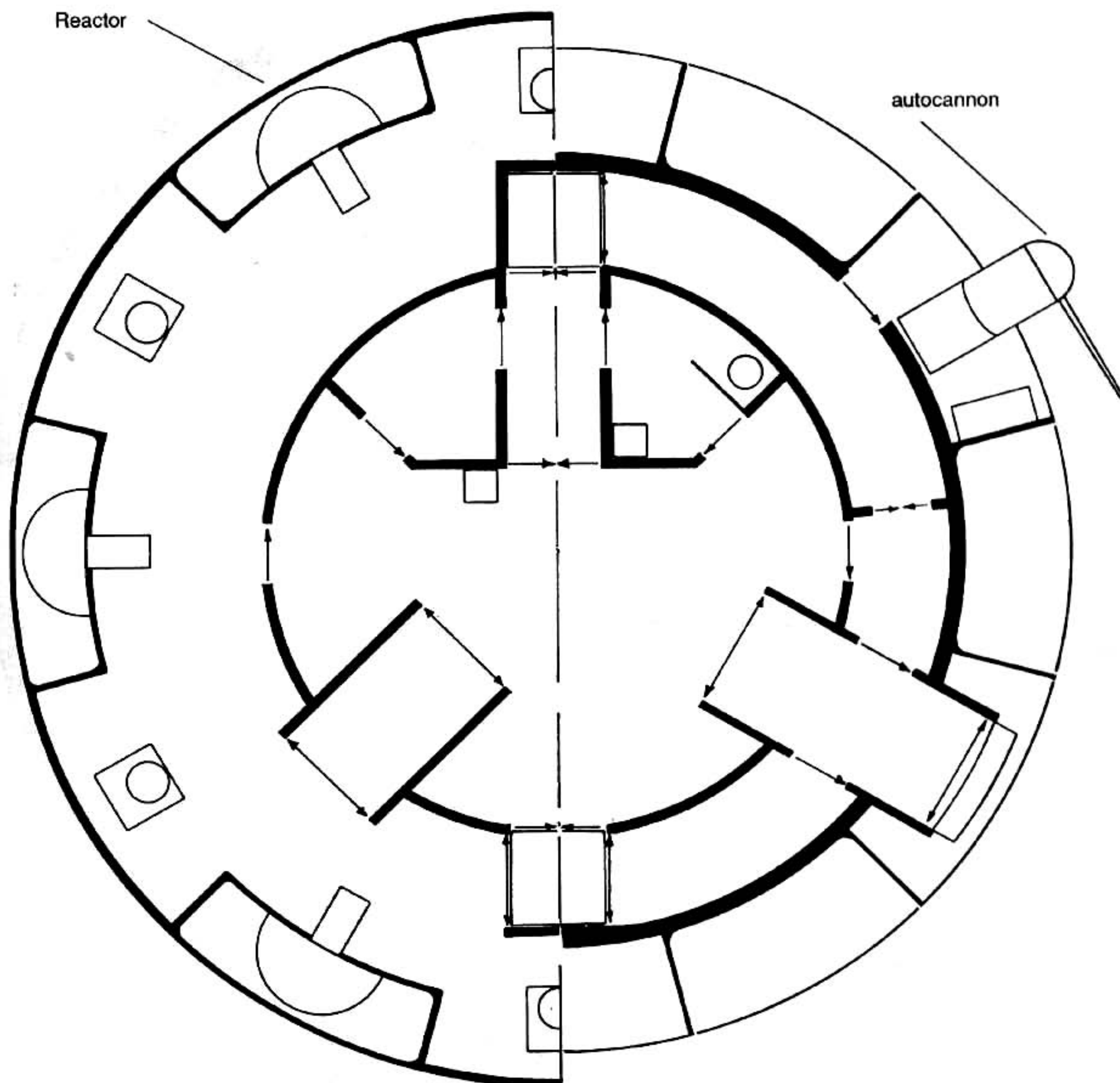
24 Meter Hull**Command Deck**

This is a standard command deck design for the 24m hull. Areas around the circumference are either special sensor gear, connections to console equipment, or storage, with a PHM in one subcompartment which doubles as an emergency survival space. Unlike larger ships, this deck plan is not modularly subdivided, but designed as a whole.

24 Meter Hull**Quarters/Cabins**

This design is shown as two half-decks. The more usual design would be to have one kind of cabin throughout the deck, especially in a passenger ship where there might be a regular and a luxury class passage, in which case the luxury decks would all have the larger cabin options. All cabins shown are double cabins. In a military ship, the option to add a second tier of bunks above the bunks shown might be utilized. 24m hulls are often designed along bilateral modular lines, so that a half-deck can be replaced without the the other side being affected. This also allows these smaller ships to combine, say, a med bay and crew cabins. In a passenger ship, a lounge or mess area might be combined with a stateroom deck-half.

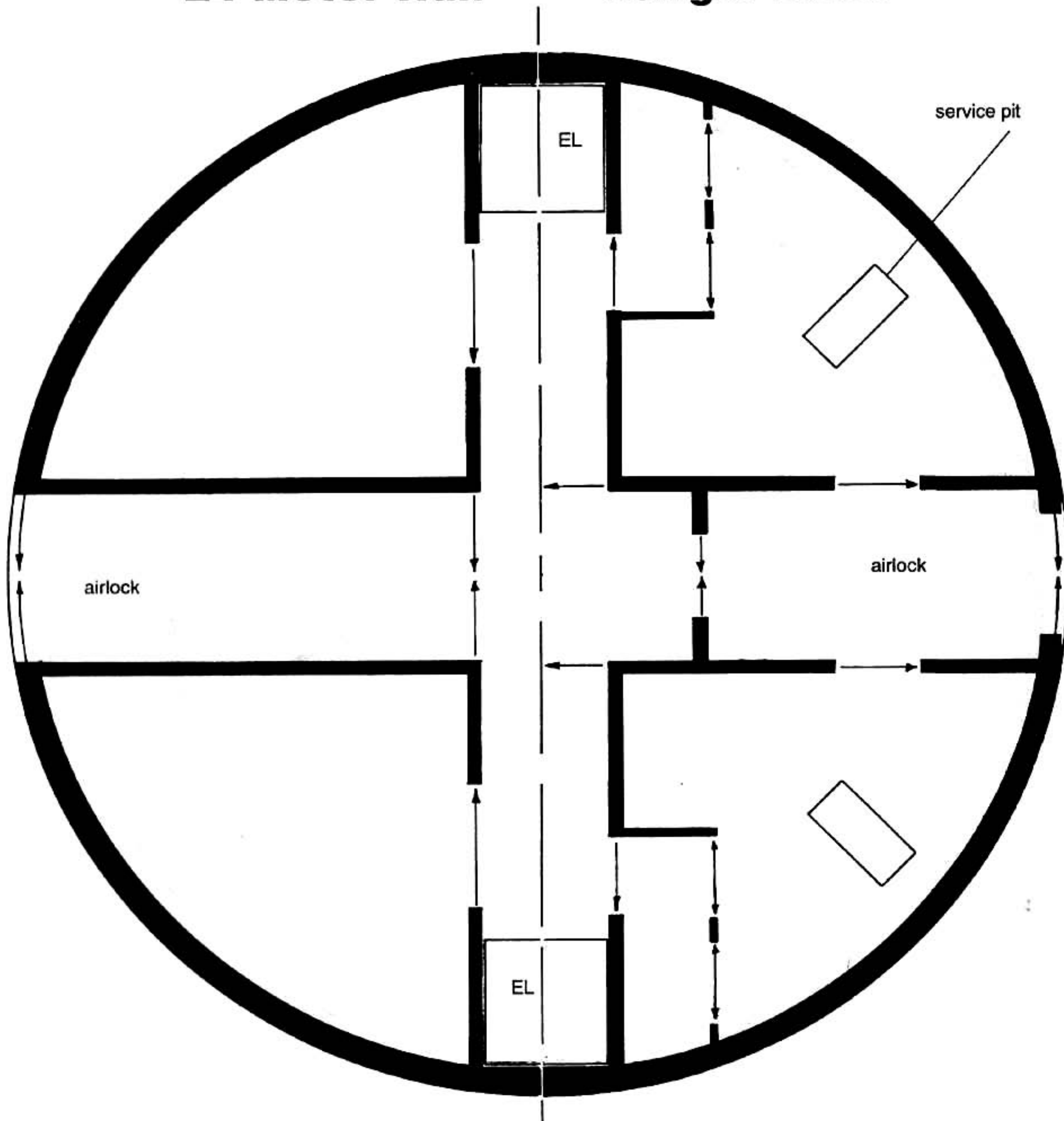
24 Meter Hull Reactor/Weapons Deck



Since this weight of ship needs only 4 to 6 propulsion reactors, the spacing of each, alternating power and propulsion assemble, is fairly generous. On heavier ships, the spacing gets more cramped, and reactors can get crammed together to a minimum of 5 meters between assembly centers. The actual reactor area of the deck is normally unpressurized and allowed to chill to nearly liquid hydrogen temperatures, so routine servicing is done in full vacc suits. The main airlock, the elevator cab, or even the elevator shaft can serve as an airlock for entry and exit. Larger diameter ships will use effectively the same layout for their reactor space, with a pressurized central compartment and airlocks. Upper engineering decks usually use a similar layout to the reactor deck, with no depressurized section. They can be fitted with airlocks or weapons packages in the gaps between the maneuvering vents. There is usually a ladderway or two between the engineering decks for convenient access between decks.

24 Meter Hull

Hangar Deck

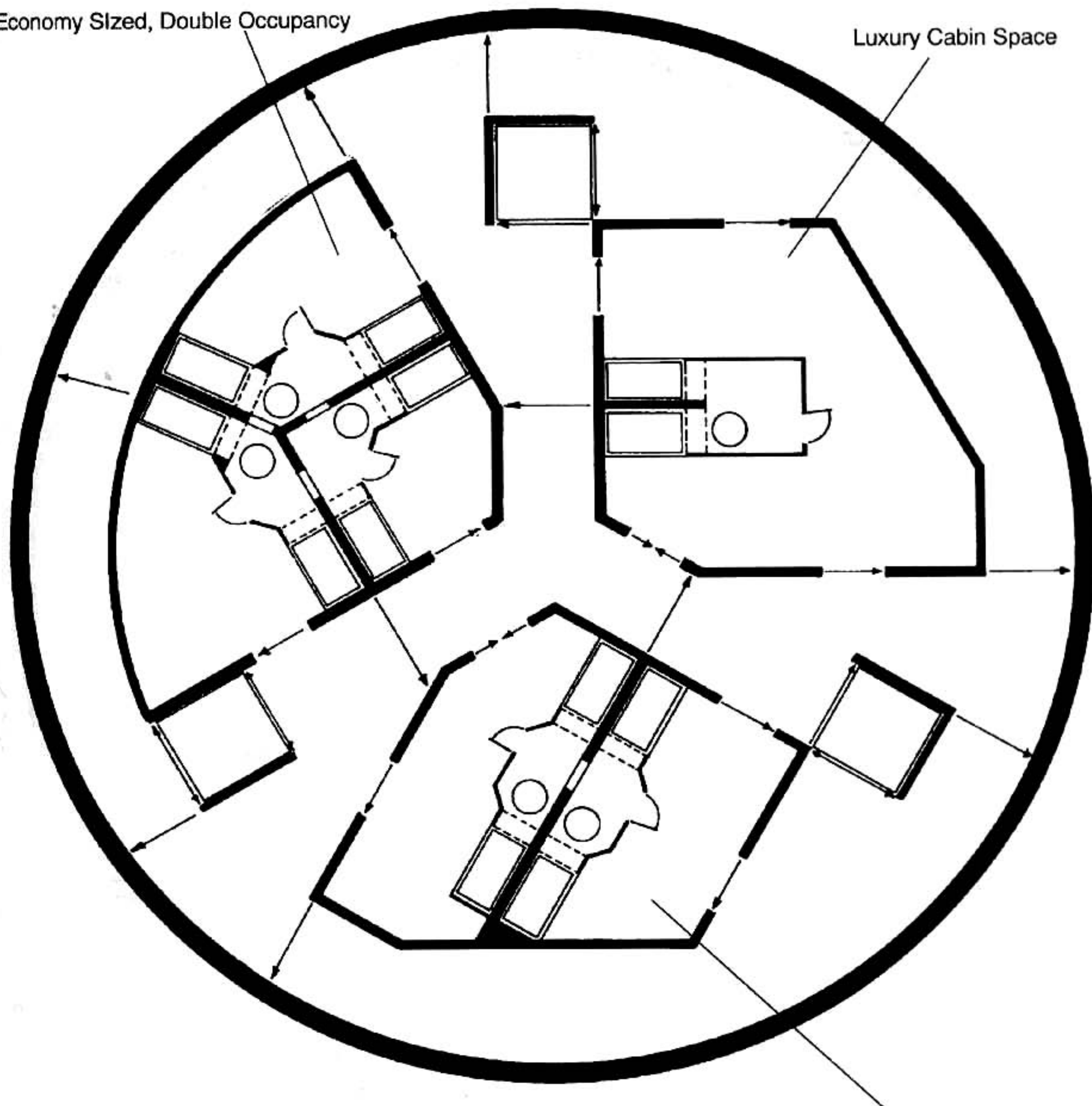


This is a divided layout showing two half decks, each of which would be built as a full circle in actual practice. The deck on the right side has been more extensively divided into workshop and service pit space. One small compartment might be an electronics workshop while the other contained a small machine shop.

