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High Guard III

TRAVELLER®

Science-Fiction Adventure
In the Far Future

Donald McKinney

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High Guard III

by Donald McKinney
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Starships

In order to promote a clearer understanding of starship operations, design, combat, and movement, the following synopsis shows how such events occur.

DEFINITION OF COMMON TERMS

The following definitions apply to starships and small craft.

Craft. Any transportation unit is a craft. Craft may be any size, and either vehicles or spacecraft.

Vehicle. Any craft designed for exclusive use on a world or in its atmosphere. This includes ground cars, ATVs, watercraft, aircraft, air/rafts, etc.

Spacecraft. Any craft not dependent on a world is called a spacecraft. Spacecraft can be small craft or large craft.

Small Craft. Any spacecraft under 100 tons in size.

Large Craft or Vessel. Any spacecraft of 100 tons or more. Large craft may be non-starships or starships.

Non-Starship or Space Ship. Any large craft equipped with a maneuver drive but not a jump drive.

Starship. Any large craft equipped with a jump drive.

The following terms are common to all craft types.

EP. A craft's power is measured in energy points (EPs).

Cost. Cost is usually expressed in credits (Cr). However, in the interest of saving space, some costs for very expensive items are expressed in megacredits (MCr). A megacredit is one million (1,000,000) credits.

Tons. The unit of volume of spacecraft. One ton is approximately the volume of water displaced by 1,000 kilograms of liquid hydrogen; by convention, 14 kiloliters. Displacement tonnage is not to be confused with the craft's mass in metric tons. A starship that displaces 100 tons may actually mass over 1,000 metric tons.

Volume. A craft's volume is the amount of space it takes up. Volume may be measured in tons (displacement tons) or kiloliters (one kiloliter equals one cubic meter).

Mass. A spacecraft's mass is measured in metric tons. One metric ton equals 1,000 kilograms. Mass is not to be confused with weight. A spacecraft with a mass of 1,000 metric tons has the same mass in deep space or on the surface of a planet with 'normal' (1G) gravity, or on the surface of a planet with high (e.g., 2G) gravity. This spacecraft is weightless in deep space, but weighs 1,000 tons on the surface of a planet with 1G gravity, and weighs 2,000 tons on the surface of a planet with 2G gravity.

TECHNOLOGY

Traveller makes certain assumptions about the nature of future technological developments. In addition to the progressive refinement of existing equipment and methods, several areas of future technology have been postulated. **Traveller** bases its technology on a series of logically explainable developments even if they may be far beyond any present science.

The first major advance upon which **Traveller** technology is built is the commercially viable fusion reactor. A cheap, abundant and long-lasting source of fusion power has some far-reaching effects on all areas of technology, and it tends to force all other means of power generation into the background.

About the only limit to the fusion power plant is its sheer size. Where portability becomes a significant factor, fuel cells or batteries become the power source of second choice. Above **Traveller's** common tech levels (late Tech Level 16 and beyond), antimatter power generation moves to the forefront and power generation makes yet another order-of-magnitude leap in output per unit of power plant volume. The staggering levels of energy available from antimatter annihilation allow manipulating the environment in near magical ways (by today's terms).

The second major breakthrough is artificial gravity. Created by manipulating sub-atomic forces, artificial gravity is not anti-gravity but is instead a unique force that acts upon the natural gravity field created by all matter. Artificial gravity can be made to either push or pull. Because of its nature, artificial gravity is not a very efficient means of locomotion in deep space where there are no strong gravity wells against which to push.

A third major breakthrough related to artificial gravity is damper technology. Nuclear dampers interfere with sub-atomic nuclear forces: when a nuclear warhead passes through a damper field, the

warhead sheds neutrons at very low energies, which renders the warhead harmless after a very short exposure. Nuclear dampers can also work in reverse to prevent nuclear decay.

The fourth significant development came from the search for a starship maneuver drive that did not lose efficiency when away from a strong gravity well. Artificial gravity and damper technology led to yet another sub-atomic force-based technology. This new, artificially generated force pushes against a vessel's "thrust plates" themselves, which make true reactionless thrusters a reality for starship-sized vessels.

The fifth major area is meson technology. Meson devices make use of the properties of the sub-atomic particle called the pi neutral meson. Mesons have short lives, which can be prolonged to precise duration by accelerating them to relativistic speeds. Because mesons do not interact with any other types of matter, they can pass through other matter without resistance.

Mesons are created by the collision of an electron and a positron in the converging beam created by two particle accelerators. In a meson gun, the mesons are manipulated to decay inside the target, where they release high energy and radiation. In a meson communicator, a much smaller meson package travels from the transmitter to the receiver, where a special meson screen causes the meson package to decay. The beam carries a signal by amplitude modulation.

MOVEMENT

Starships move through ordinary space using maneuver drives. Power for the maneuver drives is provided by the starship's power plant, which must have a factor equal to or exceeding the factor of the maneuver drive. Tech level requirements for maneuver drives are imposed to cover the grav plates integral to most ship decks, and which allow high-G maneuvers while interior G-fields remain normal. Fuel consumption for maneuver drives is inconsequential, and is assumed part of the power plant consumption, regardless of the degree of maneuver undertaken.

Starships move across interstellar distances using jump drives. Jump distances are calculated in parsecs (3.26 light-years), which is the scale of the subsector grid mapping hexagons. Jump-1, for example, indicates the ability to jump one parsec, or one hex. Jump numbers range from 1 to 6; higher jump numbers are not possible in ordinary usage, although misjumps can carry ships over greater distances. Any jump, regardless of number, takes approximately 1 week (6 to 8 days); ships in jump space are untouchable and cannot communicate with other ships or stations. Although jumps are usually made at low velocities, the velocity and vector which a ship held prior to jump (relative to the nearest large mass, such as a planet) is retained when it returns to normal space (relative to the nearest large mass at that location).

Because of the delicacy of jump drives, most ships perform maintenance operations on their drives after every jump. It is possible for a ship to make another jump almost immediately (within an hour) after returning to normal space, but standard procedures call for at least a 16 hour wait to allow cursory drive checks and some recharging. Most commercial vessels spend 1 week between jumps, using the time to maneuver to a world, land, unload cargo and load new cargo, and maneuver away from the world for the next jump.

Fuel used for ships is hydrogen, which is available in the atmospheres of gas giants (similar to Saturn or Jupiter) or from oceans of water. Fuel is gathered from gas giants by dipping or skimming, a process which involves diving into the atmosphere and opening fuel scoops. Such a maneuver is possible for streamlined and airframe hulls (configurations 1 to 6). Large ships often carry streamlined fuel tankers which can skim fuel and return it to the unstreamlined parent ship. Water may also be used to provide hydrogen; it is available on any world with a hydrographics percentage of 3+ (lower hydrographic percentages require effort and referee control). Water is dipped from oceans by ships landing in the body of water and opening fuel cocks, or through the use of fuel shuttles. Fuel which is skimmed or dipped is unrefined, and may result in misjumps; fuel purification plants can convert such unrefined fuel to refined fuel for safe use.

Any ship of configuration 1 to 6 can land on a world with an atmosphere 0 or 1; for all other worlds, streamlining is required. Streamlined craft may skim gas giants for fuel. Irregular structures and planetoids cannot land on any world. Worlds with class A or B starports or with naval or scout bases present have

orbiting stations which serve as ports for unstreamlined ships. They also provide shuttle service to the world surface.

WEAPONRY

The types of weaponry available to starship and space combat call for a complex interaction between weapons and defenses.

Offensive weapons include lasers (pulse and beam), energy weapons (plasma and fusion guns), particle accelerators, meson guns, missiles, disintegrators, tractors and jump projectors.

Lasers fire concentrated light energy in beams or pulses against enemy targets and cause damage to exterior surfaces.

Energy Weapons (which include plasma guns and fusion guns) fire a highly energized beam of ionized gas at the target; with the fusion gun, this gas actually proceeds to fusion. Energy weapons inflict surface damage.

Particle Accelerators charge and accelerate electrons or hydrogen nuclei to high velocities toward targets. Hits produce surface damage and radiation effects.

Meson Guns create high-energy mesons and direct them at a target. Mesons have short lives, which can be prolonged to precise duration by accelerating them to relativistic speeds. If the point of decay is manipulated to occur inside the target ship, the result is interior explosions and radiation damage. Because of the nature of the meson, it can pass through armor and matter without resistance.

Missiles are available in three types: explosive, nuclear, and antimatter. Explosive missiles produce surface damage, while nuclear and antimatter missiles produce surface damage and radiation effects.

Tractors are large, focused anti-grav attractors which restrict agility when directed at other craft. Tractors may also be used defensively as repulsors.

Disintegrators disrupt the strong molecular attraction that holds matter together, causing an object's molecules to fly apart.

Jump projectors induce a jump field around the target, causing it to misjump.

Defenses may be divided into active and passive defenses. Active defenses (which must target specific attacks) include offensive weapons such as lasers and energy weapons, and defensive weapons such as sandcasters and repulsors. Passive defenses (which protect against all applicable attacks when turned on) include screens such as meson or proton screens, nuclear dampers, and globe generators, and construction considerations such as configuration and hull armor.

Lasers can be used in the anti-missile role.

Energy weapons (plasma and fusion guns) can be used in the anti-missile role.

Sandcasters project a granular agent which obstructs light; when fired it interferes with incoming missile, laser or energy weapon fire.

Repulsors are large focused anti-grav projectors. When directed at incoming missiles, they deflect them away from their target.

Meson screens project an interruption of the strong nuclear force, prematurely causing decay of incoming mesons.

Nuclear dampers project a series of nodes and anti-nodes where the strong nuclear force is enhanced or degraded, rendering nuclear warheads ineffective and interfering with disintegrators. *Proton screens* disrupt antimatter missiles in a similar fashion.

Black globe generators project a barrier which absorbs all energy, shunting it to on-board capacitors. The barrier prevents all transit across it, and a ship with its black globe on cannot maneuver, fire its weapons, or communicate. In addition, the field may be overloaded, causing the failure of the storage capacitors and destruction of the ship. *White globe generators* work like black globe generators, but allow the ship to fire, communicate, use sensors, and maneuver.

PROCEDURES

Naval vessels generally operate in task forces or squadrons, rather than alone; the merits of each individual ship supplement and complement the others in company with it,

Carried Squadrons: One technique used is the construction of tenders or carriers— single large ships which carry well-armed smaller craft which actually do the fighting when battles are joined. When the craft being carried are in the ten to thirty ton range, the ship is a fighter carrier. When the ships being carried are in the 10,000 ton range, and the large ship is 200,000 tons or more, the ship is called a tender or transport.

The points of greatest danger to carried squadrons are immediately prior to jump (when the craft or ships have been recalled) and just after returning to normal space (when the craft have not yet been launched).

High Guard: Refueling operations for a task force are another danger point, as forces which are low on fuel and maneuvering in a gravity well are especially vulnerable. The high guard position, so named because the ship or ships involved are higher in the gravity well than their companions, is used to mount protective operations during such maneuvers.

SQUADRON CONCEPTS

When a squadron is being designed, the overall plan must take into account more than the qualities of the individual ships. It must deal with the way in which each of those ships interacts with the others for the best possible organization.

The following are some suggestions intended to fire the imagination.

Fleet Tenders: For any given ship tonnage, a ship which is not burdened with jump drives and jump fuel can be better armed and armored than a ship which must carry those jump drives. The concept of fleet tenders takes advantage of this fact. A fleet tender is a large jump-drive equipped ship which carries several large craft, each of which is well armed, well armored, and usually fitted with high acceleration maneuver drives.

Fleet tenders are generally produced with irregular structure hulls (configuration 7) in order to allow simultaneous launch of all craft carried immediately as the ship arrives in a system. Since the tender cannot skim gas giants for refueling, the ships it carries must contain sufficient fuel tankage to refuel the tender in a reasonable time; often they must be streamlined to allow them to gather fuel from oceans if there is no gas giant in the system they move to.

Example: One jump-4, configuration-7, fleet tender massing 200,000 tons. Approximately 100,000 tons of the ship is free to carry fighting ships; this tonnage is allocated to hold ten 10,000-ton battleships built around a primary meson gun, 6-G maneuver drives, and the best computers available.

Fleet Carriers: The presence of a great many small craft such as fighters may be used as a screen to protect a larger ship in battles. Thus, a ship may be a fighter carrier which helps transport many small craft to the scene of battle.

Example: One 100,000-ton fighter carrier capable of jump-4 and 6-G maneuver has approximately 20,000 tons available for small craft. Assuming a fighter size of 20 tons, the ship could carry up to 75 ten-ship squadrons.

Planetoid Ships: The inexpensive nature of planetoid ships would appear to be the first attraction of this particular type of vessel. Planetoids, however, provide other benefits, including relatively inexpensive, although bulky, armor protection (especially for buffered planetoids).

SHIP TYPES

The Imperial Navy acknowledges five broad ship types in its service: scouts, escorts, cruisers, carriers, and battleships. Each type has its own function within the overall mission of the navy.

Scouts: The Scout Service controls a wide variety of craft up to cruiser class, but scouts proper are vessels up to 200 tons designed for exploration, survey, and courier work. They are transferred to naval duty in time of war or when otherwise necessary. Many scout ships are couriers for the navy.

Escorts: Escorts are starships of up to 5,000 tons, and are meant to be light support craft for larger ships, primarily cruisers. They are capable of independent action, but are usually assigned to support battleships and cruisers. Escorts are also widely used for convoy protection and commerce raiding roles.

Cruisers: Cruisers are the smallest ships to carry the large spinal weapons needed to cause serious damage to a large armored ship, although most are too lightly armored to stand in the battleline. To unarmed, unarmored ships, this difference is negligible, since a cruiser can easily attack and destroy any noncombatant ships. Cruisers are assigned to support battleships and carry combat to areas where a battleship is not considered necessary. They form the cadre of commerce raiding task forces and provide fire support for planetary invasions. Sizes range from 20,000 to 100,000 tons. Cruisers serving with a battle fleet are generally grouped in cruiser squadrons (CruRons) of from four to eight ships, while individual ships or pairs of cruisers are used to form the hard core of scouting or raiding groups.

Carriers: Carriers are designed to carry large numbers of small combat craft, termed either fighters or system defense boats, for use in the screen of the battle fleet or in support of a planetary invasion. Given the limited weaponry of fighters and light boats, they are little more than an annoying distraction in a major fleet action, but they can be extremely effective against ships of cruiser class or less.

Battleships: As their name suggests, battleships are jump-capable vessels which are, due to their armament and protection, capable of standing in the battleline. When a battleship meets any lesser type of ship, its victory is almost guaranteed. When battleships on two sides meet, victory goes to the better-armed, better armored, and better-directed ship. While battleships (or, as they are often called, dreadnoughts) generally have little better in the way of primary armament than cruisers, their extensive secondary batteries render them virtually immune to missile and small craft attack while their bulk provides a tremendous ability to absorb damage and keep fighting.

The broad type of battleship is further divided into many more clearly defined types. Besides battleships, there are dreadnoughts, battle riders, and battle tenders.

Dreadnought: A dreadnought is a superbattleship, designed to be the best possible battleship. The Imperial Navy places the dreadnought designation on its latest, most-effective battleships, redesignating them battleships when their superior abilities are supplanted by newer construction.

The concept of dreadnought does not mean that battleships are not built as well. Due to the expense of dreadnoughts, the Imperial Navy also acquires battleships as such.

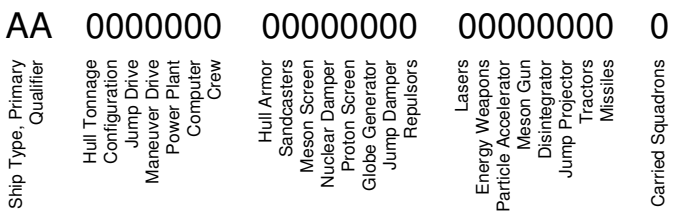
Battle Rider: A battle rider is a non-jump-capable vessel which is otherwise armed and armored like a battleship. By eliminating the jump drives and their associated controls and power plant support, the internal space they would occupy may be allocated to additional armor, weaponry, or agility. Of any two vessels of equal tonnage, a battle rider (which is not burdened with jump drives and required jump drive support) would logically be superior to a jump-capable battleship.

Battle Tender: A battle tender is a ship designated to carry battle riders into battle.

Other Vessels: the Imperial Navy deploys a wide variety of supporting ships and boats. Many do not fit into the five categories presented above, and they are commonly classed as auxiliaries.

THE UNIVERSAL SHIP PROFILE

The following breakout of the Universal Ship Profile (USP) shows the meaning of each position within the data string.



Letter Codes Beyond 9: When dealing with values greater than 9, **Traveller** makes extensive use of hexadecimal notation; the letters A through F are used to represent the values 10 through 15 in the base 16 number system. However, in many instances in *High Guard*, values beyond 15 (F) are called for; for

example, when the number of batteries available on a ship exceeds 15, number values must be assigned to letters higher than F. The following table indicates the corresponding values and letters used in this work. Because the letter I and the letter O can be confused with the number 1 and the number 0, they are omitted. Using this table, values up to 33 can be expressed.

LETTER VALUES FOR USE WITH TRAVELLER

Letter	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	G	H
Value	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Letter	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Value	n/a	18	19	20	21	22	n/a	23	24	25	26	27	28	29	30	31	32	33

In cases where values greater than 33 are called for, it is possible to redefine letters toward the end of the alphabet as necessary. Within this work, such redefinitions are shown in the Universal Ship Profile. For example, if it is necessary to express the values 40 and 50 when showing the number of batteries, the USP will show (Y=40. Z=50.) to indicate the redefinition of those particular letters. All non-redefined letters in the USP remain as shown in the table above.

Construction

The fighting starships built and operated by the navies of the galaxy range in size from one hundred to one million tons and represent the most potent weapons available to any government, corporation, or individual.

STARSHIP DESIGN

Starships are designed by navies, corporations and individuals using their own specifications to produce the exact type of ship desired; contracts are then let, and construction begins.

Design: A navy can issue a specification for a naval vessel within approximately eight weeks of authorization to procure. Plans for a new ship-class require four weeks before construction may begin (and may be made up long in advance). Corporations and individuals must obtain the services of a naval architect (who charges 1% of the final ship cost), who prepares the final plans and specifications from which the shipyard works.

A shipyard will insist upon a 20% down payment with the order for the vessel, as well as requiring a demonstration that proper financing is available to cover the balance when due.

Availability: Starships (with jump drives) may be constructed at the shipyard of any class A starport; non-starships (without jump drives) may be constructed at the shipyard of any class A or class B starport.

Tech Level: Tech Level is important in the design of a ship because it governs where the ship may be produced, and how well the crew can operate and maintain it. The Tech Level of the building shipyard determines the Tech Level of the ship being constructed (a class A starport on a tech level 14 world constructs a tech level 14 ship). Equipment and components of a starship may always be equal to or less than the ship's tech level.

The Imperial Navy may procure ships of up to tech level 15, although it also procures vessels at tech levels 10 through 14. A subsector navy may procure ships at any shipyards within its borders. A planetary navy may procure ships at any shipyard within the borders of its subsector; alternatively, a planetary navy may construct ships on its planet, using local resources, even if a shipyard is not present.

Construction Times: Time required for construction varies by ship tonnage, according to the Construction Times table. For tonnages other than those given on the table, the referee should round to the nearest quantity or interpolate. Construction times are given in weeks. For simplicity, a ship is not usable for any purpose until it is completed.

CONSTRUCTION TIMES

Tons	*Weeks*
0—50	24
51—80	32
81—100	40
101—200	48
201—400	64
401—600	96
601—800	112
801—1,000	120
1,001—5,000	144
5,001—10,000	160
10,001—20,000	174
20,001—50,000	192
51,001—100,000	208
100,001—200,000	224
200,001—500,000	232
500,001—1,000,000	240

A number of factors may speed up construction; these are expressed in terms of the extra percentage of a week's work that can be finished in one week. For example, if rate increases totaling 30%

apply, then 130% of a week's work will be done that week, counting as 1.3 weeks off the construction time. The largest possible increase is 100%, or two weeks' work done in one week. There are three factors capable of speeding construction. These are:

1. If the ship is not the first ship built in its class (i.e., it satisfies the requirements to cost only 80% of its face value): +25%.

2. If double the ship's tonnage in yard capacity is assigned to it during the week (extra workers and equipment): +40%.

3. For every extra 10% of the unmodified weekly construction cost (see below) that is paid: +10%.

Construction is paid for every week. To find the unmodified weekly cost, divide the total ship cost by the construction time given on the table. After all time modifiers have been determined each week, multiply the weekly cost by the work done; for example, if 1.3 weeks' worth of construction have been done, pay 1.3 times the unmodified weekly cost. Speed-up payments (as in 3 above) are in addition to the weekly cost.

Ship Classes: Once a ship is built, the building crews gain a certain familiarity with the requirements of construction, and *a* shipyard can then produce such ships more rapidly and with greater efficiency. Additional identical ships built following the initial ship in a class can be completed in 80% of the original time at 80% of the original construction cost.

Ships of a class are named to show this relationship. For example, the first ship in a series of small, swift escort vessels might be called the *Gazelle,* prompting the formation of the *Gazelle* class of close escorts. Other ship names in the class could be *Reindeer, Kudie* (for *Kudebeck's Gazelle), Antelope, Unicorn, Pinto,* as well as any of the many other names for swift herbivores.

SUMMARY OF SHIP DESIGN

The following procedure is used when designing a ship; more detailed and specific coverage is provided later in this chapter.

The tech level of the building shipyard is determined. A hull is selected and a configuration specified. The hull may be constructed of metal or it may be made from a hollowed-out planetoid. Configuration indicates the shape and degree of streamlining the hull demonstrates.

Maneuver drives and power plants are installed; if the ship is to be interstellar, jump drives must be installed.

Fuel requirements for the ship, based on its installed drives and tonnage, are determined, and fuel tanks are allocated. It is possible to specify fuel scoops for gas giant skimming refueling, a fuel purification plant to allow use of such unrefined fuel, and drop tanks to increase range of jumps.

The bridge is allocated and the ship's computer is determined.

The hull may be armored through the addition of stronger material.

Weaponry is selected and installed. If desired, one spinal mount may be procured for attacks of the greatest possible power. Weapons bays may be installed. Turrets may be installed. Screen protection may be available.

Ship's vehicles may be selected, including planetary craft, small craft, and large craft. Launch facilities are indicated for ship's vehicles, as needed.

The ship's crew is determined and quarters are allocated for them. Ship's troops and frozen watches may also be specified.

Other aspects of the ship are allocated, such as cargo space, passenger accommodations, low berths and emergency low berths, laboratories, special installations, extra capacitors, or unusual items.

Finally, the figures are analyzed to insure that the project has not exceeded hull capacity and that it has not gone over budget or violated tech level requirements. The various factors for the ship are entered in the Universal Ship Profile and a Ship Information Form is obtained for use in space combat, should that become necessary.

Non-starships (ships without jump drive, and massing 100 or more tons) are designed in much the same manner as starships; small craft (without jump drives and under 100 tons) follow a slightly altered procedure explained in the small craft section.

BASIC STARSHIP COMPONENTS

The following components are basic to any starship.

Preliminaries: The ship name and ship class must be decided upon. The tech level of the building shipyard must be determined (specified by the referee, determined by the navy involved or by the world the procuring individual is presently on). Precise ship type should be decided.

SHIP TYPE CODES

	Primary		*Qualifier*
A	Merchant	A	Armored
B	Battle	B	Battle, Boat
C	Cruiser, Carrier	C	Close, Colonial
D	Destroyer	D	Destroyer
E	Escort	E	Escort
F	Frigate, Fighter	F	Fast, Fleet, Frontier
G	Gig, Refinery	G	Gunned
H	Hunter	H	Heavy
J	Intruder	J	Imperial
K	Pinnace	K	Courier
L	Lab, Corvette	L	Leader, Light
M	Merchant	M	Missile
N	Ferry	N	Non-standard
P	Planetoid	P	Provincial
Q	Auxiliary	Q	Decoy
R	Liner	R	Raider
S	Scout, Station	S	Strike
T	Tanker, Tender	T	Troop, Transport
U	Tug	U	Unpowered
V	Carrier	V	Carrier, Vanguard
W	Barge	W	Slow
X	Express	X	Alternate
Y	Yacht	Y	Shuttle, Cutter
Z	Special	Z	Experimental

TONNAGE

Factor	*Tonnage*	*Crew Sections*
0	1—99	1
1	100—199	1
2	200—299	1
3	300—399	1
4	400—499	1
5	500—599	1
6	600—699	1
7	700—799	1
8	800—899	1
9	900—999	1
A	1,000—1,999	2
B	2,000—2,999	3
C	3,000—3,999	4
D	4,000—4,999	5
E	5,000—5,999	6
F	6,000—6,999	7
G	7,000—7,999	8
H	8,000—8,999	9
J	9,000—9,999	10 (A)
K	10,000—19,999	11 (B)
L	20,000—29,999	12 (C)
M	30,000—39,999	13 (D)
N	40,000—49,999	14 (E)
P	50,000—74,999	15 (F)
Q	75,000—99,999	16 (G)
R	100,000—199,999	17 (H)
S	200,000—299,999	18 (J)
T	300,000—399,999	19 (K)
U	400,000—499,999	20 (L)
V	500,000—699,999	21 (M)
W	700,000—899,999	22 (N)
X	900,000—999,999	23 (P)
Y	1,000,000	23 (P)

THE HULL

The foundation of the starship is the hull, into or onto which all other components are placed. Hulls are identified by their volume (expressed in tons; one ton equals 14 cubic meters) and by their configuration.

Hull tonnage for both metal hulls and planetoids is expressed as a code given on the tonnage table. The table shows the number of crew sections for a ship of the given size. Each specific tonnage level includes all values between it and the next highest stated level, as shown above.

Configuration: Configuration is a rough description of the shape and design of the starship hull. It affects combat and determines the streamlining of a ship. Small craft may not use any planetoid configurations (configurations 8 and 9).

It is possible to select a planetoid as a hull, hollowing out spaces within it for drives and equipment. Such planetoids are generally available for the finding. However, a planetoid must allow 20% waste space (tonnage) for structural integrity; a buffered planetoid has greater ability to withstand combat damage, but must allow 35% interior waste space. Although a planetoid is essentially free, there is a cost of for fusion tunneling and hollowing of passages and compartments. In addition, there is a transportation charge to bring the planetoid into orbit above the shipyard. These are factored into the costs below.

Determine the ship's hull size and configuration; the base cost of a hull per ton is given in MCr below.

CONFIGURATIONS AND STREAMLINING

Factor	*Configuration*	*Description*	*Stream*	*Cost/Ton*
0	Open Frame	An open skeletal frame with no exterior covering.	USL	Cr50,000
1	Needle/Wedge	A long, pointed exterior with few square edges.	SL	Cr120,000
2	Cone	An oblong rounded exterior with few square edges.	SL	Cr110,000
3	Cylinder	An oblong rounded exterior with square-edged ends.	PSL	Cr100,000
4	Close Structure	A square-edged exterior with few rounded edges.	PSL	Cr60,000
5	Sphere	A ball-shaped exterior.	PSL	Cr70,000
6	Flattened Sphere	A half-sphere or disk-shaped exterior.	SL	Cr80,000
7	Dispersed Structure	A dispersed, modular exterior, which is not clearly definable as any one of the other possible configurations.	USL	Cr50,000
8	Planetoid	A metallic or rocky hollowed-out asteroid.	USL	Cr900
9	Buffered Planetoid	A metallic or rocky asteroid given an extra thick hull by hollowing out less of the interior.	USL	Cr750

Streamlining: The form of streamlining a ship has is determined by its configuration. The forms of streamlining are defined as follows:

Unstreamlined (USL): Unstreamlined ships cannot normally operate in atmospheres 2+ (or in gas giants), cannot take off in such atmospheres and automatically suffer a roll on the Critical Hit table when landing in such an environment, unless completely prevented from the attempt due to the world's gravity (see below). Unstreamlined ships cannot skim gas giants for fuel or refuel from oceans. Unstreamlined ships can land and take off from vacuum worlds (atmospheres 0-1), subject to gravity limitations.

Partially Streamlined (PSL): Partially streamlined ships are limited to a top speed of 300kph (regardless of maneuver factor) when operating in atmospheres 2+ and skimming gas giants, but may take off or land unless further restricted by the world's gravity (see below). They cannot refuel from oceans. Partially streamlined hulls may be designed as streamlined for an additional Cr50,000 per ton cost.

Streamlined (SL): Streamlined ships are limited to a top speed of 1,000kph (regardless of maneuver factor) when operating in atmospheres of 2+ or skimming gas giants, but may refuel from oceans, and take off or land unless limited by the world's gravity (see below). They are unhampered in vacuum atmospheres (0-1), subject to gravity limits.

Airframe (AF): Streamlined ships may be designed as airframes at an additional cost of Cr50,000 per ton. Ships designed as airframes are designed for maximum performance within an atmosphere, as shown in the table below:

AIRFRAME TOP SPEED IN STANDARD ATMOSPHERES

Maneuver Factor	1	2	3	4	5	6
Top Speed (kph)	1,200	2,120	2,850	3,400	3,840	4,200

Speed: A craft's streamlining affects its speed when operating in a standard atmosphere (6-7). Other atmospheres affect the craft's speed as follows:

Vacuum Atmospheres (0-1): Uses Maneuver drive movement except for NOE.

Very Thin Atmospheres (2-3): Use standard atmosphere speed x2.

Thin Atmospheres (4-5, F): Use standard atmosphere speed x1.5.

Dense Atmosphere (8-9): Use standard atmosphere speed x0.75.
Very Dense Atmosphere (D): Use standard atmosphere speed x0.25.

The limit for nap-of-the-earth (NOE) speeds is based on the TL of the craft's bridge (where the avionics controls are). The NOE top speed for craft with no bridge is 40kph. For craft with bridges up to tech level 16, the NOE top speed is 40 kph plus 10 kph per TL (for example, 160kph at TL 12). The NOE top speed craft with bridges of tech level 17 and higher is 200 kph plus 50 kph per tech level above 16 (for example, 300 kph at TL 18). If top speed is lower than NOE (such as in a Very Dense atmosphere), use the top speed instead.

Landing and Gravity: Regardless of streamlining, ships with a Maneuver factor of 0 cannot land or take off of any world. Ships with Maneuver factor-1 may be able to land or take off from worlds of size 7 or less, depending on hull configuration. Ships with Maneuver factor-2 may be able to land or take off from any world, depending on hull configuration.

Armor: Hulls may be armored with strengthened exterior skins and interior bracing. When armor is used, the entire hull is armored. Such armor is not possible on ships with an open frame or irregular structure (configurations 0 and 7); open frames and irregular structures cannot be armored, and have an armor factor of zero.

The value of armor added to a hull for a ship may not exceed the ship's constructing tech level. The only exception to these limits is in the case of planetoid hulls; an automatic hull armor factor is already present in such hulls, 3 for planetoids; and 6 for buffered planetoids.