32 Meter Hull**Quarters Options**

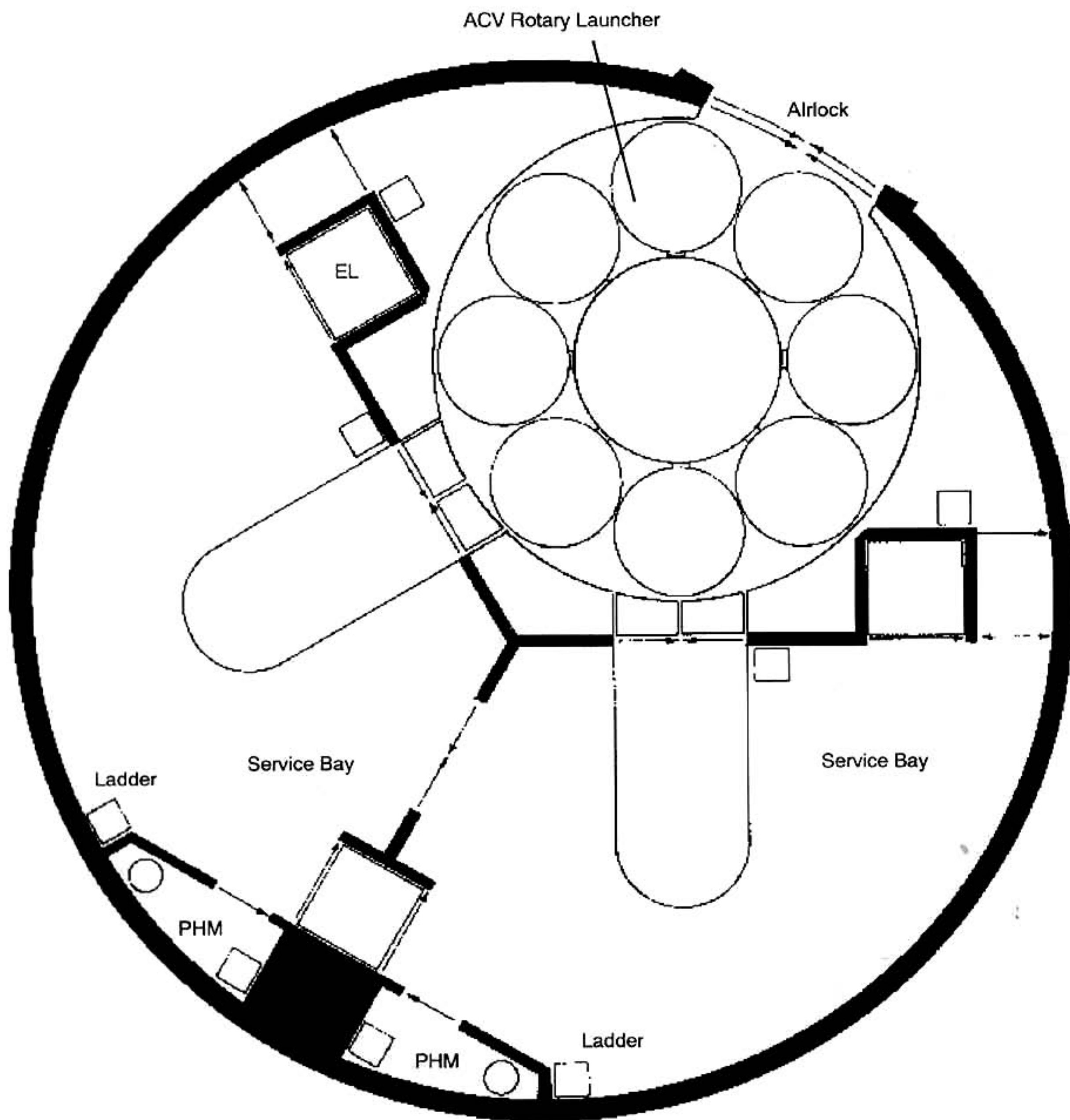
Economy Sized, Double Occupancy

Luxury Cabin Space



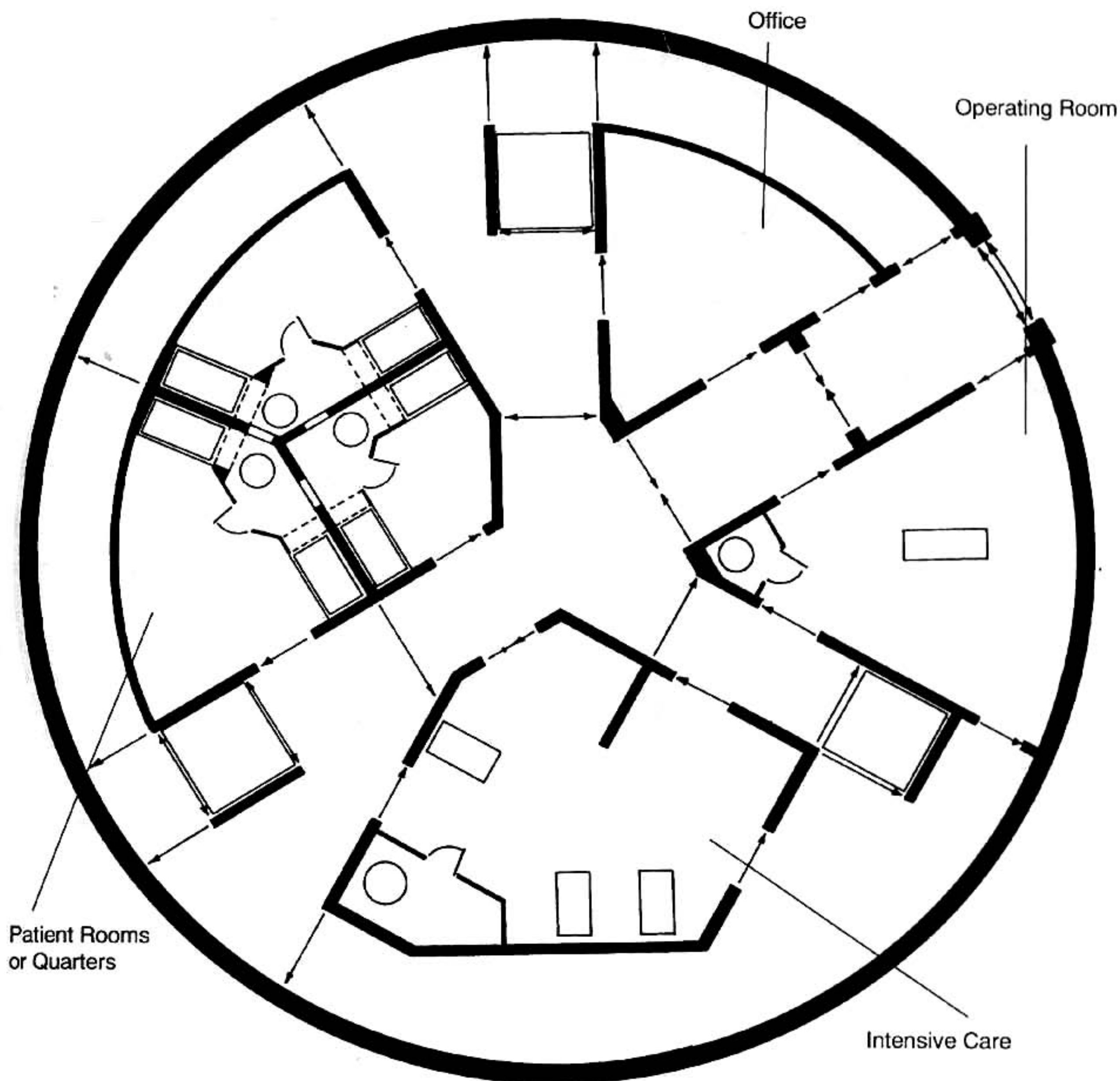
Standard Sized, Double Occupancy

32m hulls are often designed along trilateral modular lines, so that a 1/3-deck can be replaced without the other sides being affected. For cabins, a more usual design would be to have one kind of cabin throughout the deck, especially in a passenger ship where there might be a regular and a luxury class passage, in which case the luxury decks would all have the larger cabin options. All cabins shown are double cabins. In a military ship, the option to add a second tier of bunks above the bunks shown might be utilized. This also allows the combination of different types of use modules. In a passenger ship, a lounge or mess area might be combined with stateroom deck-thirds.

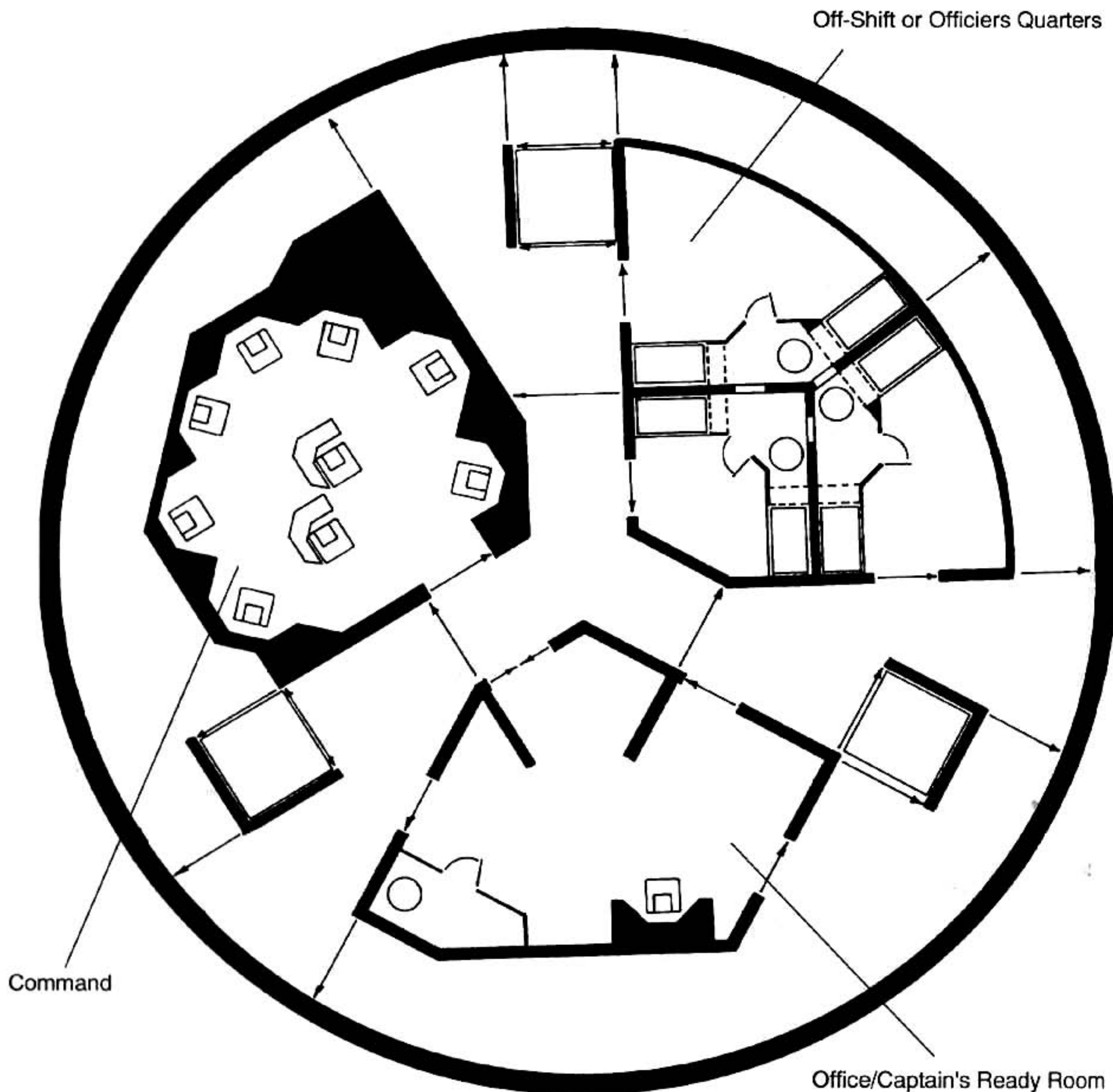
32 Meter Hull**ACV Deck**

This fitting is an 8-round ACV rotary launcher and two ACV service bays. Two ACVs can be stored in each service bay. Spare parts and servicing hardware are in each bay, in quantities large enough to piece together most of another ACV, or to do substantial conversions or modifications.

The 8-round rotary launcher is a standard item which can be instilled on any ship that it will fit. Multiple launches can also be done from this fitting. In this case, two launches can be done from one bay while the other is in use, or three launches can be done if both bays are otherwise unoccupied.

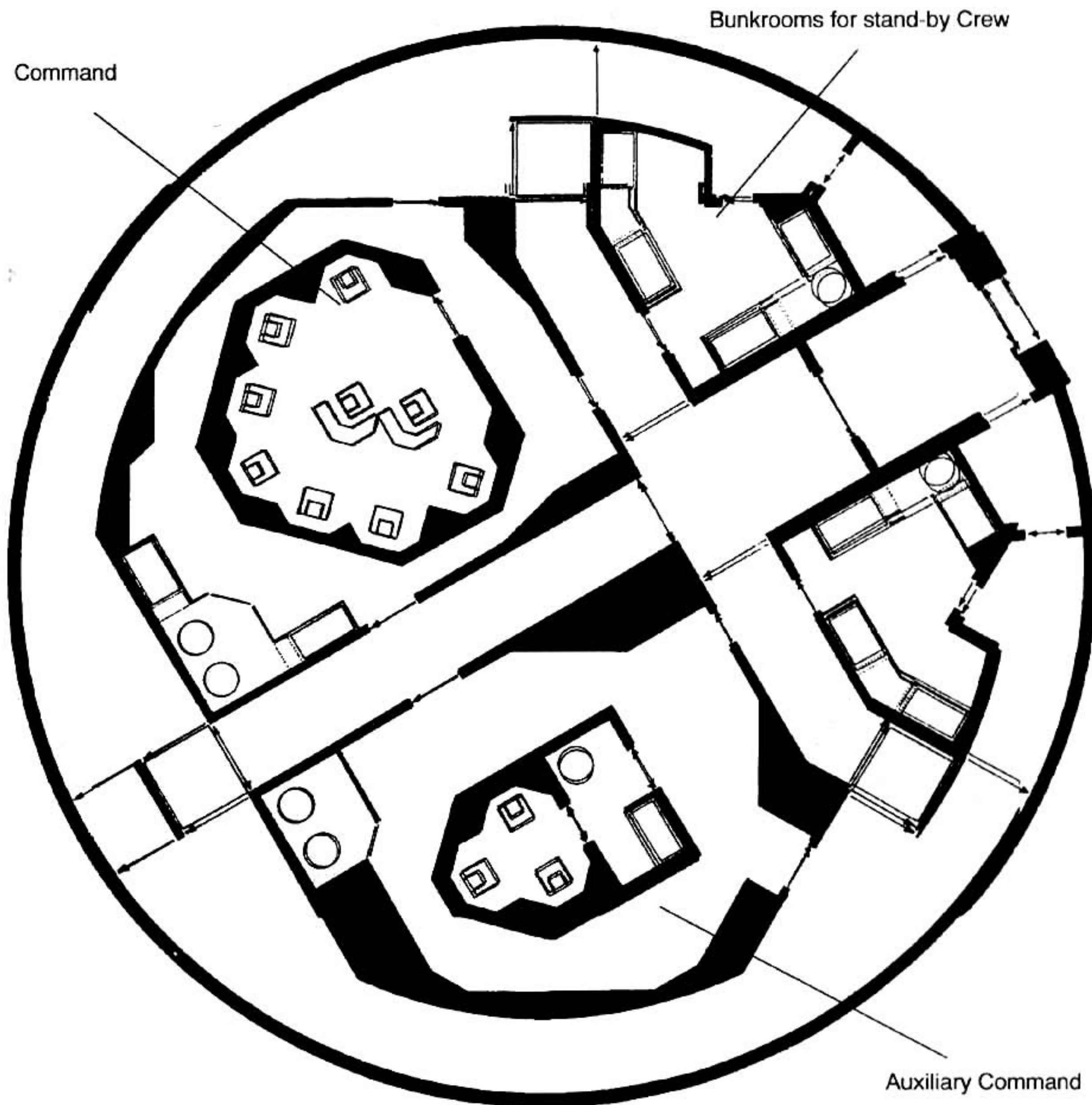
32 Meter Hull**Medical Deck**

This is a fairly small installation, a single surgical unit and adjacent intensive care ward. A second surgical unit can be fitted opposite the airlock, but is not necessary. The stateroom section can be used for either convalescence or crew space. Often medical personnel are quartered there.

32 Meter Hull**Command Deck**

This deck layout is not uncommon for commercial hulls of this size. The command unit has been fitted into a common three-part deck pattern rather than contoured in the hull or in a hardened enclosure (see 40m command deck opposite for hardened compartment, 24m deck for contoured compartment). The deck also features a crew relief area with an extra work station and a segment of triple staterooms for either off-shift rest or officer crew quarters.

Alternate configurations could include alternate stateroom segments or, as these are quarters for space-rated crews, extra dense-packed quarters with 4 bunks but only one PHM per cabin. Bunk-adjacent survival kits would include full space suits, so using the PHM as a vacuum survival shelter would be less necessary.

40 Meter Hull**Command Deck**

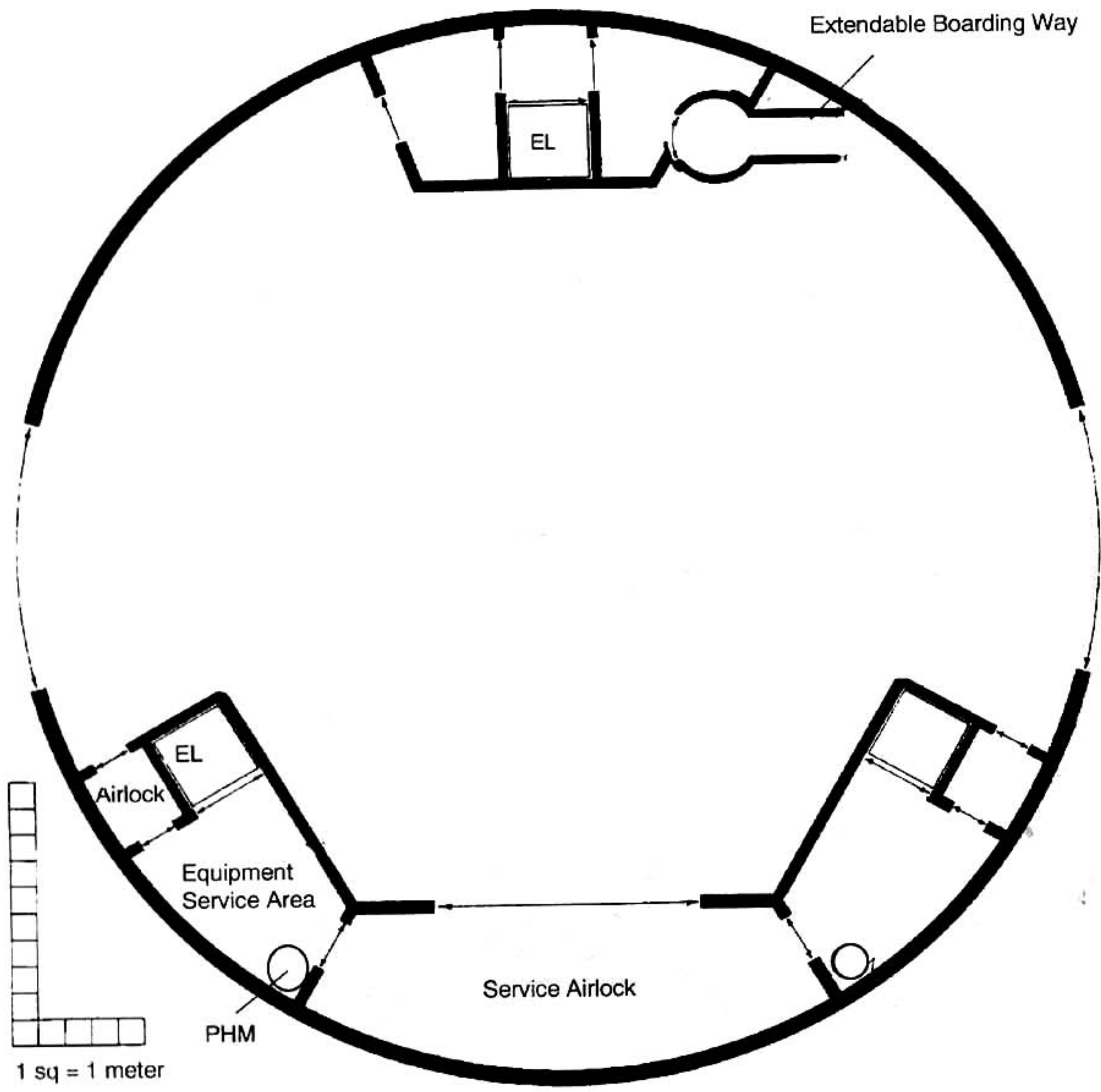
This is not necessarily the standard arrangement for a hardened military-style of deck, using a bilateral deck arrangement with a airlock in the center and matched compartments on each side. This style of layout is less common, but entirely compatible with other 40m deck designs (see pages following). This basic layout, minus the command units, can be used for utility, cargo, or other miscellaneous applications.

The several bunks are for relief crews, especially in extended priority operations or in an emergency survival setting. The bunks unconnected with a PHM still have full survival equipment; all positions have full space suits.

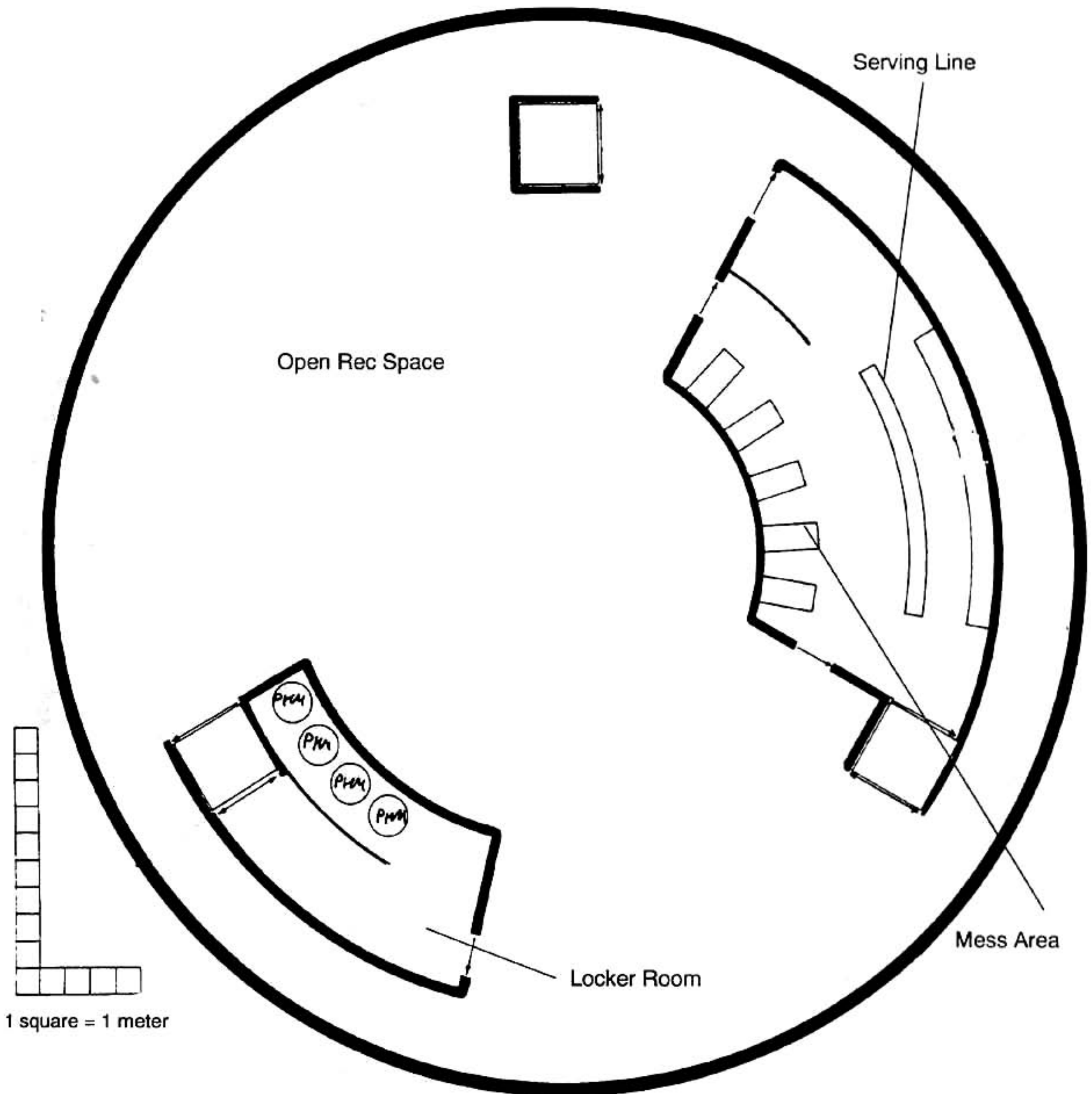
The small auxiliary command unit is an extra-hardened backup with an isolated crew.

40 Meter Hull

Hangar Deck



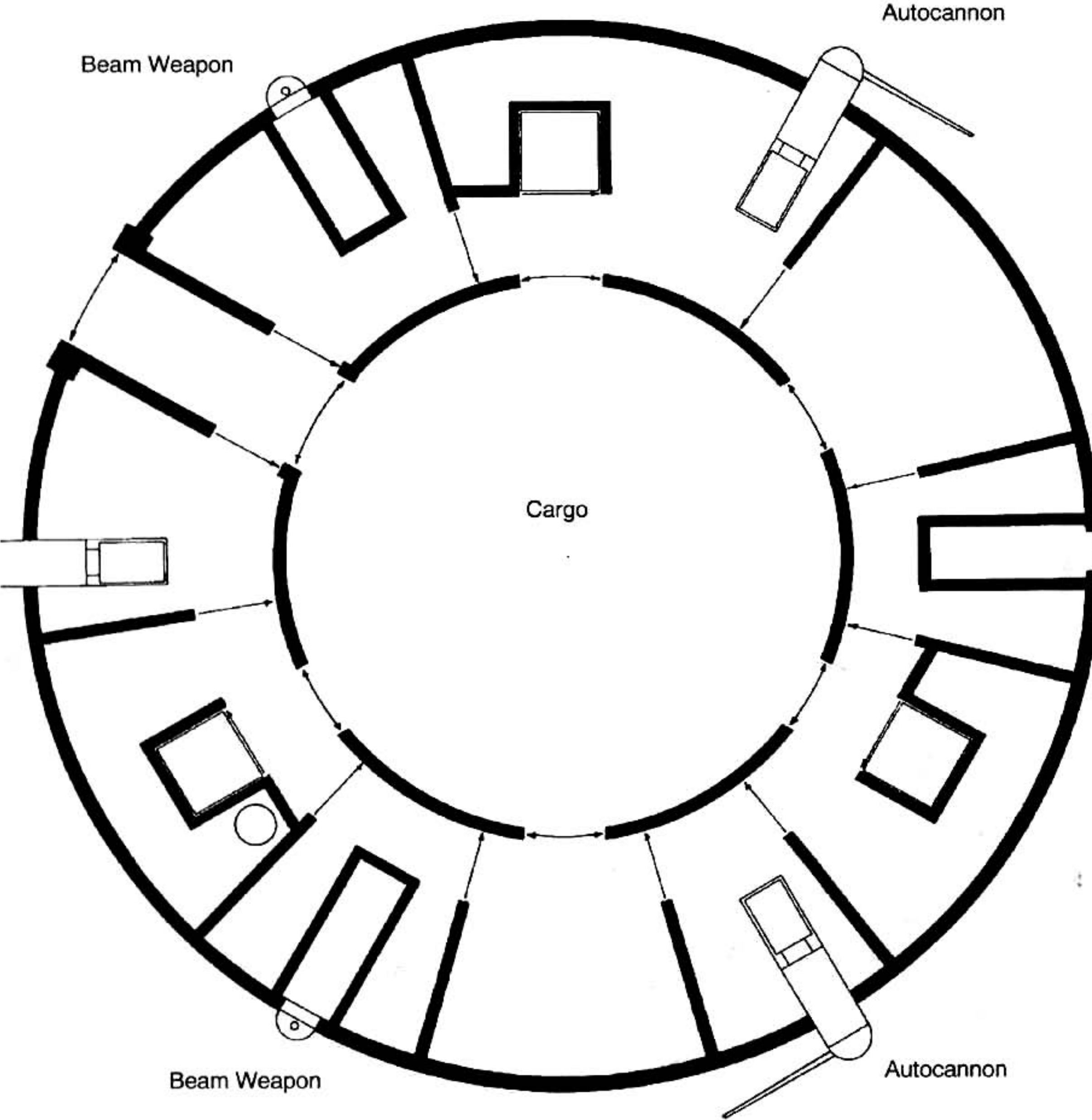
This deck is designed on the whole-circle format, not a modular division. It allows the servicing of several craft at a time. As an option, one of the compartments to the side can be devoted to fuel storage for the craft.