As a result, at any specified tech level, planetoid armor may exceed its Tech Level by 3 and buffered planetoids may exceed their Tech Level by 6. For example, a buffered planetoid already has an armor factor of 6. If that ship were to be constructed at tech level 15, then it could add up to 15 factors of armor to its hull. The resulting planetoid ship could conceivably have an armor factor of 21 (6 + 15).

HULL ARMOR TABLE

TL	*Type*	*Description*	*%Ship*
7	Composite Laminate	A composite metal-ceramic hull.	4 + 4*a*
10	Crystaliron	Ferrous hull using metal with perfect crystal structure and carefully controlled impurities in order to gain maximum hardness and toughness.	3 + 3*a*
12	Superdense	A hull that has had its molecular structure partially collapsed in a massive artificial gravity field (such as might be encountered in a white dwarf star), which increases its density and strength.	2 + 2*a*
14	Bonded superdense	Superdense armor with a small induced electronic current to strengthen the internal electron bonds which further increases the hull strength.	1 + 1*a*
17	Coherent superdense	Bonded superdense armor dynamically manipulated by input from the sensors and the computer so as to polarize the subatomic forces in the hull molecules, thereby presenting maximum penetration resistance to the specific striking weapon.	0 + 1*a*

%Ship indicates percentage of ship tonnage required for armor (*a* is desired armor factor).
Armor Cost is MCr 0.3 + 0.1*a* per ton of armor installed.

The armor factor is the value of armor added to the hull; if no armor is selected, the armor factor in the USP is zero. The armor table indicates formulae for the computation of armor tonnage and cost, based on the factor selected. For example, the formula at tech level 9 is 4 + 4*a* (*a* is armor factor). On a 100-ton ship with an armor factor of 3 at TL 9, this formula indicates that the ship must allocate 16% (4 + 4 x 3), or 16 tons. Cost is MCr 0.3 + 0.1*a* per ton of armor installed; the cost per ton is MCr0.6 (0.3 + 0.1 x 3), or MCr9.6 (16 tons x MCr0.6) total for the ship.

DRIVES

Three types of drives are required for starships—maneuver drives, power plants, and jump drives. Non-starships may omit the jump drives. Some ships (such as express boats) omit the maneuver drives.

All ships require power plants. Custom-built drives must be produced and installed while observing restrictions as to tech level and interior space.

The Drive Potential table indicates the percentage of interior space required for a specific maneuver or jump drive. The Drive Tech Level table indicates the minimum tech level required to construct the specified maneuver or Jump drive. The Drive Cost table indicates the cost (in millions of credits) to produce the specified drive, per ton of drive.

DRIVE POTENTIAL

	Drive Factor						
	1	*2*	*3*	*4*	*5*	*6*	
Maneuver	2	5	8	11	14	17	*((Maneuver factor x 3) –1) ÷ 100*
Jump	2	3	4	5	6	7	*((Jump factor + 1) ÷ 100*

Number is percentage of the ship required.

DRIVE TECH LEVEL

	Drive Factor					
	1	*2*	*3*	*4*	*5*	*6*
Maneuver	7	7	8	8	8	9
Jump	9	11	12	13	14	15

Number is minimum tech level required.

DRIVE COST

	Drive Factor					
	1	*2*	*3*	*4*	*5*	*6*
Maneuver	1.5	0.7	0.5	0.5	0.5	0.5
Jump	4.0	4.0	4.0	4.0	4.0	4.0

Number is cost in millions of credits per ton of drive installed.

Drives are noted in the USP by the drive factor (from 1 to 6); use 0 if no such drive is present. On any given ship, the power plant factor must at least equal the jump factor or the maneuver factor, whichever is higher. Unlike maneuver or jump drives, power plants can achieve factors higher than six. Theoretically, a power plant factor may reach as high as 50; practically, it should rarely go higher than 35. The power plant tables indicate the percentage of ship tonnage required by power plant factor, based on tech level.

The technology behind power plants depends on the available tech level:

Fission (TL 6 – 8): The familiar nuclear fission power plant.

Fusion (TL 9 – 16): Cheap, efficient fusion reactor.

Antimatter (TL 17+): Ultimate efficiency in energy production using the total conversion of mass to energy.

POWER PLANTS

	Tech Level						
	6	*7-8*	*9-12*	*13-14*	*15-16*	*17-18*	*19+*
% Ship	10*Pn*	8*Pn*	3*Pn*	2*Pn*	1*Pn*	0.05*Pn*	0.025*Pn*

Number is the percentage of ship tonnage (times *Pn*) required to produce a power plant of the desired factor.

Cost is MCr 3.0 per energy point of output produced.

Fuel: A ship requires fuel for its jump drives and for its power plant; the power plant converts fuel to energy for computers, jump drives, maneuver drives, weapons, and screens.

JUMP FUEL REQUIREMENTS

	Tech Level					
	9-16	*17*	*18*	*19*	*20*	*21*
Jump	10	8	6	4	2	1

Number is percentage of the ship tonnage per jump factor.

Jump fuel requirements are computed at a percentage of the ship's tonnage per jump factor; thus, the *Akron* is a 10,000 ton TL 15 jump-6 ship and requires fuel tankage of 6,000. Fuel usage is computed similarly; below TL 17, 10% of the ship tonnage in fuel is used per jump factor used (for the *Akron*, performing jump-1 uses 1,000 tons of fuel, while performing jurnp-6 uses 6,000 tons of fuel).

Power plant fuel requirements vary depending on the type of power plant, and its usage. Power plant operations also provide energy for the maneuver drive.

Fission power plant fuel is included in the plant's volume, and is good for roughly 1 year (52 weeks) of maneuvering at full power. Typically, the fuel elements are replaced during the ship's annual overhaul. Fission power plants increase the annual maintenance costs of the ship by MCr0.1 times the EP rating of the power plant.

Fusion power plant fuel is computed at one ton of fuel for every EP of power plant output, or 1% of the ship tonnage per power plant factor. For example, the *Akron* has power plant-6 and requires 600 tons of fuel tankage. The stated fuel tonnage supports 4 weeks maneuvering at full power (including time spent in jump space) before refueling is necessary.

Antimatter power plants function much like fusion power plants, except they require antimatter as fuel equal to 0.85 tons per EP per 4 weeks of cruising at full power.

Powering Down: Ships in non-combat situations can be powered down to reduce the fuel consumption of the ship's power plant. The minimum level of power plant is one, which is enough to power the life support systems and maintain maneuver drive-1, jump drive-1, etc. No energy-using weapons may be used while the ship is powered down. Ships which spend an entire four-week period in the powered down state reduce the fuel consumption of the power plant to the powered down level.

If a ship is caught by an enemy in a powered down state, the crew may attempt to bring the power plant up to full blast. One combat turn is required for each level of power plant to be restored. No energy-using weapons or screens may be operated during this restoring period, and agility is reduced to one.

Fuel Tankage: All craft must be fitted with fuel tanks during the design and construction process. The size of those tanks is determined by the fuel formulae for jump drives and power plants.

Required fuel for the power plant must be carried in normal fuel tanks; jump fuel and additional fuel may be carried in one of the additional tankage types outlined below. In addition, small craft must have at least one ton of normal interior fuel tankage.

Any craft may have more fuel tankage allocated within the ship, should the designer consider it necessary or desirable. Such additional tankage may be used to increase the ship's range (in number of jumps possible) or endurance (in weeks of maneuver allowed before refueling).

Fuel Scoops: Any partially streamlined, streamlined or airframe vessel may be equipped with fuel scoops which allow the skimming of gas from gas giants. On streamlined or airframe ships, such an installation also includes hoses or other equipment for drawing water from oceans. No additional tonnage is required; cost: Cr1,000 per ton of ship.

Fuel scoops allow scooping of unrefined fuel at the rate of 20% of the ship's tonnage per hour, until the ship's fuel tanks are filled.

Fuel Purification Plants: If fuel scoops are installed, a fuel purification plant should be installed on the ship or available on another ship before the fuel is used in drives.

Unrefined fuel, when used in starship drives and power plants, can result in equipment malfunctions and misjumps. This can be avoided with the use of a fuel purification plant which allows refining of the raw gas before it is used in the drives. The table shows fuel purification plants as a percentage of the fuel

tankage of a ship, and includes the minimum tonnage required and the cost per ton of purification plant installed.

FUEL PURIFICATION PLANTS

	Tech Level									
	8	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*
% Fuel	5.0	4.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0	0.5
Minimum	10	9	8	7	6	5	4	3	2	1
Cost/Ton (Cr)	4,000	4,222	4,500	4,857	5,333	6,000	7,000	10,000	16,000	34,000

A fuel purification plant sized to the percentage of the fuel tank above will purify all fuel in the ship's tanks in six hours. Smaller purification plants will work slower, and larger plants will work faster; any non-standard plant should be noted on the ship information form with the time required to purify the ship's fuel tankage.

Other Types of Fuel Tankage: There are four varieties of fuel tankage which are not integral to a ship, each with its advantages and disadvantages. These are collapsible tanks, demountable tanks, exterior demountable tanks, and drop tanks. These may be added to any ship at any time provided the cost is paid. Insure that the proper notation is made on the ship statistics if such additional tankage is installed.

Collapsible tanks hold fuel in the cargo hold to allow refueling when there is no other source of fuel available. Demountable tanks hold fuel to increase the total available tankage of the ship. Exterior demountable tanks and drop tanks simultaneously increase fuel capacity and ship tonnage; drop tanks, however, may be detached just prior to jump to reduce ship tonnage in order to achieve greater performance.

NONSTANDARD FUEL TANKAGE

Type	*TL*	*Construction*	*Replacement*	*Fittings*	*Tank Cost*
Collapsible tanks	9	1 week	reusable	—	Cr500/ton
Internal demountable tanks	9	10 weeks	reusable	—	Cr1,000/ton
Exterior demountable tanks	12	10 weeks	annual	Cr500/ton	Cr10,000/ton
Drop tanks	15	10 weeks	per use	Cr1,000/ton	Cr1,000/ton

Collapsible Tanks: Large fuel bladders can be used to hold additional fuel; the collapsible tanks are filled with fuel and take up space in the ship's main cargo hold. It must have a hold equal to, or greater than, the tonnage required for the collapsible tanks, and the tanks displace tonnage in the cargo hold when in use. When not in use, collapsible tanks collapse and are stored in the cargo hold; they take up 1% of their filled tonnage.

Fuel from collapsible tanks must be pumped into the normal fuel tanks before it can be used; thus, a jump made using collapsible tanks may not use more fuel than the capacity of the normal interior fuel tanks. Pumping fuel before a jump takes about three hours.

The typical use for collapsible tanks is to allow a short-jump ship to cross a gap in two or more jumps. For example, to cross between two worlds located four parsecs apart, jump-4 drives are needed. With collapsible tanks, a ship with jump-2 could negotiate the distance in two sequential jumps, the first to deep space half way across, where the collapsible tanks provide the fuel for the second jump.

Collapsible tanks are available at tech level 9, and may be installed at any class A or B starport in one week and cost Cr500 per "filled" ton.

Demountable Tanks: Sturdy fuel tanks can be installed on a ship to supplement its normal fuel capacity. These tanks take up space in the ship's cargo hold; they occupy that space regardless of whether the tanks are full or empty. Demountable tanks may be installed in any tonnage, but may not exceed the cargo capacity of the ship.

Demountable tanks operate in the same manner as normal fuel tanks, and their fuel is available for use by the drives immediately.

Demountable tanks are available at tech level 9, and may be fabricated at any class A or B starport, at a cost of Cr1,000 per ton, in 10 weeks. Once installed, demountable tanks may be demounted by the

ship's crew in about two weeks, or at a class A, B, C, or D starport by professionals in about one week (at a cost of Cr10 per ton). Remounting costs are similar. It should be noted that demountable tanks (once demounted) must be stored and safeguarded. Costs for such run Cr50 per week per ton of tanks stored.

Exterior Demountable Tanks: Exterior demountable tanks may be installed on a ship which does not have sufficient interior cargo capacity (or if that capacity is to be conserved). Exterior demountable tanks are fitted to a specific ship, and cannot be reused

Any ship carrying exterior tanks is considered unstreamlined regardless of its configuration. A ship's tonnage is increased by the size of the tanks, with consequent effects on its jump, maneuver drive, and power plant factors.

Exterior demountable tanks operate in the same manner as normal fuel tanks, and their fuel is available for use by the drives immediately.

Exterior demountable tanks are available at tech level 12, and may be fabricated at any class A or B starport, at a cost of Cr10,000 per ton, in 10 weeks. Ships using such tanks require exterior tank supports at a cost of Cr500 per ton. Once installed, demountable tanks may be demounted by the ship's crew in about two weeks, or at a class A, B, C, or D starport by professionals in about one week (at a cost of Cr100 per ton). Remounting costs are similar. It should be noted that demountable tanks (once demounted) must be stored and safeguarded. Costs for such run Cr50 per week per ton of tanks stored.

Exterior demountable tanks wear out over time, and are normally replaced during a ship's annual maintenance.

Drop Tanks: Disposable fuel tanks may be added to the ship to increase its range. These tanks are fitted to the outside of the ship, and drop away before jump. The result is more interior space available for cargo and passengers. Disposable drop tanks must be replaced each time they are used, so they are practical only on runs to civilized areas, or to increase fuel capacity to allow several jumps. Drop tanks are installed outside the hull, and increase the total tonnage of the ship; drives are reduced in their efficiency based on the total tonnage of the ship. With tanks retained, efficiency is decreased, and jump capability is reduced; when the tanks drop away, tonnage is reduced, and the drive efficiency is increased. The reduced ship tonnage, combined with the higher resulting capacity of the ship's drives, can result in an increased jump factor or maneuver drive factor. Power plant factor may increase, but its energy point output remains the same.

When a ship is produced with drop tanks, the total tonnage of the ship without drop tanks determines the number of weapons allowed.

Drop tanks do not affect the streamlining of the ship carrying them.

Drop tanks may be built onto a ship when it is originally produced or added to an existing ship at a cost of Cr1,000 per ton. In both cases, the tanks themselves must also be purchased at Cr1,000 per ton. Drop tanks are available at tech level 15, and may be fabricated at any class A or B starport; building time is 10 weeks. Installation time requires only a few minutes by the ship's crew. Spare drop tanks may be acquired and stored at a cost of Cr50 per week per ton of tanks stored

Both drop tanks and exterior demountable tanks are very vulnerable to battle damage.

Energy Points: Before installing computers or arming a ship, it is necessary to calculate the energy points available to the ship. This calculation uses the formula EPs = 0.01 x ship tonnage x power plant factor. Note: At tech level 15, energy points also equals the tons of power plant installed and the tons of power plant fuel required.

Energy points are used for four purposes: powering weapons, shields, for maneuver drives (for agility), and for computers.

Powering Weapons, Shields, and Computers: Various weapons, screens, and computers require energy points for operation, and these must be provided from the power plant. The weapons and screens installed on a ship may not consume more energy points than the power plant generates. Additional equipment may not be installed in reserve; the total energy point requirement for all equipment aboard ship must not exceed the energy point value of the ship.

Agility: A ship's agility factor is a measure of the amount of energy available to the ship's maneuver drives, even when other operations are in progress. Energy points remaining after weapons, screens, and computers have been installed may be applied toward the ship's agility factor. Divide the remaining energy

points by 0.01 x ship tonnage, dropping all fractional points; the result is the number of agility points the ship has.

In combat, agility is the ability of a ship to make violent maneuvers and take evasive action while engaging hostile targets. Agility also describes the difficulty in predicting the precise location of a ship so that weapons fire may inflict damage. Thus, agility serves as a defensive DM on the throw to hit for all weapons. Agility also assists (or hinders) in pursuit actions. For each power plant hit received in combat (cumulative), the ship's agility factor is reduced by one.

While a number of circumstances can result in a ship's agility factor being higher than its maneuver drive factor (power plant designed output, maneuver drive damage, etc.), whenever agility is used in combat, the factor applied should be the lower of the ship's agility factor or maneuver drive factor. However, when reducing the agility due to power plant damage, this reduces the ship's original agility factor. The significance of this is that a ship could have an agility of 8 but a maneuver drive of 3; as a result, it functions as a ship with an agility of 3, but it will take much longer for power plant damage to reduce its agility.

A ship may voluntarily refrain from using any energy-consuming weapons in a combat round and receive an emergency agility factor (for that combat round only) equal to its current maneuver drive factor or power plant factor (whichever is lower).

Due to technological limitations, the agility of a ship using a lower TL maneuver drive is halved when not within 100 diameters of a planetary or stellar body. Early maneuver drives lose efficiency rapidly when away from a gravity well. This limitation disappears at TL 11 with the advent of thruster-based maneuver drives.

THE BRIDGE

Every ship requires a bridge for basic controls, communications equipment, avionics, scanners, detectors, sensors, and other equipment for proper operation of the ship. The bridge contains all necessary equipment for the control of the ship with the exception of the computer. The table below gives a convenient breakdown of bridge equipment by tech level:

BRIDGE CONTROLS AND EQUIPMENT

TL	*Communications*	*Detectors*
5	Radio	
6		Radar
8	Laser	Ladar
10		Active/Passive EMS
11		Neutrino Sensor
15	Meson	
20		Densitometers

Communications and Detectors indicate developments by tech level.

The tech level of the bridge also indicates the sophistication of the craft's avionics controls. This dictates what speeds may be used by the maneuver drives for NOE.

Military craft can be considered to include appropriate jamming equipment at the same tech level.

A bridge (designated as the main bridge or prime bridge) requires 2% of the ship's tonnage (minimum: 20 tons) at a cost of Cr5,000 per ton of ship. For example, a 100-ton ship must allocate 20 tons for the bridge at a cost of Cr500,000.

A 1,000-ton ship must allocate 20 tons for the bridge at a cost of MCr5. A 1,100-ton ship must allocate 22 tons for the bridge at a cost of MCr5.5.

One or more auxiliary bridges may be installed to replace the prime bridge in the event of battle damage. Costs are identical to those of the prime bridge.

Computers: A central computer system must be specified for the whole ship; backups may be installed if desired. Such a computer system represents not just a centralized computer for the ship, but the operational facilities for accessing such in controlling the craft's functions throughout the craft. At various tech levels, this is represented by varying types of control interfaces in the craft.

Several types of control interfaces exist:

Mechanical (TL 5 – 6): Basic gauges, dials and mechanical controls.

Electronic (TL 7 – 8): Digital electronic gauges and electromechanical controls.

Computerized (TL 9): Computerized controls with detailed and informative flat computer displays.
Dynamic (TL 10 – 12): Dynamically configurable flat 2D controls. The operator may reconfigure the controls in a moment's notice to fit preference or operating style.
Holographic (TL 13 – 15): Dynamically configurable contoured 3D controls with tactile feedback. The operator may reconfigure the controls in a moment's notice to fit preference or operating style.
Synaptic (TL 16+): As with holographic control interfaces, except that the processing behind the interface learns from and with its operators, anticipating and expecting commands based on experience, and offering suggestions and options based on its experience."

Computer model indicates the size of the jump which the computer can control. A model/1 computer is required on a ship which makes a jump-1; a model/5 computer is required on a ship which makes jump-5. Computer models greater than 6 do not allow greater jumps, and in any case, the ship would require the appropriate jump drive.

The bis models (R – T, improved versions of the standard model with greater program handling capability) are capable of controlling a jump one higher than their model numbers; thus, a Model/1bis is capable of controlling jump-2, but in all other ways acts as a Model/1 computer.

The fib models (versions of the standard model with a fiber-optic core) are designed to be resistant to radiation damage. Such computers ignore damage from the radiation damage table in space combat. These models are noted separately in the listing below the USP as “Fib computer”.

COMPUTER MODELS

Model	*Standard*		*Fiber-optic*		*Storage*	*Tech*	
(USP)	*MCr*	*Ton*	*MCr*	*Ton*	*Capacity*	*Level*	*EP*
1	2	1	3	2	2/4	5	0
1bis (R)	4	1	—	—	4/0	6	0
2	9	2	14	4	3/6	7	0
2bis (S)	18	2	—	—	6/0	8	0
3	18	3	27	6	5/9	9	1
3bis (T)	26	3	—	—	9/0	9	1
4	30	4	45	8	8/15	10	2
5	45	5	68	10	12/25	11	3
6	55	7	83	14	15/35	12	5
7	80	9	100	18	20/50	13	7
8	110	11	140	22	30/70	14	9
9	140	13	200	26	40/90	15	12
10 (A)	200	15	300	30	50/110	16	15
11 (B)	300	10	400	20	60/130	17	18
12 (C)	400	12	500	24	70/150	18	22
13 (D)	500	14	600	28	80/170	19	26
14 (E)	600	16	700	32	90/190	20	30
15 (F)	700	18	800	36	100/210	21	35

The Computer Models table indicates the model number, cost, tonnage, CPU and storage, tech level, and energy point requirement. Model number is the relative size of the computer. Costs are given in megacredits. Tonnage is the number of interior tons required for installation of the computer. CPU and storage capacity are included for use with the computer programming rules in **Traveller**. Tech level shows the minimum tech level required to build the indicated computer. Sensor limits notes the ultimate limits of sensitivity available with that computer. Energy point requirement is the number of energy points which must be committed to powering the computer.

WEAPONRY

Ships may be armed for offensive or defensive operations. Inclusion of such weaponry allows them to deal with other armed ships.

Batteries: Ships with more than one turret mounting the same number and type of weapon may group them into batteries. Ships with more than ten turrets mounting the same number and type of weapon must group them into batteries. A battery may consist of just a single turret to a maximum grouping of ten turrets, but all of a battery’s turrets must have the same type of weapon and weapon USP factor. Each bay weapon is considered a single battery. The spinal mount of a ship (if it has one) is a single battery. On ships 1,000 tons and under, mixed turrets (weapons of different types in the same turret, such as one missile, one laser, and one sandcaster) are allowed, but mixed turrets can never be grouped together into batteries, making each weapon in a mixed turret a single battery.

BATTERIES

Ship Size	*Percent Bearing*
0 – 9	100%
A – K	100%
L	95%
M	90%
N	85%
P	80%
Q	75%
R	70%
S	65%
T	60%
U	55%
V – Y	50%

For example, a ship has eighty triple beam laser turrets. The ship may have 80 batteries of one turret (attack factor 3), 40 batteries of two turrets (attack factor of 4), 16 batteries of five turrets (attack factor of 6), or 8 batteries of ten turrets (attack factor of 8). Other configurations are possible, but these selections constitute the optimal battery configurations on the turret weapon table.

As a rule, each battery may fire once each fire phase. Battery configurations are determined when the ship is built, not spontaneously. The actual number of batteries which may bear on the target may be less than the total number of batteries on larger ships, and is determined from the battery table.

The number of batteries which may bear in combat is affected by the size of the ship. Only the percentage of batteries shown may bear (fire) on the target in space combat. Round fractions to the nearest whole number.

For example, if a 50,000-ton ship (size factor P) has 15 particle accelerators in bays, 100 laser turrets in ten batteries, 50 missile turrets in five batteries, and 80 sandcaster turrets in eight batteries, it could bring to bear 12 particle accelerator batteries, 8 laser batteries, 6 sandcaster batteries, and 4 missile batteries. The figures are based on the table reading that factor P hull sizes can bring 80% of their batteries to bear on a target. Round fractions to the nearest whole number. The spinal mount always bears. One battery of each weapon type always bears.

When a ship takes a hit, it loses a battery. Ships may change attitude (and are assumed to do so) so that undamaged weapons batteries can continually be brought to bear. Thus, the ship above can initially bring 12 of its 15 particle accelerator batteries to bear, but the first three battery hits the ship takes in particle accelerators will not reduce its firepower.

If a ship is reduced to or has only one battery of a particular type, then a weapon hit on it reduces its USP factor by one; it does not eliminate the battery. This rule also applies to spinal mount weapons.

Spinal Mounts: A fixed-mount major starship weapon which provides for attacks of the greatest possible power. Because a starship’s entire structure is built around a spinal mount (and hence the name), no starship may have more than one spinal mount.

The tables show the USP factor, tonnage required, tech level at which produced, cost in millions of credits, and energy points required for each weapon. Depending on the available tech level, this weapon may be a particle accelerator, meson gun, disintegrator or jump projector. Whichever type of spinal mount is chosen for a ship’s design cannot also be selected for use in weapon bays or turrets on the same ship.

JUMP PROJECTORS

USP Factor	*Tonnage*	*Tech Level*	*Cost (MCr)*	*Energy Points*
A	4,000	21	1,000	32,000
B	7,000	21	1,000	38,000

DISINTEGRATORS

USP Factor	Energy Points		Tonnage and Cost by TL 17	18	19	20	21
A	2,000	Tons	4,500	3,900	3,300	2,200	1,600
		MCr	5,000	3,400	2,200	1,200	800
B	2,100	Tons	—	4,000	3,400	2,300	1,700
		MCr	—	3,500	2,300	1,300	900
C	2,200	Tons	—	—	3,500	2,400	1,800
		MCr	—	—	2,400	1,400	1,000
D	2,300	Tons	—	—	—	2,500	1,900
		MCr	—	—	—	1,500	1,100
E	2,400	Tons	—	—	—	—	2,000
		MCr	—	—	—	—	1,200

PARTICLE ACCELERATORS

USP Factor	Energy Points		Tonnage and Cost by TL 8	9	10
A	500	Tons	5,500	4,975	4,450
		MCr	3,500	2,900	2,220
B	500	Tons	—	5,000	4,475
		MCr	—	3,000	2,310
C	500	Tons	—	—	4,500
		MCr	—	—	2,400
D	600	Tons	—	—	4,625
		MCr	—	—	2,500
E	600	Tons	—	—	4,700
		MCr	—	—	2,600
F	600	Tons	—	—	4,775
		MCr	—	—	2,700
G	700	Tons	—	—	4,850
		MCr	—	—	2,800
H	700	Tons	—	—	4,925
		MCr	—	—	2,900
J	800	Tons	—	—	5,000
		MCr	—	—	3,000

PARTICLE ACCELERATORS (cont'd)

USP Factor	Energy Points		Tonnage and Cost by TL 11	12	13	14	15	16	17	18	19
A	500	Tons	3,925	3,400	2,875	2,350	1,825	1,500	1,175	850	525
		MCr	1,260	920	700	500	220	160	120	100	90
B	500	Tons	3,950	3,425	2,900	2,375	1,850	1,525	1,200	875	550
		MCr	1,340	990	760	550	260	190	140	115	100
C	500	Tons	3,975	3,450	2,925	2,400	1,875	1,550	1,225	900	575
		MCr	1,420	1,060	820	600	300	220	160	130	110
D	600	Tons	4,000	3,475	2,950	2,425	1,900	1,575	1,250	925	600
		MCr	1,500	1,130	880	650	340	250	180	145	120
E	600	Tons	4,125	3,500	2,975	2,450	1,925	1,600	1,275	950	625
		MCr	1,625	1200	940	700	380	280	200	160	130
F	600	Tons	4,200	3,625	3,000	2,475	1,950	1,625	1,300	975	650
		MCr	1,700	1,350	1,000	750	420	310	220	175	140
G	700	Tons	4,275	3,700	3,125	2,500	1,975	1,650	1,325	1,000	675
		MCr	1,775	1,400	1,075	800	460	340	240	190	150
H	700	Tons	4,350	3,775	3,200	2,625	2,000	1,675	1,350	1,025	700
		MCr	1,850	1,450	1,100	875	500	370	260	205	160
J	800	Tons	4,425	3,850	3,275	2,700	2,125	1,700	1,375	1,050	725
		MCr	1,925	1,500	1,125	900	550	400	280	220	170
K	800	Tons	4,500	3,925	3,350	2,775	2,200	1,850	1,400	1,075	750
		MCr	2,000	1,550	1,150	925	600	575	300	235	180
L	800	Tons	—	4,000	3,425	2,850	2,275	1,900	1,450	1,100	775
		MCr	—	1,600	1,175	950	650	600	475	250	190
M	900	Tons	—	4,200	3,500	2,925	2,350	1,950	1,500	1,175	800
		MCr	—	1,700	1,200	975	700	625	500	375	200
N	900	Tons	—	4,300	3,700	3,000	2,425	2,000	1,550	1,200	825
		MCr	—	1,800	1,275	1,000	750	650	525	400	275
P	900	Tons	—	4,400	3,800	3,200	2,500	2,050	1,600	1,225	840
		MCr	—	1,900	1,350	1,050	800	675	550	425	300
Q	1,000	Tons	—	4,500	3,900	3,300	2,700	2,100	1,650	1,250	855
		MCr	—	2,000	1,425	1,100	850	700	575	450	325
R	1,000	Tons	—	—	4,000	3,400	2,800	2,200	1,700	1,275	870
		MCr	—	—	1,500	1,150	900	750	600	475	350
S	1,000	Tons	—	—	—	3,500	2,900	2,300	1,775	1,300	885
		MCr	—	—	—	1,200	950	800	650	500	375
T	1,000	Tons	—	—	—	—	3,000	2,400	1,850	1,350	900
		MCr	—	—	—	—	1,000	850	700	525	400
U	1,100	Tons	—	—	—	—	—	2,500	1,925	1,400	925
		MCr	—	—	—	—	—	900	750	550	425
V	1,100	Tons	—	—	—	—	—	—	2,000	1,450	950
		MCr	—	—	—	—	—	—	800	575	450
W	1,100	Tons	—	—	—	—	—	—	2,250	1,500	975
		MCr	—	—	—	—	—	—	900	600	475
X	1,200	Tons	—	—	—	—	—	—	2,500	1,750	1,000
		MCr	—	—	—	—	—	—	1,000	700	500
Y	1,200	Tons	—	—	—	—	—	—	—	2,000	1,250
		MCr	—	—	—	—	—	—	—	800	550
Z	1,300	Tons	—	—	—	—	—	—	—	—	1,500
		MCr	—	—	—	—	—	—	—	—	600