40 Meter Hull**Recreation/Mess**

This is not a luxury dining room, but a combined mess-rec room for a military crew or the working crew of a mixed ship. Many passenger ships offer this as standard passenger accommodation as well. This may be the one large area which travellers will see for the entirety of their stay. It is deemed psychologically necessary to devote this large space. Even the most cramped of ships plan for such an assembly and 'free moving' area. This one doubles as the ship's gym, see locker rooms.

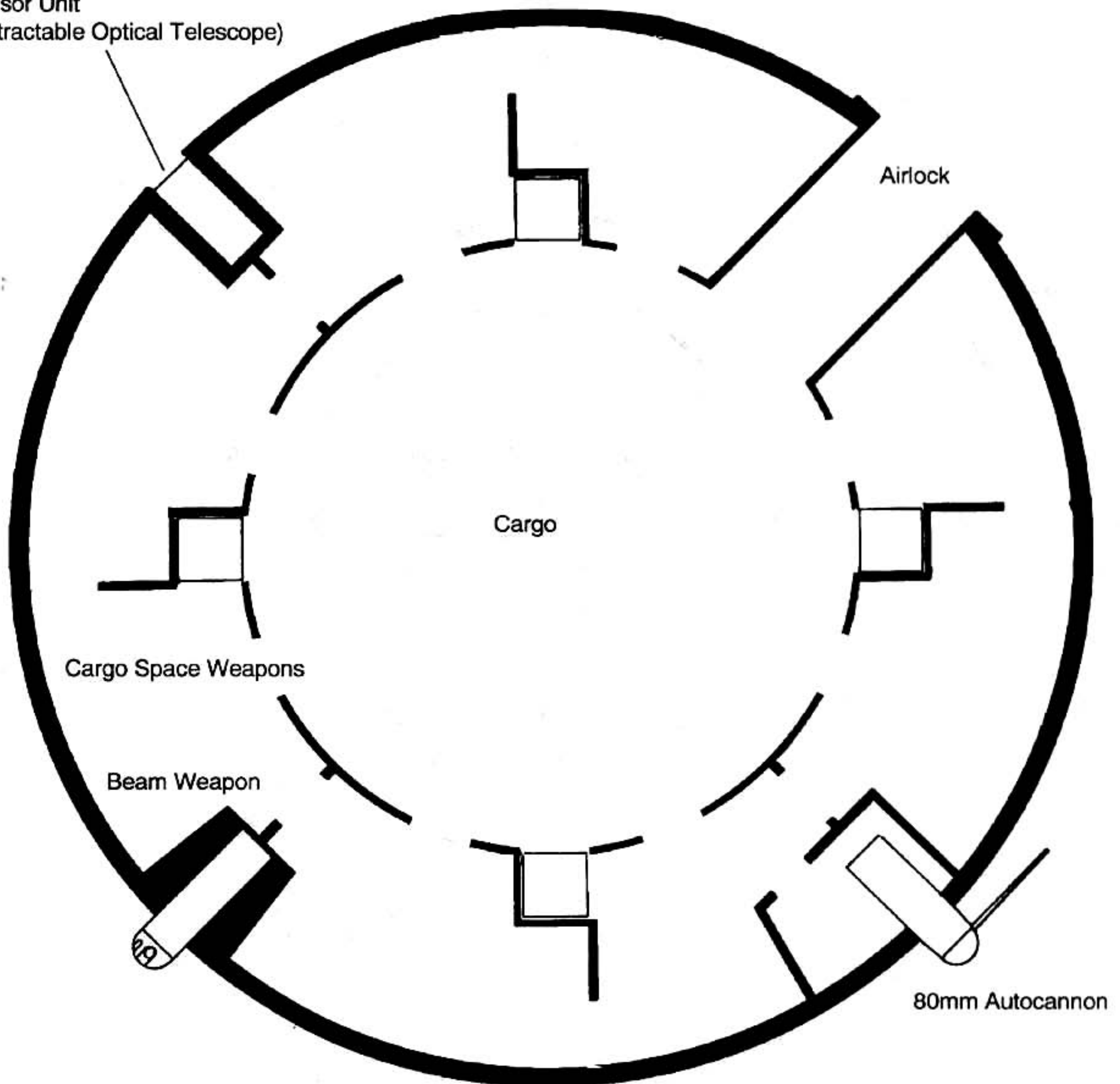
40 Meter Hull

Weapons/Cargo



48 Meter Hull**Weapons/Cargo**

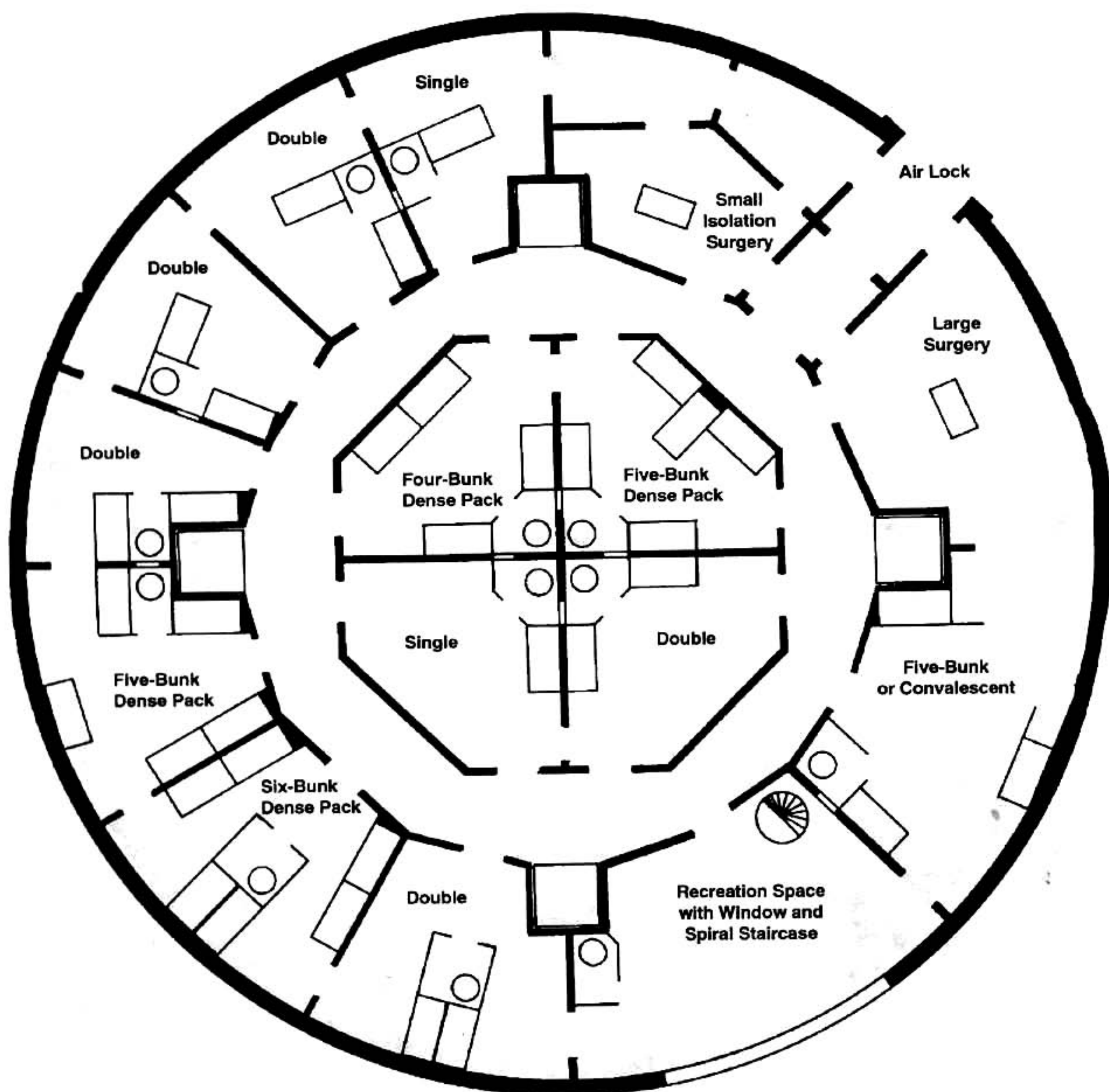
Sensor Unit
(Retractable Optical Telescope)



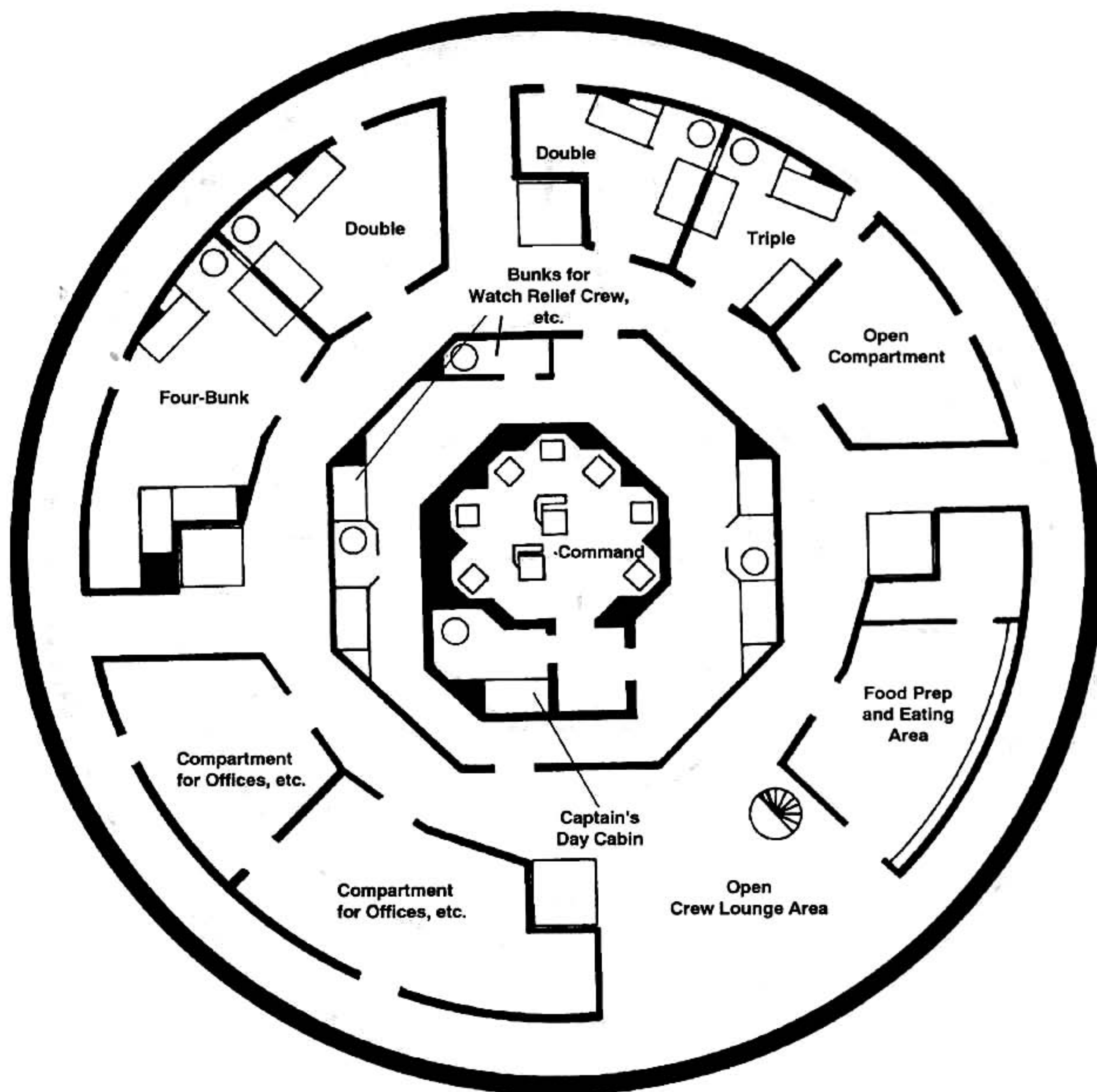
This is primarily a cargo deck; for the 48m hull, this is a standard layout for cargo, with a central handling space and separate compartments. This is a good deck layout to include weapons, so a large autocannon and standard beam turrets are shown. Normally, the weapons would be equally spaced around the circumference of the hull, as opposite. Note that this example may also include the larger components of the sensor array.