MESON GUNS

USP Factor	Energy Points		Tonnage and Cost by TL 11	12	13	14	15	16	17	18	19
A	500	Tons	5,000	1,950	900	850	800	575	450	325	200
		MCr	10,000	2,880	640	220	200	170	150	140	80
B	600	Tons	8,000	1,975	925	875	825	600	475	350	225
		MCr	12,000	2,940	680	250	225	190	165	150	90
C	600	Tons	—	2,000	950	900	850	625	500	375	250
		MCr	—	3,000	720	280	250	210	180	160	100
D	700	Tons	—	5,000	975	925	875	650	525	400	275
		MCr	—	5,000	760	310	275	230	195	170	110
E	700	Tons	—	5,500	1,000	950	900	675	550	425	300
		MCr	—	6,000	800	340	300	250	210	180	120
F	800	Tons	—	6,000	2,000	975	925	700	575	450	325
		MCr	—	6,800	1,000	370	325	270	225	190	130
G	800	Tons	—	6,500	2,600	1,000	950	725	600	475	350
		MCr	—	7,600	1,400	400	350	290	240	200	140
H	900	Tons	—	7,000	3,200	2,000	975	750	625	500	375
		MCr	—	8,400	1,800	600	375	310	255	210	150
J	900	Tons	—	7,500	3,800	2,500	1,000	775	650	525	400
		MCr	—	9,200	2,200	650	400	330	270	220	160
K	1,000	Tons	—	8,000	4,400	3,000	1,250	800	675	550	425
		MCr	—	10,000	2,600	700	450	350	285	230	170
L	1,000	Tons	—	—	5,000	3,500	1,500	1,050	700	575	450
		MCr	—	—	3,000	750	500	410	300	240	180
M	1,000	Tons	—	—	6,000	4,000	1,750	1,200	900	600	475
		MCr	—	—	3,800	800	550	440	360	250	190
N	1,000	Tons	—	—	7,000	5,000	2,000	1,350	1,000	700	500
		MCr	—	—	4,400	880	600	470	390	310	200
P	1,100	Tons	—	—	8,000	6,000	3,000	1,500	1,100	800	650
		MCr	—	—	5,000	940	680	500	420	340	260
Q	1,100	Tons	—	—	—	7,000	4,000	2,400	1,200	900	700
		MCr	—	—	—	1,000	740	580	450	370	290
R	1,100	Tons	—	—	—	7,500	5,000	3,200	1,800	1,000	750
		MCr	—	—	—	1,500	800	640	500	400	320
S	1,200	Tons	—	—	—	8,000	6,000	4,000	2,400	1,400	800
		MCr	—	—	—	2,000	900	700	550	440	350
T	1,200	Tons	—	—	—	—	7,000	5,000	3,000	1,700	880
		MCr	—	—	—	—	1,000	750	600	470	370
U	1,300	Tons	—	—	—	—	—	6,000	4,000	2,000	940
		MCr	—	—	—	—	—	800	650	500	385
V	1,300	Tons	—	—	—	—	—	—	5,000	3,000	1,000
		MCr	—	—	—	—	—	—	700	550	400
W	1,300	Tons	—	—	—	—	—	—	5,500	4,000	2,000
		MCr	—	—	—	—	—	—	750	600	450
X	1,400	Tons	—	—	—	—	—	—	6,000	4,500	3,000
		MCr	—	—	—	—	—	—	800	650	500
Y	1,400	Tons	—	—	—	—	—	—	—	5,000	3,500
		MCr	—	—	—	—	—	—	—	700	550
Z	1,500	Tons	—	—	—	—	—	—	—	—	4,000
		MCr	—	—	—	—	—	—	—	—	600

Bay Weapons: Bay weapons are very large weapon mounts able to move to point at the target. These represent the most powerful type of moving weapon mount. Bays are available in 100-ton and 50-ton sizes (the size indicates the tonnage required) and must be installed during construction. The weaponry in bays is easily removed and replaced by other bay weaponry as the need arises.

Weaponry installed in bays consists of several different types: meson guns, particle accelerators, energy weapons (fusion and plasma guns), repulsors, and missile racks; at higher tech levels, tractors, disintegrators and jump dampers are also possible.

One bay (regardless of size) may be installed for each 1,000 tons of hull. Tonnage not otherwise allocated to weaponry is considered available. For example, a 50,000-ton ship might be assigned a 5,000-ton type A meson gun; it may install 45 bays in addition to the spinal mount. In comparison, an 800-ton ship bearing a 50-ton fusion gun bay could carry no other weapons.

Allocating space for weapons bays costs Cr10,000 per ton; so, 100-ton bays cost MCr1; 50-ton bays cost MCr0.5. They need not be assigned any specified weaponry during construction.

The Bay Weapons table indicates the cost for one bay weapon and its energy point requirement. The table also cross-references tech level and weapon type. The number at the intersection is the factor used for the weapon on the Universal Ship Profile. All bay weapons of the same weapon type on a ship must be identical. Each bay weapon is a battery. Weapons installed in bays may not be allocated for turrets.

BAY WEAPONS

100-ton Bay Weapon	Tech Level 7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	EPs	Cost (MCr)
Missile	7	7	7	8	8	9	9	A	A	B	B	C	C	D	—	0	20
Par. Accel.	—	6	6	7	7	8	8	9	9	A	A	B	B	C	—	60	35
Repulsor	—	—	—	2	4	6	7	8	9	A	B	C	D	E	F	10	10
Meson Gun	—	—	—	—	—	—	3	5	9	B	D	F	H	—	—	200	70
Tractors	—	—	—	—	—	—	—	—	—	2	4	6	6	7	—	200	40
Disintegrator	—	—	—	—	—	—	—	—	—	—	7	7	8	8	9	260	150

50-ton Bay Weapon	Tech Level 10	11	12	13	14	15	16	17	18	19	20	21	EPs	Cost (MCr)
Missile	7	7	8	8	9	9	A	A	B	B	C	—	0	12
Par. Accel.	3	3	4	4	5	5	6	6	7	7	8	—	30	20
Plasma Gun	4	5	6	—	—	—	—	—	—	—	—	—	10	5
Fusion Gun	—	—	7	8	9	A	B	C	D	E	F	—	20	8
Repulsor	—	—	—	—	3	5	7	9	A	B	C	D	5	6
Meson Gun	—	—	—	—	—	4	6	9	B	D	F	H	100	50
Disintegrator	—	—	—	—	—	—	—	—	6	6	7	—	130	90
Tractors	—	—	—	—	—	—	—	—	—	—	3	5	100	24

Explanation: The number in the body of the chart is the USP factor of the type of weapon in the specified size of bay at the tech level shown. In addition, that weapon will require energy points in the amount shown and will cost the amount shown in millions of credits. Note that costs and energy points are not dependent on Tech Level.

Empty weapons bays may be put to a variety of uses, such as holding small craft (air/rafts, ATVs, fighters, pinnaces, etc), or storing cargo. Vehicles and craft may be carried in otherwise unused bays at 50% wastage (100 tons of bay holds 50 tons of vehicle or craft). A bay may launch one craft per turn. An otherwise unused bay may also be used to carry deadfall ordnance for planetary bombardment; such a bay is useless in battle, but is used to bombard worlds.

Turrets: Weapons may be mounted in turrets emplaced on the hull. Turrets require only that a hardpoint be designated and created during construction. One hardpoint is allowed per 100 tons of hull not otherwise allocated to weapons. For example, a 50,000-ton ship carrying a 5,000-ton type A meson gun

and twenty 100-ton bays may designate 250 hardpoints for turrets. Hardpoints require no tonnage; but turrets themselves (when installed) do require tonnage. Hardpoints are designated at no cost.

Turrets are installed on hardpoints with single, dual, and triple configurations, and allow the mounting of lasers (beam or pulse), energy weapons (plasma or fusion guns), sandcasters, particle accelerators, and missile racks.

The Turret Weapons table indicates each type of turret weapon in column and the nine possible USP factors in rows. The number at the intersection is the number of weapons of the type indicated required to achieve that USP factor. For example, the missile column shows that 18 missile racks are required to achieve a USP factor of 5. In addition, the table shows the minimum tech level at which the weapon is available, the energy points each individual weapon of the type shown requires, the tonnage required for a turret mounting the weapon (tonnage does not vary with number of weapons within the turret), and the cost for one weapon of the type shown. In addition, the table shows tech level modifications allowed. For example, six triple missile turrets (a total of 18 missile racks) merit the USP missile factor of 5; if the missile racks are at least tech level 13, that factor is increased by +1, giving a missile factor of 6.

TURRET WEAPONS

USP Code	*Sand.*	*Missile*	*Pulse Laser*	*Beam Laser*	*Plasma Gun*	*Fusion Gun*	*Part. Accel.*	*Disint.*
1	1	1	1	1	1	—	1	1
2	3	3	3	2	4	—	2	4
3	6	6	6	3	10	—	4	10
4	8	12	10	6	16	1	6	16
5	10	18	21	10	20	4	8	20
6	20	30	30	15	—	10	10	—
7	30	—	—	21	—	16	—	—
8	—	—	—	30	—	20	—	—
9	—	—	—	—	—	—	—	—
TL Available	5	6	7	9	10	12	14	18
EPs	0	0	1	1	1	2	5	20
TL Mod +1	8+	13+	13+	13+	11+	14+	15+	—
TL Mod +2	10+	21+	16+	16+	12+	17+	16+	—
TL Mod +3	16+	—	—	—	16+	—	18+	—
Tonnage	1	1	1	1	2	2	5*	2
Cost (MCr)	0.25	0.75	0.5	1.0	1.5	2.0	4.0*	5.0

*For particle accelerators, tonnage is 5 at TL 14, 3 at TL 15, 2 at TL 16, and 1 at TL 18; the cost is MCr4.0 at TL 14, MCr3.0 at TL 15+.

Explanation: The number listed in the body of the chart is the number of weapons of the listed type required for a battery to achieve the USP factor listed to the left.

TL Available indicates the first tech level at which the weapon becomes available.

EPs are the energy point requirement for each weapon installed of the type. For example, twenty fusion guns would require 40 energy points.

TL Mods indicate a modification to the USP factor based on higher tech levels. If all of the weapons involved are of the tech level indicated, then the USP factor is increased. For example, 16 plasma guns normally have a USP of 4. At tech level 11, they would have a USP of 5; at tech level 12 or higher, they would have a USP of 6. TL mods are not cumulative; only the best one is used. This tech level increase is the only way that turret weapons can achieve a factor of 9.

Tonnage indicates the tonnage of the turret containing the type of ordnance described, regardless of the number of weapons of that type mounted in it. Particle accelerators may be mounted only one per turret. Plasma guns, fusion guns and disintegrators may be mounted two per turret. All other types may be mounted three per turret. Weapons may be mixed in multiple-weapon turrets provided they fit; for example, you could combine a fusion gun and a sandcaster in the same turret. On ships with more than ten turrets, weapons may not be mixed within a turret.

Cost is in millions of credits, for one of the weapon type listed.

Screens: Ships may install a variety of screens which will reduce or eliminate the force of enemy attacks. Screens are passive; they are installed in the ship interior and operate continually, as opposed to defensive weapons such as sandcasters or repulsors. Screens include nuclear dampers, meson and proton screens, and black and white globe projectors.

NUCLEAR DAMPERS

USP Factor	*Energy Points*		*Tonnage and Cost by Tech Level* 12	13	14	15	16	17	18	19	20	21
1	10	Tons	50	12	4	2	1	—	—	—	—	—
		MCr	50	35	15	6	4.5	—	—	—	—	—
2	20	Tons	—	15	5	3	2	1	—	—	—	—
		MCr	—	40	20	10	9	5	—	—	—	—
3	30	Tons	—	20	6	4	3	2	1	—	—	—
		MCr	—	45	25	14	13.5	10	5.5	—	—	—
4	40	Tons	—	—	8	5	4	3	2	1	—	—
		MCr	—	—	30	18	18	15	11	6	—	—
5	50	Tons	—	—	10	6	5	4	3	2	1	—
		MCr	—	—	35	22	22.5	20	16.5	12	6.5	—
6	60	Tons	—	—	12	8	6	5	4	3	2	1
		MCr	—	—	38	26	27	25	22	18	13	7
7	70	Tons	—	—	—	10	7	6	5	4	3	2
		MCr	—	—	—	30	31.5	30	27.5	24	19.5	14
8	80	Tons	—	—	—	15	8	7	6	5	4	3
		MCr	—	—	—	40	36	35	33	30	26	21
9	90	Tons	—	—	—	20	10	9	8	7	5	4
		MCr	—	—	—	50	40.5	40	38.5	36	32.5	28
A	100	Tons	—	—	—	—	12	11	10	9	7	6
		MCr	—	—	—	—	45	45	44	42	39	35
B	110	Tons	—	—	—	—	—	14	12	11	10	8
		MCr	—	—	—	—	—	50	49.5	48	45.5	42
C	120	Tons	—	—	—	—	—	—	16	14	12	10
		MCr	—	—	—	—	—	—	55	54	52	49
D	130	Tons	—	—	—	—	—	—	—	18	15	12
		MCr	—	—	—	—	—	—	—	60	58.5	56
E	140	Tons	—	—	—	—	—	—	—	—	20	16
		MCr	—	—	—	—	—	—	—	—	65	63
F	150	Tons	—	—	—	—	—	—	—	—	—	22
		MCr	—	—	—	—	—	—	—	—	—	70

Nuclear Dampers project a series of nodes and anti-nodes where the strong nuclear force is enhanced or degraded, rendering nuclear warheads ineffective and reducing the effects of high radiation and disintegrators. Dampers must be focused on incoming nuclear missiles and depend on an integral fire control system for efficiency. The nuclear damper table indicates USP factor, tech level, tonnage required, cost, and energy point requirement.

Meson Screens project an interruption of the strong nuclear force, which prematurely causes decay of incoming mesons before they can intrude on the interior of a target. The meson screen table indicates USP factor, tech level, tonnage required, cost in millions of credits, and energy point requirements for the meson screen.

MESON SCREENS

USP Factor	*Energy Points*		*Tonnage and Cost by Tech Level* 12	13	14	15	16	17	18	19	20	21
1	0.002	Tons	90	20	8	5	4	3	2	1	—	—
		MCr	80	45	25	12	10	6	5	4	—	—
2	0.004	Tons	—	30	10	6	5	4	3	2	1	—
		MCr	—	50	30	15	12	8	6	5	4	—
3	0.006	Tons	—	45	12	8	6	5	4	3	2	1
		MCr	—	55	35	20	15	10	8	6	5	4
4	0.008	Tons	—	—	16	10	8	6	5	4	3	2
		MCr	—	—	40	25	20	12	10	8	6	5
5	0.010	Tons	—	—	20	12	10	8	6	5	4	3
		MCr	—	—	45	30	25	15	12	10	8	6
6	0.012	Tons	—	—	24	16	12	10	8	6	5	4
		MCr	—	—	50	35	30	20	15	12	10	8
7	0.014	Tons	—	—	—	20	16	12	10	8	6	5
		MCr	—	—	—	40	35	25	20	15	12	10
8	0.016	Tons	—	—	—	30	20	16	12	10	8	6
		MCr	—	—	—	50	40	30	25	20	15	12
9	0.018	Tons	—	—	—	40	30	20	16	12	10	8
		MCr	—	—	—	60	45	35	30	25	20	15
A	0.020	Tons	—	—	—	—	50	40	20	16	12	10
		MCr	—	—	—	—	50	45	40	35	30	25
B	0.022	Tons	—	—	—	—	—	60	40	20	16	12
		MCr	—	—	—	—	—	60	55	50	45	40
C	0.024	Tons	—	—	—	—	—	—	70	50	20	16
		MCr	—	—	—	—	—	—	70	65	60	55
D	0.026	Tons	—	—	—	—	—	—	—	80	50	20
		MCr	—	—	—	—	—	—	—	80	75	70
E	0.028	Tons	—	—	—	—	—	—	—	—	90	60
		MCr	—	—	—	—	—	—	—	—	90	85
F	0.030	Tons	—	—	—	—	—	—	—	—	—	100
		MCr	—	—	—	—	—	—	—	—	—	100

Explanation: Meson screens have an energy requirement based on the size of the shielded ship: energy points required equal the factor given times ship tonnage. For example, a 20,000-ton ship with a level 4 meson screen requires 160 energy points (0.008 x 20,000).

Globe Generators project a barrier that absorbs all energy and shunts it to onboard capacitors. The barrier prevents all transit across it, and a ship with its black globe on is restricted in its ability to maneuver, fire its weapons, and communicate. These limitations would make the black globe of little value in battle if not for the ability of the field generator to flicker— switching the field on and off many times per second— giving the ship part-time protection while still allowing it to fire, maneuver, and track enemy ships during the "off" intervals. A black globe generator's factor is its maximum rate of flicker; a black globe may be on up to 10% of the time times its factor. For instance, a black globe with a factor of 2 may flicker at a maximum rate of 20%; it is on 20% of the time in every second. In the pre-combat decision step, a player decides the flicker rate of each ship's black globe (if any), which may range from its maximum rate down to zero (off).