48 Meter Hull

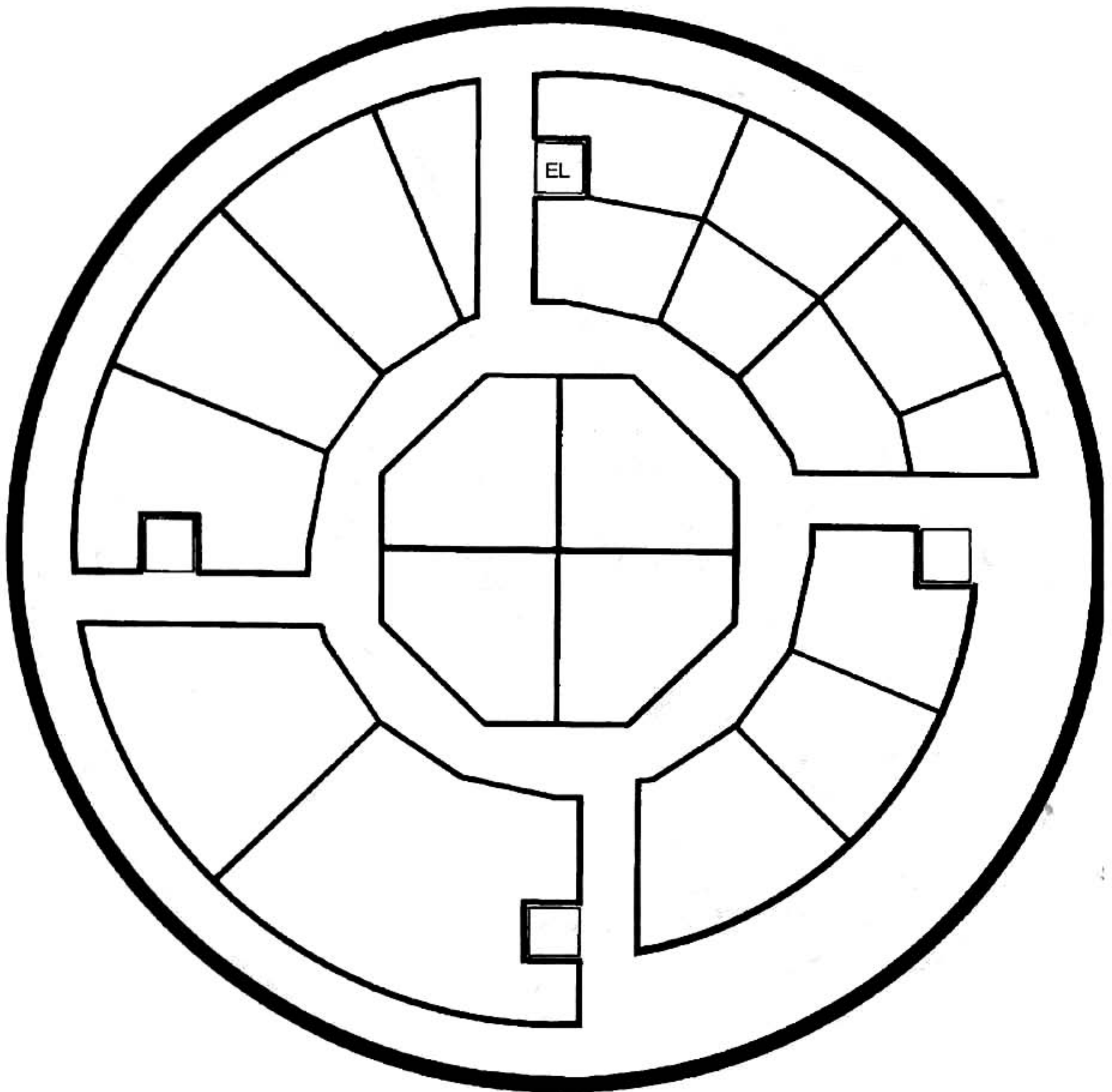
Multi-Use Layout



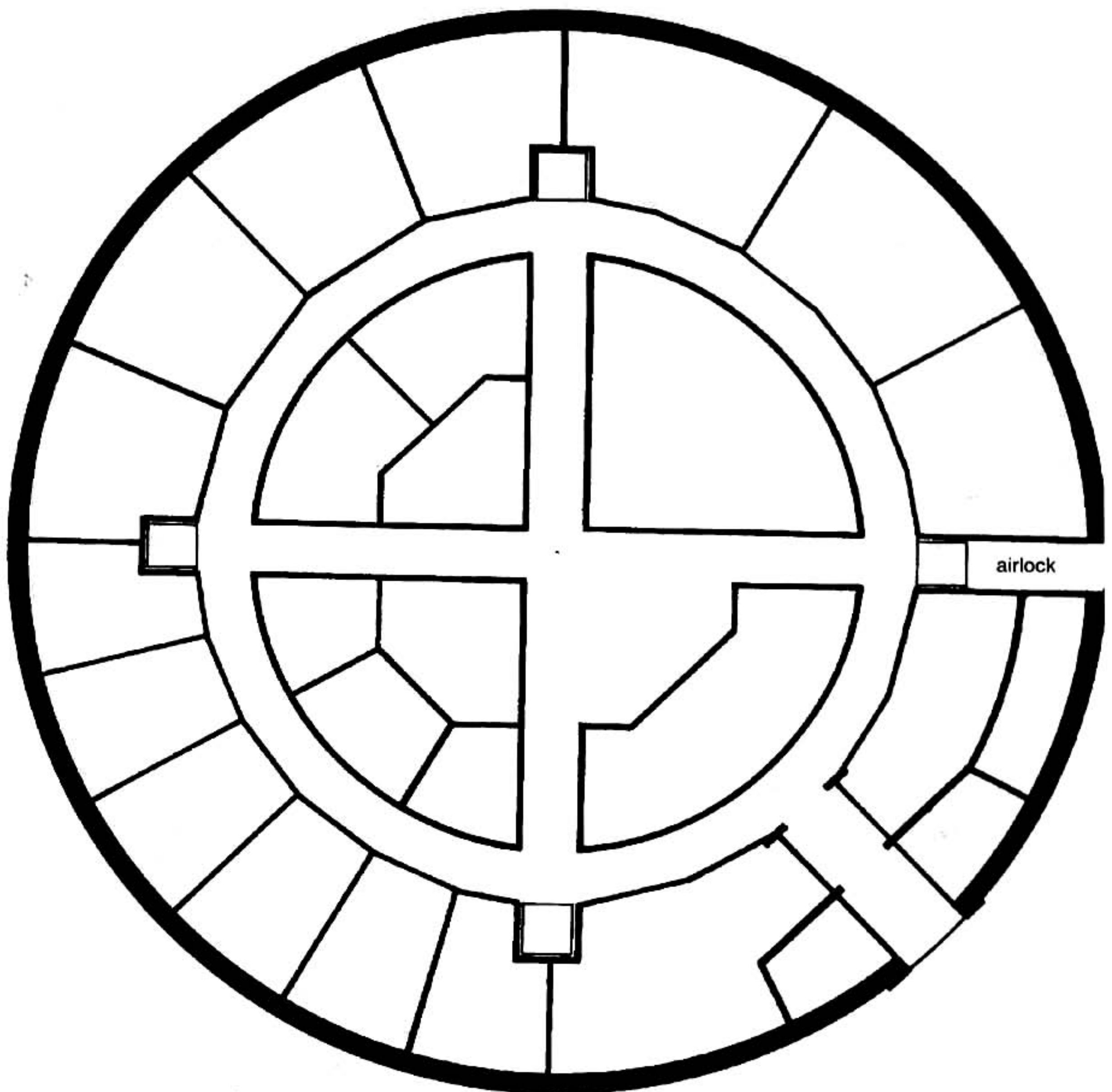
The various sizes of staterooms would not necessarily be all together on a single deck, but this does show the variety of cabin spaces that this basic type of deck layout can offer. The layout allows for windows in cabins as an option. The spiral staircase is not typical, but it is an option used in some ships.

48 Meter Hull**Command Deck**

This combined crew quarters/command deck is typical in a civilian passenger ship where the crew keep to themselves, out of the passenger areas. It is a layout also used in cargo ships, where much of the available space is taken up with revenue-generating cargo. This layout could alternatively surround an auxiliary command center, with the actual command bridge on another deck. In ships where crew is largely confined to one deck off duty, special attention is paid to cabin space and open areas for recreation, for obvious psychological reasons.

60 Meter Hull**Two Layouts**

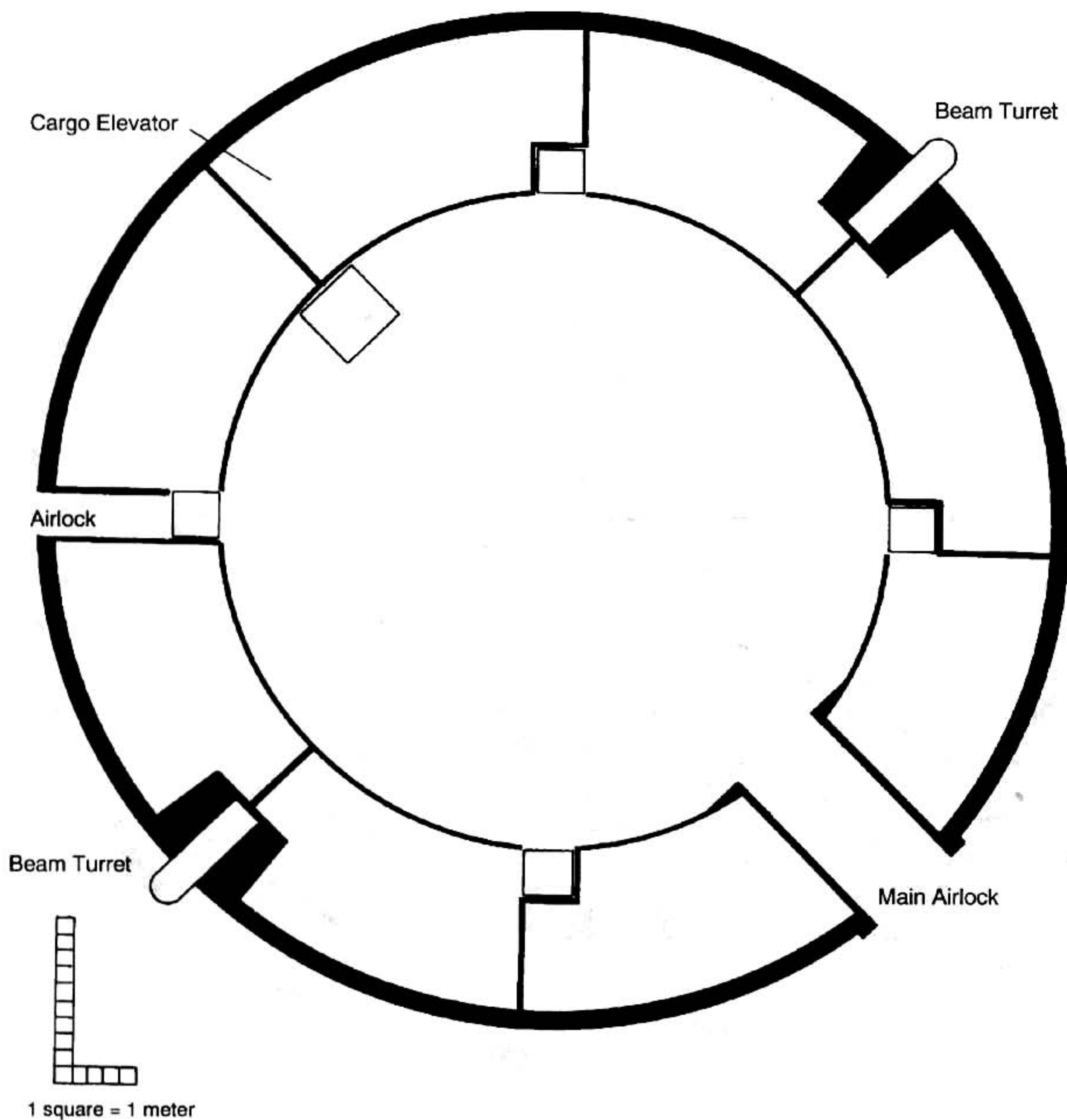
General compartment layout version 1 shows small, medium and large room arrangement options with a corridor around the circumference. Interiors could also be used for office, laboratory, or workshop space.