Each 10% of flicker acts as two levels of armor, protecting the owning ship and any enemy ship it fires at. For instance, if a ship has a black globe with a factor of 4 operating at the maximum of 40% flicker rate, all damage rolls against the ship will receive a DM of +8, and all damage rolls it inflicts on enemy ships will also have a +8 DM. Unlike normal armor, a black globe also affects meson guns. Further, armor granted by a black globe is not reduced by disintegrators or critical hits.

A black globe generator also affects a ship's ability to maneuver. A ship's agility is reduced by 10% (round fractions to the nearest whole number) for each 10% of flicker rate of its black globe

In addition to the problems above, the globe generator may be overloaded by incoming fire, which causes the failure of the ship's jump capacitors and destruction of the ship. The jump capacitors contained in the ship's jump drive is used to store this energy; additional capacitors may also be purchased. All ships possess jump capacitors equal to 0.005 x ship tonnage x max jump drive factor; for example, a drive capable of jump-3 will include jump capacitors equal to 0.015 x ship tonnage. Each ton of jump capacitors holds up to 36 energy points. Additional jump capacitor tonnage may be purchased at MCr4.0 per ton.

Energy striking a globe generator is diverted to the ship's jump capacitors. When the globe is flickering, a percentage of the incoming energy equal to the flicker rate is absorbed. In order to strike the globe, the weapon must first hit and penetrate all defenses. The amount of energy a weapon transfers depends on its type and factor. Turret and bay weapons inflict a number of energy points equal to their factor times the energy point requirement for one such weapon installed in a turret. Explosive missiles inflict two points times their factor; nuclear and antimatter missiles inflict 100 points times their factor; meson guns inflict 20 points times their factor. Spinal mount weapons inflict their full energy point requirements. For example, a particle accelerator bay with a factor of 8 would inflict 40 energy points each time it hits and penetrates. If the target ship's globe is operating at a flicker rate of 10%, the jump capacitors would absorb 4 EPs. If a ship's globe generator absorbs energy and its jump capacitors are already full, the ship is destroyed.

Stored energy may be removed from the jump capacitors when the globe is off (or during the off intervals of its flicker). During a single combat round, a ship may dispose of its energy from its jump capacitors equal to the number of energy points generated by its power plant, minus 10% for every 10% of flicker rate of the globe generator. For example, if a ship's globe generator is operating at 60% and its power plant has an output of 1,000 EP, 400 EP may be removed from the jump capacitors that round.

Instead of flickering, any globe may be turned completely on. No enemy fire will affect it, but the ship may not fire or maneuver. While the globe is on, all enemy fire automatically hits the globe, and 100% of its energy is absorbed. No energy may be removed from the ship's jump capacitors while the globe is on. All fire also automatically hits (although it may not penetrate the ship's defenses) in the first combat round after the globe is turned off.

If a ship absorbs enough energy to make a jump, and is supplied with sufficient fuel, it may jump at the end of the combat round.

The globe generator table shows the USP factor, tech level, globe type, tonnage, and cost required. Black globes have no energy point cost; white globes do. Devices shown at tech level 15 are used by the Imperium; those at higher tech levels are shown for reference. Black globe generators are not available commercially; they are recovered artifacts installed on a makeshift basis or experimental versions installed on tech level 15 Imperial warships. The acquisition of any globe generator is probably the result of a lucky find on the part of a government, individual, or corporation.

White Globe Generators: Unlike the black globe, white globe generators do not restrict the ship with the globe generator from seeing out or using any sensors, or reducing agility and outgoing offensive fire.

Invisibility: Since a globe field absorbs all energy, a ship with its globe completely on is, at any range over a few kilometers, effectively invisible. In battle, this will have no effect, since a ship that suddenly disappears from enemy sensors in this way will have its course predicted based on its last known position; since the ship cannot maneuver while in the field, the prediction will always be correct.

However, the advantages to a fleet which has not yet been detected by the enemy are immense. Suppose, for instance, that a fleet were to jump into a system with its black globes on and its velocity set upon a predetermined course. It could drift unseen past any defending fleet and drop its globes at a preplanned moment, to bombard a planet or to engage enemy fleets by surprise. Further tactical possibilities are left to the imaginations of the referee and players.

A black globe that is totally on shows up on enemy sensors as a "hole" in space. The prudent commander will flicker his black globe to allow enough emissions from his ship to escape so as to blend in with background levels and effectively be invisible to enemy sensors (roll 1D x 10% to determine the flicker rate needed to currently match local background levels). A white globe's flicker limit is its USP factor –10 (B is 1, C is 2, etc).

GLOBE GENERATORS

Factor	*TL*	*Type*	*Tons*	*Cost (MCr)*	*EP*
1	15	Black	10	400	—
2	15	Black	15	600	—
3	15	Black	20	800	—
4	15	Black	25	1,000	—
5	16	Black	20	500	—
6	16	Black	30	700	—
7	16	Black	35	900	—
8	17	Black	20	500	—
9	18	Black	20	500	—
A	19	Black	20	500	—
B	20	White	2	900	0.004
C	20	White	3	910	0.008
D	20	White	4	750	0.012
E	21	White	2	800	0.016
F	21	White	3	850	0.020
G	21	White	4	900	0.024

Explanation: White globes have an energy requirement based on the size of the shielded ship: energy points required equal the factor given times the tonnage of the ship. For example, a 20,000-ton ship with a factor-E white globe requires 320 energy points (0.016 x 20,000).

JUMP DAMPERS

Factor	*Tech*	*Tons*	*Cost (MCr)*	*EP*
1	21	50	120	400
2	21	100	200	800

Jump Dampers prevent jump projectors from imposing a jump field and throwing a ship into misjump.

PROTON SCREENS

Factor	*Tech*	*Tons*	*Cost (MCr)*	*EP*
1	19	100	75	100
2	20	30	60	200
3	20	40	70	300
4	21	45	45	400
5	21	20	55	500
6	21	25	60	600

Proton Screens render antimatter missiles ineffective. Proton screens must be focused on incoming antimatter missiles and depend on an integral fire control system for efficiency. The proton screen table indicates USP factor, tech level, tonnage required, cost, and energy point requirement.

SPARE SYSTEMS

Spare jump drives, maneuver drives, power plants, computers, and screens may be installed in a ship to take over in the event that the main unit is disabled.

These are backup devices only and may not be in operation at the same time as the main device. The higher-output device is the mainstay and operates under normal conditions; the backup device does not consume fuel or energy points while it is not in use. When the main device takes battle damage that reduces it below the level of the backup, the backup takes over. If the backup is then damaged, the main unit returns to action. Whichever unit has the highest current factor is the one in operation; when damage is received, it is applied to the unit in operation.

For example, a ship may have a computer Model/6 for its main computer and a Model/4 as a backup. If the ship receives three computer hits, reducing the main computer to Model/3, the backup takes over. If the ship takes a further two computer hits, reducing the backup to Model/2, the main computer returns to operation to replace it.

Under no circumstances may a backup and main device be operating at the same time; two power plant-6 drives cannot be used as a power plant-12.

Extended Duration Missions: It may be necessary for a ship to be prepared for extended duration missions. By devoting 1% of the ship's tonnage to expendables, and at a cost equal to the ship's annual

maintenance, a ship can carry stores, spares and munitions to permit a full year away from friendly bases. This may be required for diplomatic or exploration missions, for design or scenario requirements.

AMMUNITION

All missile and sandcaster-based weapons (turrets and bays) must track all ammunition fired. Such launchers (from 1 to 3 launchers in a turret; 50-ton bays are considered to have 25 launchers, 100-ton bays have 50 launchers, for purposes of this rule) can have one missile or canister ready to fire and two additional such loads ready for future combat rounds. Once these three loads are exhausted, the weapon crews must reload them. A crew can load new ammunition from within the weapon space (turret or bay) and still fire the weapons in the same combat round.

Turrets have enough space to store 12 additional missiles or canisters; 50-ton bays carry 100 additional missiles or canisters, 100-ton bays 200 such. Once this ammunition has been used, the weapon must be restocked with ammunition carried elsewhere in the ship (usually in the cargo hold). Restocking takes one combat round, during which the weapon spaces being reloaded cannot operate.

Military ships may be assumed to be carrying additional ammunition as cargo; civilian ships will need track and pay for ammunition. Further, the installation cost of missile launchers assumes the common availability of explosive missiles. The availability of nuclear and antimatter missiles should always be tracked and paid for; costs are shown in the Ammunition Storage table below. Additional ammunition can be safely stored as cargo, 21 missiles or canisters per ton.

Sand and missiles can only be resupplied at class A and B starports at tech levels shown in the table, or if carried as cargo on other ships.

AMMUNITION STORAGE

Type	*TL*	*Cost (Cr)*
Explosive	5	20,000
Nuclear	7	150,000
Antimatter	16	200,000
Sand	7	1,000

SUBORDINATE CRAFT

Whenever a ship carries other ships, big craft or small craft, as part of its complement of vessels and vehicles, provision must be made for hangars and launch facilities for them.

Required Fittings: Small craft (under 100 tons) require tonnage equal to 110% of their tonnage at a cost of Cr2,000 per ton when carried on any ship massing 1,000 tons or less, or on any ship with hull configuration 7 (irregular structure). On ships over 1,000 tons other than configuration 7, they require tonnage equal to 130% of their mass at a cost of Cr2,000 per ton.

Big craft (100 and over, including very large ships 10,000 tons or higher) require tonnage equal to 110% of their tonnage at a cost of Cr2,000 per ton. Big craft require tonnage equal to 100% of their tonnage when carried on ships with hull configuration 7 (irregular structure) at a cost of Cr2,000 per ton.

Vehicle Launch Facilities: Launch facilities must be provided for all ships and craft carried. Such facilities are automatic with irregular structures (configuration 7), allowing all craft to be launched and recovered in a single combat round.

Ordinary launch facilities (available at no cost or additional tonnage) allow one craft to be launched or recovered per combat round per 10,000 tons of hull. Additional launch ports may be purchased, allowing an additional single craft to be launched or recovered per combat round. Each additional launch port requires tonnage equal to the largest craft using the port, at a cost of Cr2,000 per ton.

Launch tubes (requiring 25 times the tonnage of the *largest craft* to use the facility, at a cost of Cr2,000 per ton) allow 40 craft to be launched or recovered per turn. A ship may be built with multiple launch tubes to facilitate such operations.

Drop Capsules: Drop capsules are available as single-man small craft, capable of orbital insertion and landing on planets from orbit. They may also be used as emergency lifeboats. Drop capsule launch facilities may be installed on any vessel. Each launcher may launch 40 drop capsules in a combat round. The drop capsule launch facility requires one hardpoint, 1 ton of space, costs Cr10,000, and stores 1

capsule. Additional launch-ready storage costs Cr1,000 per capsule stored and requires 0.5 tons of space per capsule stored. Additional capsules may be stored as cargo at 0.5 tons each.

DROP CAPSULES AND FACILITIES

Facility	*TL*	*Tons*	*Cost (MCr)*
Basic Drop Capsule	10	0.5	0.002
Assault Drop Capsule	11	0.5	0.010
High Survivability Capsule	12	0.5	0.050
Launcher (stores 1 capsule)	10	1.0	0.010
Launch-Ready Storage (per capsule)	10	0.5	0.001

There are three types of drop capsules: the basic capsule, the assault capsule and the high-survivability capsule. The basic capsule includes only the small personnel compartment and a basic reentry package; it is used as an emergency lifeboat or for landings in areas without planetary defenses. The assault capsule includes extensive ECM equipment and is armored against small weapons fire. The high survivability capsule has similar ECM equipment, but releases a number of decoy capsules during its descent, and is even more heavily armored; only high-energy weapons or field artillery point defense can destroy these capsules.

SHIP'S VEHICLES

After weaponry has been selected, the auxiliary vehicles for the ship must be determined.

SHIP'S VEHICLES

Description	*TL*	*Tons*	*Cost (MCr)*
Wheeled ATV	6	10	0.03
Wheeled AFV	6	10	0.07
Tracked ATV	6	10	0.03
Tracked AFV	6	10	0.07
Hovercraft	7	8	0.20
Air/Raft	8	4	0.60
Prospector's Buggy	8	4	0.75
Speeder	8	6	1.00
GCarrier	8	8	1.00

The various vehicles carried on board ship are not included in the Universal Ship Profile. Those vehicles carried should be adequately described on the ship information form, or reference made to a more complete description. Tonnage within the ship must be allocated equal to the tonnage of the vehicles carried (or empty weapons bays used). Many of the vehicles shown on the vehicle table are described in **Traveller**; the costs appearing here should be used. Ship's vehicles require tonnage (at no cost) equal to their own mass within the hull.

CREW

All starships require a crew to operate and maintain the ship. In general, the crew of the ship must provide enough personnel to operate all machinery and man all weaponry.

As a rule of thumb, the crew for any craft should work out to roughly equal the tonnage of the ship divided by 100, plus any ship's troops and pilots for carried craft. The actual number of crew personnel required for the ship must be computed based on the drives, weaponry, and other equipment carried by the ship. For ships 1,000 tons and under, one person may fill two crew positions, provided they have the skills to perform the work of both positions.

For each department below, round fractions to the nearest whole number. The references below to percentages of officers and petty officers for each department are guidelines for game background; in no case should applying these percentages change the total number of crew for a department.

Command Department: Every starship and non-starship requires a pilot. Each starship displacing greater than 200 tons must have a navigation officer. The pilot of a small craft or non-starship handles its navigation requirements.

Over 1,000 tons, the ship should have a designated commanding officer, an executive officer, a computer officer, two navigation officers, two pilots (both officers), and a communications officer. The department should also have some support personnel, ratings equal to 50% of the total officers in the

department. On large ships (over 20,000 tons), there will be a third pilot (officer), and the overall number of personnel in the command department should amount to 1 per 2,000 tons of ship.

On military ships, the commanding and executive officers are drawn from the Line branch, and ship's pilots will be officers from the Flight branch; other members of the command department may be drawn from any of the naval service branches.

Engineering Section: Craft under 200 tons do not require an engineer. Craft of 200 ton to 1,000 tons require one engineering crewmember for each 35 tons of drives (power plant, jump drive, maneuver drive, and fuel purification plant) installed; craft over 1,000 tons require one engineering crewmember for each 100 tons of drives.

A ship's engineering department should include a knowledgeable chief engineer, a second engineer, and several petty officers; after determining required crews, adjust department for 10% officers and 20% petty officers. All members of the engineering department should be from either the engineering or technical services branch.

Gunnery Department: A spinal mount should have a crew of one per 100 tons of weapon; bay weapons should have a crew of at least two; turret weapons should have a crew of at least one per battery. Each screen device (black globe, damper, meson screen) should have a crew of at least four.

For small craft, the pilot is assumed the gunner for one type of weapon on the craft on a given combat round. If additional weapon types are mounted (small craft could conceivably have three different types of weapons in a single turret), gunners are required for additional weapon types expected to be used at the same time, other than sandcasters. Sandcasters never increase the crew requirements for gunners on small craft. For all craft 1,000 tons and under, including small craft, if turrets with mixed weaponry are mounted, one gunner is sufficient for each such turret, even though those turrets really are three batteries.

After determining required crew, adjust department to 10% officers and 30% petty officers. If the hull size is over 1,000 tons, there should be at least one petty officer for each type of weapon (sandcaster, repulsor, laser, energy weapon, particle accelerator, meson gun, disintegrator, jump projector, tractor or missile) carried by the ship, and an additional petty officer for screens (meson screens, nuclear dampers, proton screens, globe generators or jump dampers), if any, as well as a chief gunnery officer.