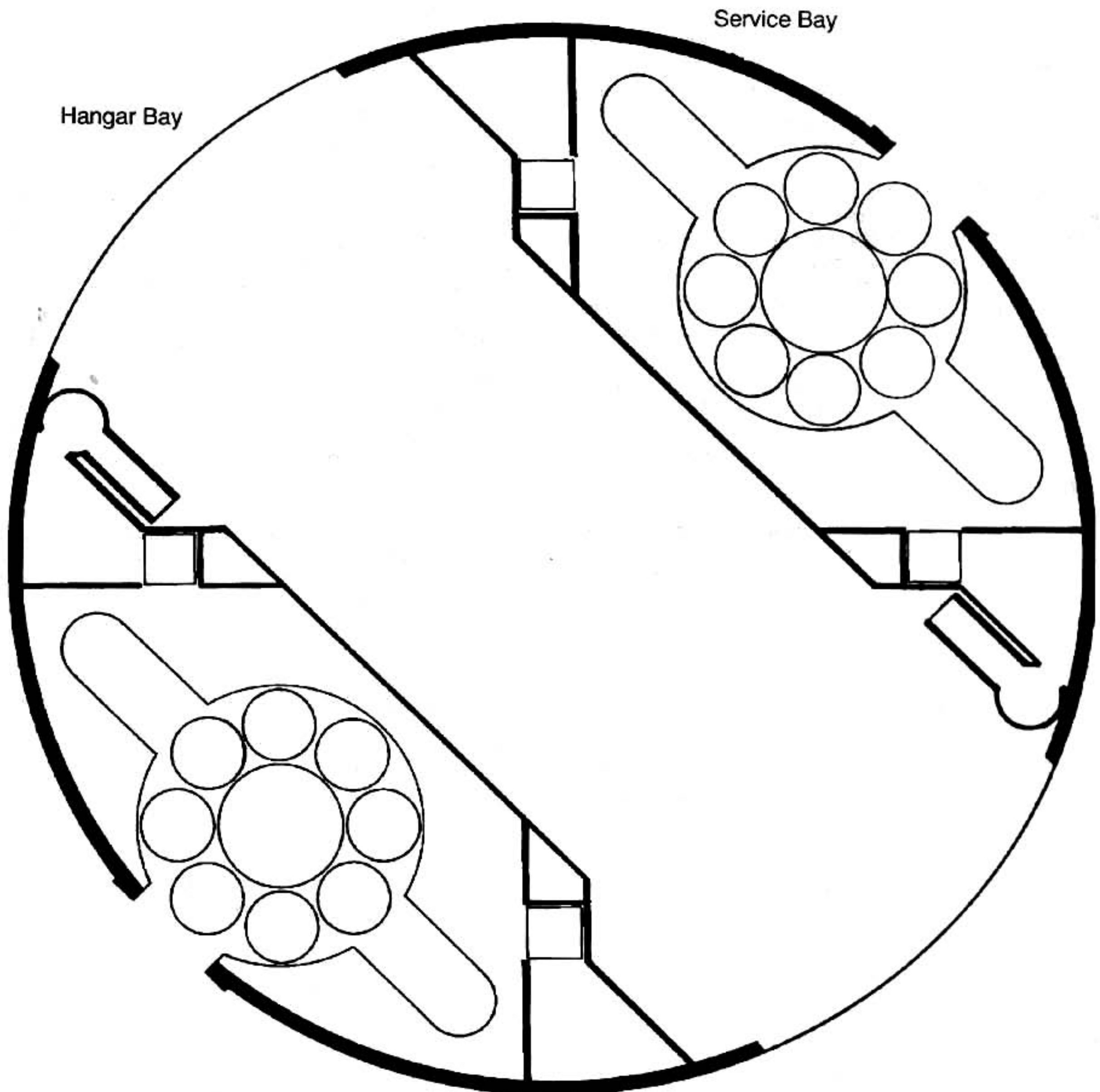
60m general compartment layout version 2 shows small, medium and large room arrangement options, as well as airlocks and surgical spaces

60 Meter Hull

Weapons/Cargo



This is a standard cargo deck with a pair of weapon installations. This layout also has a 4x4 cargo elevator in the center area that would go to another deck above or below. The small airlock is an occasional option for this and other hulls.

60 Meter Hull**ACV Deck**

This is a common arrangement for 48m and larger hulls, having an ACV launcher or two of them plan, flanking a shuttle hangar bay. In this arrangement, the ACV areas each have two double deep ACV service bays which could allow for extra ACVs. The service bay has top and bottom handling rails for moving the ACVs. The 'second floor' of this double-height deck is about the same, except for the hangar floor area.

Rules Addenda

CONTACTS (OPTIONAL RULE)

In lieu of experience points, characters may instead invest their character development in 'contacts'.

Contacts represent people known within certain industries in set locations or organizations. Each 'contact' in such an area gives player characters a +1 DRM in future dealings with the region.

Contacts must be specifically allocated. For instance, on the world of Zho-Chaka a crew might decide to create a +1 'contact' with the repair facility crew. This would allow them to jump cues for repair services, and perhaps even gain a good deal on spare parts. Having a 'contact' with the dockyard management would be a different matter entirely; they might be used to avoid customs tariffs and gain information on the flight plans of competitors.

For ease of role-play, umpires should prevent characters from gaining more than a +2 in any individual contact.

COMBAT: SECONDARY HULL PENETRATIONS

When any compartment is penetrated by damage, roll 1D6 for all other areas on the ship. A result of "6" for any compartment will mean that there had been damage caused by secondary fragments or tertiary fragments. All characters in the affected compartment must save against damage, treating the level of damage as 1 lower than the primary target compartment.

COMBAT: SHIP DESTRUCTION

In a vessel carrying player characters, simple obliteration may be too kind. If the umpire desires, simply make every single character on board roll a save vs wounds, and obliterate most of the ship's systems. This will give player characters the opportunity of leaving with a whimper instead of a bang.

NON-OPTIMAL TRAVEL

From time to time, characters must use travel options which endanger life and limb. This is generally only done when the alternative is a great chance of danger, or there is a pressing reason for hurry.

High Acceleration Journeys

High acceleration journeys require Endurance tests from all passengers and crew. Each day, every person will be required to roll Endurance vs 10 to avoid accruing one point of non-recoverable fatigue. It is quite possible for high acceleration over prolonged periods to cause cardio-vascular injury, coma and even death. Be warned!

Ship's medical services can support seriously suffering crew or passengers, granting them a +2 DRM on their endurance rolls but effectively removing them from active crew life. Those confined to their bunks (usually drugging themselves to sleep) will likewise receive a +1 Endurance Test DRM.

The difficulty level of all Efficiency Tests is increased by

one level for any ship undergoing high acceleration. All tests are taken with full penalties for any fatigue levels the departmental heads may have accrued.

Hard Jumps

Ships which make a 'hard jump', starting a jump from 85-99% of the distance between the orbital facility and a safe jump distance, will suffer stress and damage. Make a systems check for all computers, weapons and equipment.

In addition, all crew must check for jump induced injury. Roll the character's Endurance rating vs 10.

A failed roll will indicate that the character has suffered 'jump stress' - tissue damage similar to that caused by ionizing radiation. The effects may include nausea, bleeding, reduced immune systems, hair loss, and increased risk of cancer, as well as permanent nerve and neural damage which can disable or even kill.

A failed Endurance roll indicates Light jump stress.

A failure grade of 2 indicates Serious jump stress.

A failure grade of 3 indicates Massive jump stress.

Light Jump stress causes a permanent loss of 1 D6 fatigue points due to nervous damage. Initial radiation sickness symptoms likely.

Severe jump stress causes a permanent DRM of -1 on all Dexterity, Co-ord or Endurance rolls. Radiation sickness will be more acute, roll 1D6 for days and points temporarily lost in all categories. Also, if anyone rolls this, it must be assumed that the ship's computer has also suffered, and that after a systems check, there is a 10% chance that a section of computer is down.

Massive jump stress causes death. This could be fairly instant through systemic shock, or a more grisly death by severe radiation sickness symptoms. Also, if anyone rolls this, it must be assumed that the ship's computer has also suffered, or it would not have allowed conditions to reach this state. After a systems check (failed), there is a chance ranging from an initial 25% to a maximum of 50% that a section of computer is down. There is also a 1% chance of residual radioactivity.

CATASTROPHIC FAILURE ROLLS AND CATASTROPHES

All ship's systems which have been repaired in flight, damaged or in a state of poor repair are subject to *catastrophic failure*. Whenever the system is used, the umpire must roll to see whether the unit undergoes total breakdown by testing the chief engineer's (or the work party chief's) skill rating vs 15. A failed roll means that the machinery is not working and has a DRM of +1 to repair - which can be embarrassing if the vessel needed it badly (for instance, to decelerate upon entering a star system.) For an in-depth discussion of emergency and survival issues, refer to *The Drift*.

Trouble With the Drives

Thrust is produced by fusion reactors, identical and interchangeable with the power reactors, but fitted to high-efficiency magnetic nozzles for propulsion. The exhaust has such high velocity that it has the hazards of a plasma torch at several kilometers, being able to blast/melt through sheet

metals or vacc suits in an instant. All reactors are built from interchangeable modules that can be repaired or replaced with only a few tools and basic instructions, though some of the hardware inside these modules is very complex and would be all but impossible to service in the field.

The MHD generators, magnetic thrust nozzles, and associated hardware are also designed for simple field repair or replacement. Such work, though not outside the ability of a rated crewmember, will still be a major task, since these parts have dozens or even hundreds of fasteners and connections. Some are quite large; a whole magnetic nozzle assembly is about 10 meters long and weighs several tons.

As the fusion reactors are largely solid state, there is little that can normally go wrong. However, the various components do wear over time; liquid hydrogen injectors erode. Hydrogen pumps have moving parts which are under high pressure and operate at low temperatures, so they can either slowly wear or suddenly fail. Beam generators have enormous thermal contrasts between the fusion event, the liquid hydrogen coolants, and the heat of the beam generation itself, so they can break down. And as the entire assembly is being exposed to the strong neutron flux of the reaction, as well as the intense heat and pressure, eventually break-down of the materials will occur.

Since a standing wave fusion event is difficult to create and maintain in the first place, any faltering of beam or stream will collapse the event and instantly turn it all off. Worse cases for the reactor itself would be if (1) cooling flow was blocked so exposed parts overheated, melting or vaporizing important components or (2) if, having lost fusion, the coolant system continued running and flash-chilled parts, causing them to break through thermal shock.

As there is some expected wear and tear on the system, the assembly is designed to be reworked en route. The reactor faceplate is the most common element for servicing. As it is directly exposed to the fusion event, it includes coolant injection nozzles and beam lenses. Next is the fuel pump and injection system. Then, the beam generators. The propulsion nozzle and MHD power generation coils are all solid state and, other than inspections for stream wear or fine-tuning the various coils (thus improving efficiency), there is not much which needs to be done here. Externally-caused damage would make a mess of a coil, so the only good way to deal with it is to replace the damaged section. If you were way out in the middle of nowhere and rebuilding a coil was your only way out, it could be done, but it would be long slow work. The repaired section would not work as well as before, but it would get you home!

The various maneuvering vents, down stream from the MHD coils, are large, motor-driven flaps that redirect the post-MHD stream off-axis to turn or roll the ship, need ongoing attention for any number of mechanical bugs. Failure could be as simple as something gets stuck or as bad as something falling off. In either case, that vent, and by extension, that reactor section can't be used properly. Since there are usually several power/maneuvering reactors on a ship, the loss of any one would be merely an inconvenience. Loss of one means compensation for the engineering staff; loss of several cuts off power generation to the ship. Even the propulsion system would be compromised. As long as even one is operating, basic power and maneuvering are still possible. If all the units

were out, the ship could still generate some power through a propulsion unit, but it would then not produce any useful thrust, and maneuvering would be gone. An ACV, if available, could be used as a tug to move the ship, or a propulsion assembly could be dismounted and manually aimed as a thruster. While this is no small task, a competent engineer and a few good space-rated personnel could do it.

Environmental Systems Failures

Environmental systems failure can mean that travelers are reduced to living on processed concentrates. There are food elements which must enter the body from fresh sources, bulk as well as certain vitamins. Digestive difficulties will trouble personnel who eat nothing but concentrates. After the concentrated rations grow scarce, Food deficiencies symptoms take weeks or months to develop, but they include loss of hair and teeth, poor vision, joint pain, or lowered resistance to infection.

While emergency quantities of water are stored with each compartment's survival equipment, long-term water resources need the environmental system to be operational. In lieu of that, various distillation processes are available or can be improvised with hardware on hand. Similarly, oxygen and general air quality can be maintained with emergency assets, though over time the risk of accumulations of what would otherwise be trace gases could become an issue.

Hull Breaches

Hull breaches are possible, but because of the excellent level of construction and materials technology, the affected area is quickly and effectively sealed off.

Communications Failures

Communications failures are difficult primarily from a psychological point of view. A ship which has communications failure will get within a day's travel of the nearest orbital station and release one of a variety of compressed-gas emergency signals (fluorescing, high-albedo, etc.) to indicate that a communications emergency exists and to specify which alternate means of communication may be successful.

Quarantine Problems

A ship which enters a system and finds that it has a quarantine situation such as a disease vector which has suddenly become apparent will be directed to an alternate orbital location until medical aid can be obtained. There have been no plague-level disease outbreaks in Albedo history, but no system wants to be the first. Volunteer personnel and medical supplies are sent to the quarantined vessel; consumable supplies will be provided as well, but no-one will leave a stricken ship to carry a disease to another population group, no matter how small. This is part of the 'spaceship mentality' too. Better for one sector to be destroyed than for the 'whole ship', the Confed, to perish. No matter what the planetary government, aid to such a quarantine party will not be denied until the situation is resolved.

Sample Campaign Region

THE OLYANI SUBSECTOR



Located at the spinward side of the ConFed Rim, the Olyani administrative district has only just begun to grow in importance. The system data here is approximate, given for use in simulation play. Once the Albedo Systems Book is published, that data will be considered the 'true standard'. ILR refugees The Olyani subsector is fairly far removed from ILR space; however, a recently plotted jump route now passes through a region of nebular activity and stellar masses which had previously been thought impassable. This route opens up a 'back door' into ILR space, and the secret has not yet come to the attention of the ILR military. The jump route leads right into the edges of the Olyani subsector. An underground organization in the ILR has begun smuggling small numbers of criminals and political refugees from the ILR into the Olyani subsector. The refugees do not wish it to be known that they are ex-ILR, fearing that they may be handed back to their old government. They instead claim to be ConFed settlers. They will usually be dropped off at Banihani starport, and will be seeking a ship to take them to a potential home world. If the trade in smuggled refugees is discovered, ILR reaction could veer in a number of directions; the ILR might attempt to plug the gap by extension into the Olyani subsector. Alternatively, they may actively encourage the route, treating it as a means of escaping their enclosed area of space. Olyani will soon become inundated by shiploads of ILR 'political refugees' seeking homes (and incidentally spreading ILR influence and culture). Unitrade A large trading company which operates

within the Olyani, Marni and Geelan subsectors. Expansionistic and monopolistic policies will bring Unitrade into conflict with many small trader vessels. Unitrade is quite happy to work within the letter of the law, but will deliberately compete with free traders for contracts. Unitrade will even risk minor fiscal loss to remove troublesome competition. Gor-Tech An aggressive mineral mining cartel. The company has a definite agenda; it is clearly working towards the goal of monopolizing all mineral exploration and exploitation within this and several other sub sectors. Secretly controlled by a hidden cabal of Senior ConFed administrators and EDF command, Gor-Tech is being used as a toll to control this sector by individuals who plan a slow, careful takeover of the ConFed itself. This will undoubtedly bring them into conflict with EDF or ConFed admin player characters, who may well find themselves struggling against a terrifying and merciless conspiracy.

Going 'Past The Rim'

The Olyani subsector lies at the very outermost edge of the ConFed, at the limit of known space. Past the upper edge of the map lies unclaimed, uninhabited territory. Here is the region where the bats from Banihani may find their ideal colony world, or where secret ILR supply bases might be constructed and maintained. Mysterious artifacts of The Creators might be discovered, or new jump routes carefully explored. Many pirates and mercenaries also make their bases in these 'uninhabited' climes. Mapping Each star sys-

tem which is usable or inhabited is named and coded. Those which have clear 'of sight' links to other systems are joined to those systems by lines. If desired, ships may attempt to jump between systems which are not linked by safe jump routes. To even find a possible route for such a dangerous jump requires a roll of Navigation skill vs 20. Any ship travelling in this way must test as though undertaking an 'hard jump'.

Aooboochi

Starport: C (Rs, Tar)

System mass: 1

Notes:

Aooboochi is a world of rich, deep cycad forests - of tiny waterfalls and massive, majestic oceans. A rich and unspoiled environment has become home to a small settlement of dedicated environmentalists. Initially founded as a research center devoted to the study of an astonishingly rich and varied local ecology, the colony developed into one of the most beautiful planets in the rim. Communities are small and decentralized, burrowing their houses below the surface to peek windows and doors out into the ferns. The theme has been to integrate settlement with the natural environment; children are raised to value living things above all else. Violent crime is rare, and the local life forms are protected from intrusion by imported species and diseases. The planet is a hotbed of scientific research, but locals tend to be clannish and self-involved. Avant garde artists and career minded folk will often leave to travel the stars - and just as often, they will return home to found small, hyperactive communities deep within the quiet moss. All seeds, animals and weapons are banned from import. Organic products must undergo a lengthy quarantine, and will be taxed at 10%. To import or export physical cargo or passengers to Aooboochi, a vessel must become a licensed carrier. This costs 5000Cr and involves a lengthy search through local subsector records for evidence of criminal activities. Characters with records of violent crimes will be banned from holding import/export licenses. The local lifestyle is wealthy enough to support an interest in luxury goods. Perfumes, art objects, music, etc. will command high resale prices. The local culture is utterly uninterested in technology.

Banihani

Starport: A (Bu, Qu)

System mass: 2.5

Notes:

A crowded world with considerable local industry, Banihani has closed itself off to immigration. Ships are not allowed to directly interface with the planet's surface, and visitors are allowed on planet only on limited visitation visas. Unfortunately, the planet's rich lifestyle is quite attractive, so refugees feel it is their perfect choice for a new home. Unhappy with the crowded cities, a political splinter group of Bats are extremely keen to establish their own colony on a world with light gravity and breathable air. Although they can initially only offer 50 million for the task, they will arrange payment in ongoing deposits, hoping to find more funds as time goes by. The

group's leader, a skinny, haughty white female bat called Ch'iitra, is passionate enough about her vision to risk financing the venture through smuggling, illegal salvage and the hosting/resettlement of ILR refugees. Players might find themselves either asked to act as planetary survey scouts, or may find themselves somehow unwittingly involved in Ch'iitra's illegal activities.

Binary Bd 4521

Starport: N/A

System mass: 1 to 2.5

Notes:

A binary system used as a travel nexus, the system's mass varies depending on the configuration of the twin suns. As a simple rule of thumb, the suns have a four year cycle (the mass goes from 1 to 1.5, to 2, to 2.5, and then scales back down again).

Dahana

Starport: C

System mass: 1.5

Notes:

Dahana is a bustling, low technology world with an extremely varied population. Its main claim to fame is the Nuli tree, which bleeds a golden yellow sap. When hardened, this substance becomes exquisitely fragrant; it can be used for carvings, scent-jewelry and even decoration of houses. It's normal purchase price is 50,000 credits per ton. The wood itself is also exquisitely fragrant, and is worth 10,000 credits per ton. The growth and harvesting of Nuli groves is carefully managed in order to prevent the loss of this colorful local resource. The Unitrade company has purchased the sole right for the export of this valuable substance. While they allow other traders to sub-contract exports of Nuli resin, they impose a tariff of 1000 credits per ton on the material. Finding a clandestine source of resin, somehow evading customs inspection and sneaking quietly off without paying sub-contract export fees would obviously be an attractive proposition, were it not for the 1,000,000 credit fine that such activity can incur. The highest prices for Nuli resin would be from sale on Aooboochi. Aooboochi charges heavy taxes on the importation of organic products such as off-world resins.

Dethra - oonihan

Starport: A (Mil)

System mass: .5

Notes:

A matriarchy which is peopled by canine races - largely Foxes (antarctic, black and red), Jackals, Coyotes and Wolves. The planet's culture is organized specifically into clans, each ruled by its female members, who hold higher social status than males. All family reckoning is made through the female line, and females hold a majority of the positions of power. Unfortunately, they are brutally restricted by the expectations of their clans, and are married by arrangement to partners they may never have met, thus forming political bonds. Males

are somewhat more free in their choices of lifestyle. Dethra-oonihan is one of the few planets on which homosexuality is commonplace. In an environment of sexual segregation and restrictive relationships, a fair scattering of individuals seek love relationships within their own genders. Clan politics is a constant war of maneuver. Economic advantage and political domination is constantly sought after. The local beings wear extremely complex clothing which consist of boots, trousers and tunics, over robes, hats and ear bangles, all of which serve to identify the wearers' clan, rank and status (and also the number of children borne - a matter of some importance within the clan). A very arts-intensive culture has developed. Luxury goods are always welcome. Music, art and poetry are common export material. Medical engineering and psychological sciences are quite advanced, and a skilled trader might find local information resources that can make valuable trade goods. The local Homeguard is extremely well equipped. About 60% of its personnel are female. Some locals will wish to flee their clans, either for fear of arranged marriages or as a result of clan political conflicts. These passengers will be dangerous to transport, since they are refugees from clan law. Smugglers might be able to pick up business whisking away local females and their lovers (be they male or female!), or perhaps a terrified husband or two! Locals offering to work for free in return for passage off world might also be seeking escape from their home lives - so buyer beware! The penalties and fines for spouse smuggling run into multiple millions of credits.

Hlian System

Starport: N/A

System mass: 1

Notes:

Also nicknamed 'The Drift': An uninhabited starsystem used only as a jump point for the trade routes which lead into the Marni and Geelan subsectors. While passing through The Drift is the faster of the three main routes to these subsectors, this route misses the extra stopping points that allow the transfer of cargo and passengers - plus the extra fuel use makes this route passable only to longer ranged vessels. An attempt to open a refuelling station here before the first stellar war led to a minor battle being fought in-system between major ConFed and ILR task forces. The shattered, stripped remnants of this battle now float in the system's Lagrange points, giving the location its rather grisly name. See The Drift module for further details.

Kenken

Starport: C

System mass: 0.5

Notes:

A new colony which is in need of frequent transshipment of goods. Player ships will have no difficulty in securing contracts for 1000 to 3000 tons of 'hot' cargo. However, competition is beginning to appear; Unitrade will attempt to oust small traders from their cargo contracts by fair means or foul. An intriguing little organism native to Kenken is land coral

- a colonial microorganism which secretes silica to fashion tall columns of honeycombed rock. Feeding off windblown organic matter (which manifest themselves as fragrant pink clouds), these merry little blighters will quite happily colonize all sorts of interesting outcrops and surfaces - engine outlets, car bonnets, airport runways, etc. The only way to be rid of the creatures is to paint roads, vehicles and houses with a chemically treated paint which repels the land coral organisms. It is likely that unauthorized vehicles landing at Kenken will pick up an infestation of land coral. However, the coral has its attractive aspects. In the evenings, when the wind blows through the canyons, the coral outcrops make a low, melodious whistle or hum which is extremely pleasing to the ear. Kenken was insufficiently surveyed - a fact that is only now coming to light as roads and settlements are being built on unsound land. Players can possibly pick up contracts to prospect for potential mineral deposits or explore undiscovered terrain.

Lalaha

Starport: B (LW)

System mass: 1.5

Notes:

Home to a very 'briable' bureaucracy, this system is a common 'point of registry' for many of the more shady operators in the sector. Planetary culture stresses individual self reliance, making the place a near-anarchy. The active local free enterprise system is extremely competitive, and good prices are paid for innovative franchises and licenses. Likewise, intensive research is likely to yield some very useful industrial processes and product blueprints. The system is acting as the home base for the colonization of Xuxa. At some point during a player character vessel's visit, a crisis will erupt with the arrival of an emergency message torpedo from Xuxa. The Xuxa colony has been raided by pirates and has suffered damage to its life support systems. This requires immediate high speed delivery of 300 tons of life support equipment to the new colony. Players can snatch the contract for 300,000Cr to 500,000, and will be required to make an immediate high acceleration delivery. Wouldn't it be too bad if the pirates were still waiting at the other end of the jump...?

Olyani

Starport: A (Bu, Mil)

System mass: 1.5

Notes:

A self-important little port which is home to the local ConFed sector authority. Staunch ConFed loyalists, this planet was largely colonized by demobilized EDF military personnel and refugees from ruined worlds. Famed for love of form over function, the Olanji have developed from their inner ConFed roots into a surprisingly irritating culture. Democratic, regimented, social minded, they have tried their best to make themselves into a small scale model of an inner ConFed world. Unfortunately their isolation and the narrow cultural base of the original colonists has served to create a society which is far more bigoted and opinionated than the very

artistically minded inner worlds; On Olyani, most opinions are held to be absolutes. Travellers might find the locals somewhat brusque. Gor-Tech heads its operations from its offices on Olyani. The subsector ConFed governor secretly has shares in the company, linking him with the evil ConFed conspiracy of doom. The ILR is a specter of hate and suspicion to the inhabitants of Olyani.

Pxtl

Starport: C (Qu)

System mass: 0.5

Notes:

A dark world swept by rain and cloud, with a characteristic gloomy light which somehow artists find attractive. Pxtl has become home to a number of nocturnal species - possums, owls, Fennec and the like - who find the low light levels attractive. Pxtl supports an extensive ecology. Flat mats of purple-green lichen covers the soil, and tall spore stalks rattle in the breeze. Floating spheres - a migratory fungus - drift and roll across the landscape. A number of these plants have become the basis of medical drugs which are of great value as 'luxury goods'. Unfortunately, the microscopic flora and fauna of Pxtl is also virulent, adaptive and dangerous. Fungus

growths will infect virtually everything brought onto the planet, and retardants must be applied to delicate machinery. An extensive barrage of inoculations will be required for visitors - a treatment which takes a full week. Even so, parasitic fur fungi gives a greenish hue to the pelts of most local inhabitants. System quarantines are enforced for good reason. Aoochochi will definitely not accept shipments of goods from Pxtl, and will require decontamination of any vessel which has taken on cargo from Pxtl in the last 12 months. Unitrade were a major investor in the development of Pxtl's medical drug laboratories, and charge a 15% export tariff on all drugs, medical information and organic compounds.