Personnel are drawn from the gunnery branch and the technical services branch.

Flight Department: On all military craft, and civilian craft 1,000 tons or more, if the ship has any carried craft, it should have crew for each craft (unless those craft have staterooms for their personnel), and at least one maintenance person per craft. Pilots must be officers, and maintenance personnel are generally ratings. Ships over 1,000 tons with carried craft require a flight control officer. Launch tubes should have a crew of at least ten, which will include a flight supervision officer and a preponderance of petty officers.

In addition, if the ship has more than three vehicles (air/rafts, ATVs, etc), the flight section should include vehicle drivers and maintenance personnel for them as well (at least one per three vehicles). The flight section also provides maintenance personnel for drop capsule launchers (one per three launchers) if they are installed.

All officers are drawn from the flight branch, and all petty officers and ratings are from the technical services branch or the crew.

Ship's Troops: Most ships over 1,000 tons have a marine (or military) contingent aboard which ranges in size from a squad to a regiment. While one troop per 1,000 tons should be considered a design minimum, many ships carry additional troops (typically 3x to 30x the minimum). Such forces are organized according to *Book 4—Mercenary*, and are assigned to the ship; their equipment should be consistent with the tech level of the ship. Ship's troops often fill the role of security forces aboard the ship, and are used for military adventures by the commander where necessary. Ship's troops are also used for damage control parties, manning of some weapons, and boarding actions.

Service Crew: The ship itself may have a requirement for other sections which provide basic services, including shops and storage, security (especially if there are no ship's troops aboard), maintenance, food service, and other operations. The maintenance crew is not a department, but scattered across the ship's organization. All military craft, and civilian craft 1,000 tons or more, require two ratings per 1,000 tons of ship; three per 1,000 tons if there are no ship's troops. Such personnel are drawn from the crew branch if no other appears appropriate

For any ship, if high passengers are carried, then a steward is required. There must be at least one steward per eight high passengers, and one for every 50 middle passengers on the ship.

Medical Department: Every starship 200 tons or greater must have at least one medic on board. A craft will have one medic for every 120 crew and passengers aboard, plus an additional medic for every 20 low passengers and frozen watch personnel. Non-starships under 1,000 tons and small craft do not require dedicated medical crew.

A ship's medical department will be led by a chief medical officer on any ship large enough to require multiple medical officers; after determining required crews, adjust department for 10% officers (doctors) and 20% petty officers (medical specialists). All members of the medical department should be from the medical branch.

Crew Sections: For tracking combat damage against ship's personnel, the crew is divided into sections as shown in the Tonnage table above. Each section has an equal number of crewmembers in it. The *Kinunir*, for example, is a 1,200-ton vessel, with 45 crewmembers. The ship would have two sections, each with 23 members (45 ÷ 2=22.5 or 23).

Frozen Watch: Supplementary crewmembers may be carried in low berths (with competent medical personnel assigned). This frozen watch is then available to replace crew sections disabled in combat. Replacement personnel are kept available in low berths for continuous replacement of casualties and battle losses; between battles, the frozen watch can be revived and used to restore lost crew.

Multiple Frozen Watches: More than one frozen watch may be assigned to a ship. The frozen watch on a ship could replace multiple sections of lost crew providing there is enough crew in cold sleep to replace an entire section. For example, the *Kinunir* has a section with 23 members; with 30 personnel in a frozen watch, one section could be replaced, but the 7 remaining could not fill another lost section.

Sufficient low berths must be installed to carry all frozen watch personnel.

Transfers to Other Ships: Frozen watch personnel may be transferred to other ships, but only between battles. A battle must end before frozen watch personnel can be transferred to other ships in order to crew them.

Accommodations: Accommodations must be provided for the entire crew and any passengers, based on the expected operational time of the craft. In addition to providing sleeping and travel arrangements, these accommodations also provide life support and food for passengers and crew. Low berths and emergency low berths may also be installed, based on the craft's intended mission.

For short term operations, up to a maximum of 36 turns in combat (12 hours), or 24 hours for routine operations, acceleration couches are sufficient for passengers and crewmembers.

For in-system operations of up to a week, sleeper berths must be provided. These allow sleeping and privacy for passengers. For non-commercial transportation, double occupancy is allowed (each person has the facilities for half a day).

For jump-capable craft, and in-system operations lasting longer than a week, passenger and crew staterooms must be provided. High and middle passage passengers must be provided with passenger staterooms. The ship's captain must be provided with a passenger stateroom, as must the commanding officers of each section and the commander of the ship's troops (if any). All other crewmembers must be provided with a crew stateroom. These can be arranged as single rooms, large bunk rooms or in any other way that the architect chooses.

ACCOMMODATIONS

Details	*TL*	*Tons*	*Cost (MCr)*
Passenger staterooms	7	4.0	0.500
Crew staterooms (per person)	7	2.0	0.250
Sleeper berths	7	2.0	0.100
Emergency low berths	9	1.0	0.100
Acceleration couches	7	0.5	0.025
Low berths	9	0.5	0.050

Passenger staterooms require four tons at a cost of MCr0.5 per stateroom. Staterooms actually average about two tons, but the additional tonnage is used to provide corridors and access ways, as well as galley and recreation areas. Crew staterooms are computed at MCr0.25 and 2 tons per person.

Low passengers should be provided with individual low berths. Low berths require 0.5 ton per berth, at a cost of MCr0.05 each.

Emergency low berths weigh one ton and cost MCr0.1; each contains four persons, all of whom share the revival roll. Emergency low berths cannot hold the frozen watch. An emergency low berth can function as an acceleration couch for one person if not in use as a low berth.

SMALL CRAFT

Non-starships less than 100 tons are considered small craft. Production of small craft uses a system which differs in some details from that used for starships and non-starships of 100 tons or more.

Preliminaries: Craft name and class are decided upon. The tech level of the building shipyard is determined.

The Hull: Only hulls of metal may be used for small craft. They are built to tonnages up to 99 tons, at a cost of Cr100,000 per ton. Configurations 0 through 7 (anything but planetoids) may be selected.

Drives: Small craft do not have jump drives. Maneuver drives and power plants are selected from the drive tables and installed. The power plant number must be at least equal to the maneuver drive number, but may be more. No maneuver drive or power plant may be less than 0.1 ton in size; when a computation produces a drive of less than 0.1 ton, use a value of 0.1 ton.

Fuel: Fuel tankage required equals one percent of the ship tonnage times the power plant number. There is no minimum fuel tank size for a small craft. Endurance for small craft should be measured in days or weeks.

Fuel scoops for small craft are automatically assumed to be provided in streamlined or airframe designs. The drives do not require fuel purification plants to allow use of the unrefined fuel.

Energy Points: Energy points are computed as for starships using the standard formula of: EPs=0.01 x craft tonnage x power plant factor. Energy points are used for weapons, computer, and agility.

The Bridge and Computer: Either a bridge or a computer is required on a small craft. If a bridge is installed, it requires 20% of the craft's tonnage (minimum: 4 tons) at a cost of Cr25,000 per ton of bridge. It provides life support and acceleration couches for two persons. A bridge allows operation of the craft; no computer is necessary. If no computer is installed, use factor zero for the computer, and no weaponry may be mounted. For example, a 40-ton pinnace must allocate 8 tons for the bridge at a cost of Cr200,000.

A computer may be installed instead of a bridge. The cost of the computer is paid, and at least one acceleration couch must be provided (one-half ton at Cr25,000) for the pilot. A computer is required if the craft is to mount weaponry.

Both a bridge and a computer may be selected for a small craft. If a computer is installed, but no bridge is present, then the computer is treated as one level lower in combat (Model/2 is treated as Model/1; Model/1 is treated as Model/0, but at least the craft's weaponry may be used).

On small craft, bis models are treated as if they were the standard model of the same level.

Weapons: A small craft may mount the equivalent of one turret. In actuality, the mountings are probably rigid, and no actual turret is present. All computations, however, may assume that the craft carries one turret. Weight, tech level, cost, and energy point restrictions must be observed. The pilot is assumed the gunner for one type of weapon on the craft on a given combat round. If additional weapon types are mounted (a craft could conceivably have three different types of weapons), a gunner is required for additional weapon types expected to be used at the same time. Exception: no additional gunner is required for sandcasters.

Crew: One crewmember is required for the small craft—a pilot. The pilot must be provided with an acceleration couch and life support (one-half ton; Cr25,000) specifically, or with a bridge. One or more gunners may be optional crewmembers. Each crewmember must be provided an acceleration couch and life support. A bridge allows two crewmembers automatically.

Passengers: Provision for passengers is on the same basis as for crew. Each requires an acceleration couch and life support at one-half ton, Cr25,000. Such passenger couches can be easily removed to convert the space to cargo hold. Low berths and emergency low berths may also be installed.

Accommodations: For supporting operations for longer duration, accommodations such as sleeper berths or staterooms may be installed as required.

Cargo and Other Provisions: Cargo hold can be formed from otherwise unused tonnage at no cost. Other provisions may be designated by the referee.

Agility: Energy points remaining after weapons and computer installation are used to determine agility. Divide the remaining energy points by 1% of the craft's tonnage, dropping all fractional points. The result is the craft's agility factor.

SMALL CRAFT EXAMPLES

20-ton Launch QL-0202201-00000000-00000000-0 MCr3.84 20 tons
batteries no weaponry installed TL=9.
Crew=1. Passengers=1. Emergency Low=6. Cargo=5. Fuel=2.8. EP=0.4. Agility=2.

30-ton Ship's Boat QB-0206601-00000000-00000000-0 MCr9.14 30 tons
batteries no weaponry installed TL=9.
Crew=1. Passengers=6. Cargo=9.2. Fuel=1.8. EP=1.8. Agility=6.

40-ton Pinnace KK-0205821-00000000-10000000-0 MCr23.32 40 tons
batteries bearing 1 TL=9.
batteries 1 Crew=1
Passengers=6. Cargo=8.6. Fuel=3.2. EP=3.2. Agility=5.

STARSHIP DESIGN CHECKLIST

1. Determine ship name and ship type.
2. Determine tech level of building shipyard.
3. Determine tonnage and hull configuration.
4. Select jump drives, maneuver drives, and power plant.
5. Determine fuel tankage. Consider fuel tankage options, fuel scoops and purification plant.
6. Compute energy points available.
7. Allocate bridge and select computer.
8. Select hull armor.
9. Select spinal mount.
   A. Particle accelerator.
   B. Meson gun.
   C. Disintegrator.
   D. Jump projector.
10. Select bay weaponry.
    A. Repulsors.
    B. Energy weapons (fusion or plasma guns).
    C. Particle accelerators.
    D. Meson guns.
    E. Disintegrators.
    F. Tractors.
    G. Missiles.
11. Select turret weaponry.
    A. Sandcasters.
    B. Lasers (pulse or beam).
    C. Energy weapons (fusion or plasma guns).
    D. Particle accelerators.
    E. Disintegrators.
    F. Missiles.
12. Select screens.
    A. Meson screens.
    B. Nuclear dampers.
    C. Proton Screens
    D. Globe Generators.
    E. Jump Dampers.
13. Select small craft and ship's vehicles. Note number carried.
14. Determine ship's crew and allocate quarters.
    A. Consider ship's troops.
    B. Consider frozen watch.
15. Note cargo, passengers, and other areas.
16. Total all energy points committed to weaponry and other items, and use the remaining EP's to compute the ship's agility factor.
17. Insure that tonnage does not exceed the hull tonnage.
18. Total the cost of components and determine architect's fees.
19. Determine volume discounts, if any.
20. Determine the total cost for the ship.
21. Utilize the information from the ship design worksheet to produce *High Guard* ship statistics for the vessel.

SHIP DESIGN WORKSHEET				Ship Name			
		Tons	*MCr*	*EPs*	*Crew*	*Factor*	*Notes*
	Tonnage						
	Jump Drive						
	Maneuver Drive						
	Power Plant						
	Jump Fuel						
	Power Plant Fuel						
	Fuel Scoops						
	Purification Plant						
	Bridge						
	Computer						
	Armor						
	Spinal Mount						
Bays	Repulsors						
	Energy Weapons						
	Particle Accelerators						
	Meson Guns						
	Disintegrators						
	Tractors						
	Missiles						
Turrets	Sandcasters.						
	Lasers						
	Energy Weapons						
	Particle Accelerators						
	Disintegrators						
	Missiles						
Screens	Meson Screen						
	Nuclear Damper						
	Proton Screen						
	Globe Generator						
	Jump Damper						
	Small Craft						
	Crew –Officers						
	Crew –Ratings						
	Low Berths						
	Troops						
	Cargo						
	Total						
	Architect						
	Discounts						
	Total						

SMALL CRAFT DESIGN CHECKLIST

1. Determine craft name and craft type.
2. Determine tech level of building shipyard.
3. Determine tonnage and hull configuration.
4. Select maneuver drives and power plant.
5. Determine fuel tankage. Consider fuel scoops and purification plant.
6. Compute energy points available.
7. Allocate bridge and select computer, if any.
8. Select hull armor.
9. Select weaponry.
   A. Sandcasters.
   B. Lasers (pulse or beam).
   C. Energy weapons.
   D. Particle accelerators.
   E. Disintegrators
   F. Missiles.
10. Select screens.
    A. Meson screens.
    B. Nuclear dampers.
    C. Proton Screens
    D. Globe Generators.
    E. Jump Dampers.
11. Select small craft and craft's vehicles. Note number carried.
12. Determine craft's crew and allocate quarters
    A. Pilot's and passengers' couches.
    B. Sleeper berths and low berths.
13. Note cargo, passengers, and other areas.
14. Total all energy points committed to weaponry and other items, and use the remaining EPs to compute the craft's agility factor.
15. Insure that tonnage does not exceed the hull tonnage.
16. Total the cost of components and determine architect's fees.
17. Determine volume discounts, if any.
18. Determine the total cost for the craft.
19. Utilize the information from the craft design worksheet to produce *High Guard* ship statistics for the vessel.

SMALL CRAFT DESIGN WORKSHEET			Craft Name			
	Tons	*MCr*	*EPs*	*Crew*	*Factor*	*Notes*
Tonnage						
Maneuver Drive						
Power Plant						
Power Plant Fuel						
Bridge						
Computer						
Armor						
Weaponry: Sandcasters.						
Weaponry: Lasers						
Weaponry: Energy Weapons						
Weaponry: Particle Accelerators						
Weaponry: Disintegrators						
Weaponry: Missiles						
Screens: Meson Screen						
Screens: Nuclear Damper						
Screens: Proton Screen						
Screens: Globe Generator						
Screens: Jump Damper						
Crew –Officers						
Crew –Ratings						
Low Berths						
Troops						
Cargo						
Total						
Architect						
Discounts						
Total						

Combat

This combat system makes use of the Universal Ship Profiles (USP) generated by the previous starship construction rules. Certain assumptions are made with these rules: first, that an encounter has occurred and that it must be resolved by combat, and second, that the starships invoked have been classified using USPs.

Combat using these rules may be one-sided (the referee manipulates the opposition) or two-sided (with players controlling their own squadrons on each side).

REQUIRED MATERIALS

In addition to these rules (and to the ubiquitous six-sided dice) the following materials are required for each ship involved:

1. A Marker. This marker indicates the ship and may be as simple as a cardboard counter, or as elaborate as a miniature starship figure or model.

2. A Ship Data Sheet. Completely filled-out, this form provides the data for the ship to use in combat. Temporary combat results are marked on the form. Alternatively, each ship may be listed by USP (and other data) on a sheet of paper using the format given in ship construction; allow sufficient space around each USP to mark combat results.