Rhibis

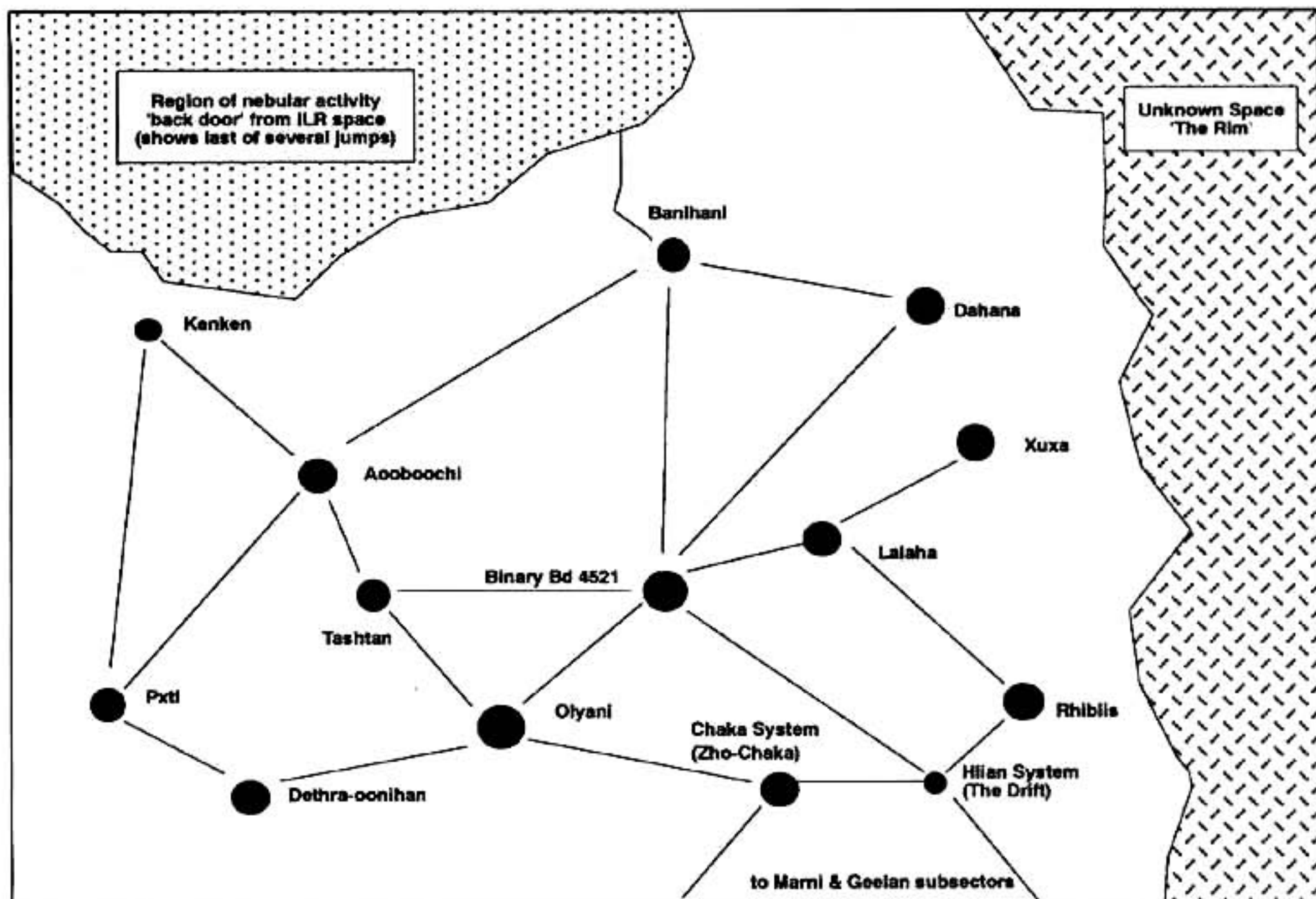
Starport: C (Tar)

System mass: 1

Notes:

An extremely parched and inhospitable world with constant dust storms and volcanic activity playing havoc with aircraft navigation and ground travel. A substantial deposit of rare minerals has led to the presence of a permanent mining base. This is a company-run planet. The police, judiciary, utilities and services are all funded and owned by Gor-Tech,

THE OLYANI SUBSYSTEM



Map NOT to scale

for use only in plotting 'safe' jumps for this campaign region

— = safe jump

a major mining consortium which has spread into this subsector. Bureaucratic, unfriendly to non-company personnel and relatively uncooperative, the system's government has no interests other than the extraction of capital from the planetary mines. Non Gor-Tech vessels which seek to unload goods, passengers or information here will be charged a 10% tariff by the company. For players of the *Zho-Chaka* scenario - this organization is one of the sub companies run by the cabal who is behind Zho-Chaka's troubles. Secret landings - secret prospecting on the planet is possible, but extremely skillful piloting will be needed to cope with the violent weather. The planet does have a functioning ecosystem, largely consisting of wind-blown floating plants, flat lichens and the swarms of flying insects who dine upon them. Still want to go there? Well, there could be reasons to go. Many specialists, miners and scientists signed work contracts to Gor-Tech, promising a number of years of faithful service. Due to the pestilential conditions on the planet, many of these residents would welcome the opportunity to be smuggled off world. Gor-Tech will attempt to impound the ship of any characters who are caught engaging in this illegal trade.

Tashtan

Starport: A (Mil) - or maybe not, depending on character actions!

System mass: 1.5

Notes:

A natty little system which is only just trying to struggle up out of its early colonization period. A period of building has led to a demand for off-world cargoes and raw materials - 'hot' and 'dead' cargo contracts to Tashtan are beginning to be offered from neighboring worlds. On the planet itself, all is in chaos. The local government is struggling to maintain its majority, having almost bankrupted itself in financing a new spaceport for the system. Virulent anti-ConFed sentiment threatens to topple the government. Since this threatens the EDF's investment in the A-Grade starport in Tashtan orbit, the ConFed is taking a keen interest in local politics. Hidden cabals would dearly love to take advantage of Tashtan's political chaos to win political and economic power in the system. Players of the Tashtan Station scenario in the *Albedo, 2nd Edition* rulebook may have had an adverse effect upon the local economy! If Tashtan Station was destroyed as a result of the scenario, then Tashtan will effectively be without a starport.

Xuxa

Starport: None

System mass: 1

Notes:

A system which lacks habitable worlds. Xuxa has recently been the site of a lucrative mineral discovery in a region of asteroids and cometary debris. A zero gravity colony has been established to exploit these new resources. Relatively new, the zero-gee habitats are still under construction. Regular consignments of building materials and life support essentials are needed in system; in return, valuable minerals are being shipped out. At some point after the beginning of the campaign, a pirate attack will be made against the Xuxa settlements, killing personnel and disabling vital life support equipment. These pirates are well equipped and merciless; they have actually been hired by Gor-Tech in an effort to destroy and bankrupt the current investment in Xuxa prior to a takeover bid. As an additional bit of fun, the pirates are all rabbits - part of a deception by Gor-Tech who can muddle the identity of the killers by casting suspicion on the ILR.

Zho-Chaka

Starport: B (RS)

System mass: 2

Notes:

A small planet with an active political life and a growing manufacturing capacity. Visiting Zho-Chaka can be both exciting and disturbing; local political enthusiasm extends to wild street rallies and the creation of uniformed para-military political organizations. The planet is currently in a state of political turmoil as free enterprise and socialized economic systems vie bitterly for supremacy. Civil war is a constant threat, and there may be considerable involvement of secret power cabals in Zho-Chaka's troubles. In order to help keep the peace, there is currently an embargo on the importation of weapons or weapons technologies to Zho-Chaka. However, local police will sometimes turn a blind eye to such imports (players of the Zho-Chaka scenario will soon discover why). Weapons can be sold at premium prices, provided consignments are hidden from EDF observers.

Sample Ship's Crewmembers

from the crew of the *Scurrilous Invertebrate*

These four crewmembers are selected to show personality types and conflicts and the wide variety of possible crewmembers for civilian ships!



Pilot - Sheddachi Toa

Race: Female Fennec Fox

Frame size: Small

Disposition: Irritable, Responsible.

Skills: Pilot (Adept), Zoology, Biology (adept), Medical.

Ties: Teela (3), Ferris (2), Noornal (1), The "Scurrilous Invertebrate" (2)

Antipathies: People who are more happy-go-lucky than her (2), Irresponsibility (1).

Special notes:

Sensitive to strong light, irritated by loud noise, Shedachi cannot abide the constant chatter of Teela and Ferris. Though she would struggle for them through thick and thin and would defend them to the death, they begin to wear more and more on her nerves with each passing day once cooped-up aboard ship. Forced to share a cabin with Teela, the bright light, incessant chatter and mindless girl talk almost always leads to fights before a voyage is over. Shenachi keeps pet insects in sealed cages in the cabin - Teela finds the bugs and arthropods extremely creepy.



Ship's negotiator/navigator - Teela Reenis

Race: Female Zebra

Frame size: Average

Disposition: Scheming, Talkative

Skills: Bargaining (adept), Assess personality (adept), Spin yarn (Adept), Navigation, Snitch, Streetwise

Ties: Shedachi (3), Ferris (2), Noornal (1), Boy-happy (1), Fashion (2)

Antipathies: Marriage (1)

Special notes:

Mistress of a thousand schemes, with little or no respect for authority, Teela is a mastermind at buying dodgy merchandise from the back of trucks, or finding passengers who want to pay top credits to be elsewhere (usually in a big hurry). Addicted to bright decor, flashy clothes, copious numbers of boyfriends and constant chatter, most people consider Teela to be extremely charismatic. Shedachi just simply considers her irritating - secretly cursing Teela's success record with males.



Engineer: Ferris na-fana Ferris

Race: Male Hyena

Frame size: Heavy

Disposition: Amorous, Greedy

Skills: Fusion engineering (Master), Scrounging, Music, Poetry, Mingle, Geology, Handguns (adept)

Ties: Shedachi (2), Noonan (2), Teela (2), "Golden opportunity" (3)

Antipathies: Unitrade Ptl Ltd (1), Authority (1),

Special notes:

Handsome, powerful, charismatic, and always scouting out 'sure-fire' opportunities for the crew to get rich quick, Ferris is an accident just waiting to happen. Always more 'knowing' than the people around him, he buys cheap parts for the ship in the sure knowledge that he has found the bargain of all bargains - despite repeated warning from the rest of the crew never to run around without a keeper again!

He considers 'the girls' (Teela and Shedachi) his little harem (although neither of them would sleep with him in a fit!) and introduces them as such at parties. Ferris considers himself to be a gifted musician and a poet. During his last musical performance, Teela feigned death as her only means of escape.



Systems engineer - Noornal Pipanya

Race: Male Feather glider (a small species of flying possum)

Frame size: Small

Disposition: Reserved, Timid

Skills: Starship systems engineer (Adept), Computer systems engineer (adept), Electronics (Adept)

Ties: Shedachi (3), Ferris (2), Teela (1), Obeys authority (1)

Antipathies: Litterbugging (1), Impoliteness (1),

Special notes:

The odd critter out in the crew - quiet, shy and always worried about the authorities, the state of the hull, possible food poisoning, viruses in the computers... He is a 'hand wringer' of the first degree, and is constantly dismantling things searching for the hidden fault he just *knows* is lurking out of sight.

Noornal has a prehensile tail equipped with a flat, feather like rudder, prehensile toes and gliding flaps stretching between wrist and ankle on each side of his body. As such, he gains a DRM of +2 in most Zero-G movement situations (where atmosphere is present). Essentially a nocturnal creature, Noornal is badly effected by bright light.

Noornal's environmental needs are similar to Shedachi's, up to a point; although their shared love of peace, quiet and low light levels would normally make them compatible cabin mates, Noornal clearly has a quiet, yearning crush on Shedachi. Since Shedachi finds Noornal's paranoias EXTREMELY annoying, she is forced to share a cabin with Teela.

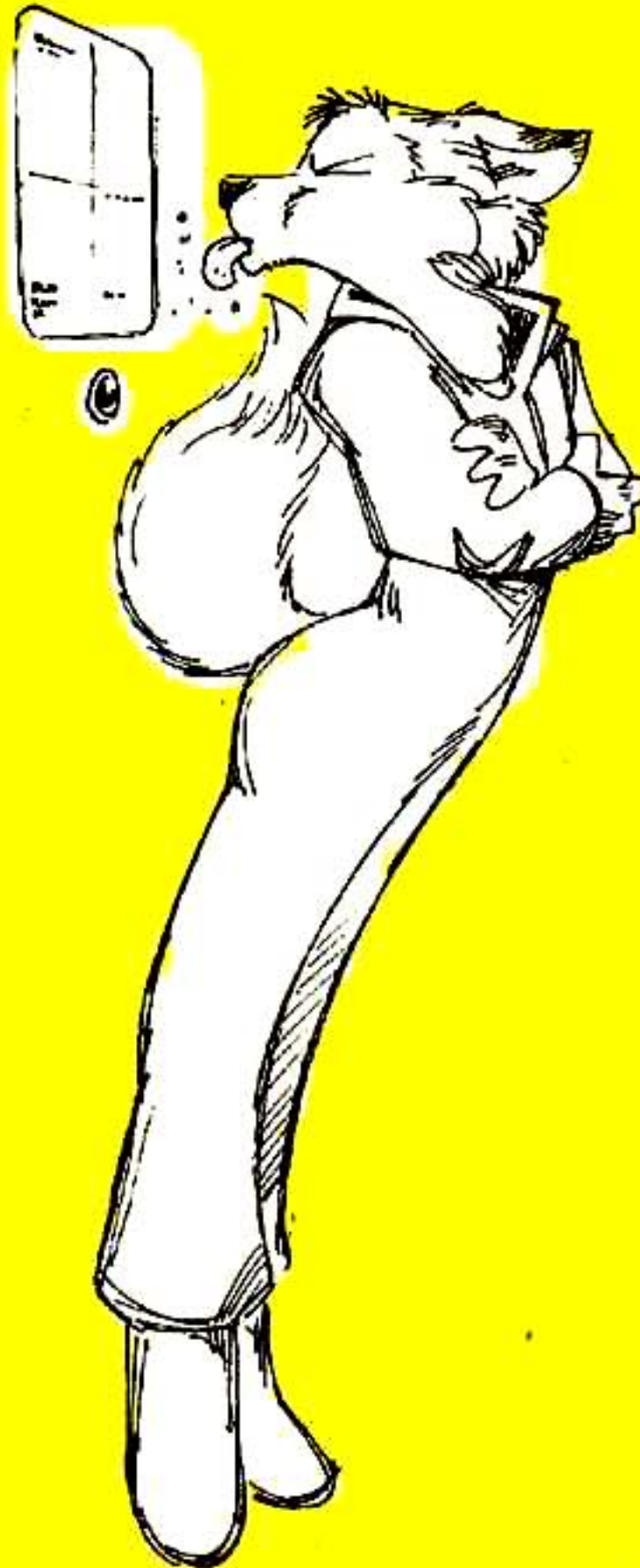
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Price: \$14.00
Stock Number: CHX 8901
ISBN: 1-883240-14-X



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