SCALE

High Guard III uses the following scales in this space combat system:

1. *Distance* is represented by two indeterminate ranges which are labeled *short* and *long*. Short range represents a distance of approximately 1.5Mkm or less. Long range extends out to 4.5Mkm; ships beyond that range cannot fire.
2. *Time* is represented by *rounds* equal to twenty minutes each.
3. *Units* represented are individual ships, small craft, and fighters.

SEQUENCE OF PLAY

The combat procedure is played in a series of turns or combat *rounds*. Each combat round is divided into a series of discrete steps, in each of which different actions may be performed. In turn, these steps are performed in a definite sequence. No action may be performed out of sequence. The steps of a combat round are repeated and explained in the rules below.

COMBAT ROUND SEQUENCE

1. **Battle Formation Step.** Both players determine their battleline and reserve positions. Craft are launched and recovered.
2. **Initiative Determination Step.** Dice determine who has the initiative. The player with the initiative is called the attacker for the round.
3. **Range Determination Step.** The attacker decides the range for the round.
4. **Pre-Combat Decision Step.** Each player decides for each ship:
   A. Whether to break off this round,
   B. Whether to use emergency agility,
   C. If black globe will be on.

   The defending player announces all such decisions before the attacker.
5. **Combat Step.** Players arrange their battlelines by size with largest ship first. Attacker then presents his first ship as a target for the combat procedure. Then the defender presents his first ship. Combat continues with players alternating until all ships in both battlelines have been presented as targets. For each ship, the combat procedure is:
   A. *Fire Allocation.* Firing player indicates which batteries will fire.
   B. *Hit Procedure.* Firing player determines which batteries have scored hits.
   C. *Defensive Fire.* Target uses its defensive batteries to prevent enemy weapons from penetrating.
   D. *Passive Defense.* Passive defensive screens must be penetrated.

E. *Damage Determination.* Batteries which hit and penetrate all defenses must determine the damage they inflict. Damage is recorded but does not apply until step 6.
F. *Fire procedure begins* for the next ship.

6. **Damage Step.** Damage inflicted during combat (5E) takes effect.
7. **Breakthrough Step.** If one player's battleline has been broken, ships in the battleline of the victorious player may fire again at any ships in the enemy reserve position. Go through steps 5 and 6 again; ships in the enemy reserve position may not fire except defensively.
8. **Pursuit Step.** Ships which are breaking off may be pursued by enemy ships.
9. **Terminal Step.** Planetary bombardment, refueling, revival of the frozen watch, and other non-battle operations are performed.

SURPRISE AND DETECTION

Scenario conditions may indicate that one player has achieved surprise on the other. A surprised player is automatically the *defender* (see Initiative) on the first round, and his units cannot engage in offensive fire.

Globe Generators*:* If an attacker with surprise has a battleline of units all possessing globe generators, then the attacker may select any range on the first round, and the defender may not place any units in the reserve in the first round.

Ship Details: At long range, the size and presence of a spinal mount must be revealed, as well as the flickering rates of globe generators. For players with significant intelligence resources about their opponent's fleet, class details would be available. Unique ship details (refits, variants, crew modifications, etc) can be identified at short range.

BATTLE FORMATION STEP

Both players form their ships into two lines each. The first is the battleline; the second is the reserve. Ships in the battleline may fire and be fired upon. Ships in the reserve are screened; they may not fire and may not be fired upon unless their defending battleline is broken (see Breakthrough).

Remember that if a surprised defender faces an attacker with a battleline of units all possessing globe generators, the defender may not place any units in the reserve in the first round.

Launch and Recovery: Ships carrying vessels (small craft or big craft) may launch or recover them. A launch facility may launch one craft each per round. A launch tube may launch up to forty craft in a turn. A ship with an irregular structure configuration may launch all its vessels in one combat round. Recovery of craft is performed at the same rate. Such vessels are ready to engage in combat in the same combat round that they are launched.

Reinforcements: If a scenario indicates that reinforcements are available to a player on a certain round, they are ready to engage in combat in the same combat round that they arrive.

INITIATIVE DETERMINATION STEP

Initiative for each combat round is determined by each player making a die roll, with modifications. The player with the higher die roll has the initiative and is termed the *attacker*; the other player is the *defender*. Note that this has nothing to do with who fires at whom. In the case of a tie, roll again.

There are three possible DMs on the initiative die roll:

1. The player with the most agile fleet (including ships in the reserve) is allowed a DM of +1; this is defined as the one whose least agile ship has the highest agility. For example, if one player has three ships with agility 5, 5, and 1 while a second player has three with agilities of 2, the second player has the most agile fleet. Because a ship can be designed with an agility higher than its maneuver drive, and because the maneuver drive can take battle damage separately, remember to use the lower factor (agility or maneuver) in this step.
2. The player with the most ships in his or her battleline (all those counted must be capable of both fire and maneuver) is allowed a DM of +1.
3. If the fleets are being used as a part of a campaign, and **Traveller** characters are operating the fleet, then each player may use the Fleet Tactics skill of the overall commander of their fleet as a DM to the initiative die roll.

Remember that the surprised player is always the defender the first round, and cannot engage in offensive fire.

RANGE DETERMINATION STEP

There are two possible ranges of engagement: long and short. All ships in *a* battle are at the same range of engagement. This range may alter from round to round. On the first round of any battle, however, the range is automatically long. On each subsequent round, the attacker chooses the range. Missiles are most effective at long range. Lasers, particle accelerators, and meson guns are most effective at short range. Energy weapons fire only at short range.

Globe Generators*:* If an attacker with surprise has a battleline of units all possessing globe generators, then the attacker may select any range on the first round, and the defender may not place any units in the reserve in the first round.

Separation: If the owner of a disabled ship is the attacker and changes range from short to long, any disabled ships belonging to the attacker are considered separated for purposes of boarding.

PRE-COMBAT DECISION STEP

There are several decisions players must make before the firing begins. The defender must make all these decisions before the attacker.

Emergency Agility: A ship may be declared to be using its emergency agility during the Pre-Combat Decision step. If so, the ship may fire only defensive weaponry, but its agility becomes equal to its maneuver drive or its power plant number, whichever is less. The ship may still use its computers and screens. Ships using emergency agility must be in the reserve or attempt to breakoff; they may not engage in ramming attempts.

Breakoff Attempts: There are two ways for a ship to break off from the battle: by jumping out of the system or by accelerating away from the enemy. Ships may attempt to break off one at a time or in groups.

Jumping: A ship which breaks off by jumping must have a destination and enough fuel to get there. It must expend energy points equal to two rounds output from a power plant whose number is equal to the jump being attempted (required EP = 0.01 x ship tonnage x jump factor). If it can do this in two rounds, it jumps at the end of two rounds. If it can do this in one round or less, it jumps at the end of one combat round (in the pursuit step). A ship which cannot summon the required energy in two rounds may not jump at all. For instance, if a ship with power plant-8 attempts jump-5, it takes two rounds; if it attempts jump-4 (or less), it takes only one round. Energy used to power the jump may not be used for other purposes. Ships may jump from the battleline or from the reserve; they may jump at any range of engagement.

Acceleration: Ships may only breakoff by acceleration if the attacker set the combat range to long in the Range Determination step. Any ship breaking off by acceleration automatically escapes at the end of the pursuit step if it is not pursued (see Pursuit). A ship may break off from the battleline or from the reserve.

Escorting: Any unit may be declared to be escorting another, as long as it has the same or higher agility than the unit being escorted, and all units involved are in the same line (battleline or reserve). Half of an escort's batteries bearing of defensive weapons (except sandcasters) are treated as if they are on the unit being escorted for the remainder of the combat round. Small craft serving as escorts may use all batteries, including sandcasters. Escorts may still use all their weapons for defensive fire against attacks on themselves, but such weapons can still only be used once in a combat round.

No unit may have a number of escorting units exceeding its current computer factor. Small craft squadrons count as a single unit for this purpose.

Screening: Any unit may be declared to be screening another, as long as it has the same or higher agility than the unit being screened, and all units involved are in the same line (battleline or reserve). Such vessels serve much like escorts, except that they give the screened unit one additional agility factor against all incoming attacks (agility given in this fashion is not limited by power plant or maneuver drive factors). If the screened unit is penetrated by any attack, one screening unit automatically receives a Critical Hit result and cannot continue screening in this combat round.

No unit may have a number of screening units exceeding its current computer factor. A unit cannot have both escorting and screening units in the same combat round. Small craft cannot screen, even as squadrons.

Globe Generators: Any unit equipped with a globe generator may declare or change its flicker settings during the Pre-Combat Decision step.

Ramming: If the attacker set the combat range to short during the Range Determination step, vessels may declare they are attempting to ram, and must specify the targeted unit.

COMBAT STEP

In the combat step, all ships in both sides' main battlelines may fire their weapons at any other ships in the enemy battleline. To avoid chaos, this procedure has been ordered.

To begin, each player organizes the ships in his or her battleline in order of size with the largest first. Fire is conducted with one ship at a time as target. First, the attacker (the player with the initiative) puts forward his or her largest ship. The defender may fire at it with any of the batteries of any of his or her ships. He may fire as many or as few batteries as he wants, from any combination of ships. He may even decline to fire at all. After all fire against that ship has been resolved (but remember that damage does not take place until the damage step), the defender puts forward his largest ship and the attacker's ships may fire. This continues with players alternating until all ships have been exposed to fire (but not necessarily fired upon) once. If one player has more ships than the other does, the rest are exposed to fire at once after the other player's last ship.

Each battery on a ship may fire once in the combat round, either offensively against another ship, or defensively against incoming fire.

Fire against each ship occurs in the following sequence:

A. All batteries which will fire against that ship must be stated.
B. Dice are rolled for each battery to determine if it scored a hit.
C. For each battery that achieved a hit, dice are rolled to determine if it penetrated the defensive fire of the target. Each battery fired by the target ship (or its screens and escorts) as defense may not be fired again in the round.
D. Dice are rolled to determine if the passive defenses of the target ship are penetrated,
E. If the battery has hit and then penetrated all defenses, then damage inflicted is determined.

There is an attack table for each type of weapon. The first portion gives the hit number for each weapon factor. This is the number which must be rolled or exceeded on two dice in order to score a hit. The die roll may be modified by a number of factors as indicated in the notes to each table. If the weapon does not score a hit, there is no further effect.

If a weapon does score a hit, then it must penetrate first any defensive weapons and then any passive defenses. Defensive weapons (sandcasters, missiles, repulsors or beam weapons used as missile defense, for example) must be allocated against specific hits. For instance, if a ship has eight laser batteries and has been hit four times by enemy missile batteries, the player may allocate two laser batteries against each missile battery hit, all eight lasers against one of the missile battery hits, or any other combination which satisfies the player. Passive defenses (various screens or the ship's configuration) resist each battery that hits. Both defensive weapons fire and passive defenses are resolved in the same way.

Such defenses have a "to pen" formula, which determines the number which must be exceeded on two dice to penetrate the defense. The formula indicates what factors and modifiers apply to each weapon type. If there is no "to pen" formula for a defending weapon or passive defense, that defense is useless against that weapon.

Close Attacks: If the range is short during the Range Determination step, small craft squadrons can make close attacks during the Combat step. Squadrons designated as making close attacks may be attacked with a modifier of +1 to hit; the squadron attacks its target with modifiers of +2 to hit, +1 to penetrate, cumulative with modifiers for already being at short range. The target ship cannot use spinal mounts against the close attacking squadron.

Intercept: If the range is short during the Range Determination step, small craft squadrons may intercept other small craft squadrons during the Combat Step. When a player declares a small craft squadron is making a close attack, the other player may (if they have a small craft squadron which has not fired yet) select one of their own squadrons to intercept. The result is as if the two squadrons had engaged each other (see Dogfighting).

Dogfighting: If the range is short during the Range Determination step and small craft squadrons engage each other during the Combat step, both squadrons are considered *dogfighting*. All the DMs for making close attacks apply to both squadrons; however, neither squadron applies the other's agility as a negative modifier for combat.

BREAKTHROUGH STEP

A breakthrough occurs if all of one player's battleline ships have been rendered incapable of firing any offensive weapons. If this occurs, the other player is allowed to fire all of his or her battleline ships at any of the ships in the enemy's reserve. The formerly protected ships are not allowed to return offensive fire, but may use their weapons defensively.

In the next combat round, the player may form a new battleline.

PURSUIT STEP

Ships breaking off by acceleration must begin at long range; they may break off from the battleline or the reserve. Ships may break off alone or in groups; a group breaks off at the agility of its least agile ship (agility being the lower of agility or maneuver factor). Similarly, a group of pursuers follows at the speed of their least agile ship. Thus, given all the other characteristics and capabilities of ships in combat pursuit situations, agility determines their basic ability to flee or pursue.

Ships breaking off from the reserve (assuming the battleline has not been broken through) do so as if their agility is two greater than they are. Enemy ships (from the battleline or the reserve) may pursue if their agility is at least equal to that of the group breaking off. Each group of pursued and pursuers forms a small engagement of its own. No ships ever return to the main engagement. Ships may attempt to break off from their pursuers. A ship succeeds in breaking off if it is not pursued. Emergency agility may be used to determine agility for the purpose of break off and pursuit, if it has been declared. Ships which succeed in breaking off are in the outer system (see Campaign Rules).

For example, suppose three Imperial ships, the *Alpha* (agility 4), *Beta* (5), *and Gamma* (5) are fighting three Solomani ships, the *Chi* (6), *Psi* (5), and *Omega* (5). The *Omega* has an emergency agility of 6. The Imperial player puts the *Gamma* in the line and his other two ships in reserve; the Solomani puts Chi and Psi in the line and Omega in reserve. The Imperial player wins the initiative and chooses long range. In the pre-combat decision step the Solomani, suspecting a break-off attempt, decides to use the *Omega's* emergency agility. Sure enough, the Imperial player announces that all three of his ships will break off individually. The combat step passes without significant damage to ships on either side. In the pursuit step, the *Beta* automatically escapes because her agility-5 is raised to 7 by being in the reserve; none of the Solomani can catch her. *Chi* and *Omega* (agility-6 each) pursue the *Alpha* (also effectively agility-6) as a group. *Psi* pursues *Gamma.* In the next round, *Alpha* is incapable of breaking off and will probably be destroyed. *Gamma,* fighting *Psi,* again gets the initiative and again tries to break off. In the combat step, she achieves a fortunate hit on *Psi's* maneuver drives and suffers no corresponding damage herself. *Psi* now has an agility-4 and is unable to pursue, so *Gamma* escapes.

SMALL CRAFT SQUADRONS

Well-armed small craft carried by large ships to act as patrol vessels and screens are normally useless in battles against larger ships; their relatively smaller weapons cannot hit, much less penetrate the defenses of larger ships. When organized into squadrons, small craft gain expanded capabilities.

Organization: To make use of squadron tactics and capabilities, small craft must be organized into squadrons of two to ten small craft. While the craft do not have to be of the same design (or size), they must all have the same agility. If an off number of craft remain after a number of whole squadrons has been assembled, they can be formed into an under strength squadron. Such a squadron should be noted on the Ship Data Sheet. A single small craft may not function as a squadron in any fashion.

What makes a squadron useful is that when a squadron is launched as a squadron, the owning player may combine all of the turret weapons of the squadrons into batteries as if the squadron was a single ship. The computer, armor and screen factors of the squadron are averaged (dropping fractions) to provide one factor for the squadron for combat purposes.

When applying damage to a squadron, all damage from a battery must be applied to a single craft of the squadron when possible, before applying excess damage to other craft. Hits to a squadron must be applied evenly; once a craft has damage applied from a battery attacking the squadron, additional damage may not be applied to it until all other craft in the squadron have been damaged.

EVACUATION

Crew on ships which are doomed for some reason or another may abandon ship. Because of the time reflected by each combat round, a ship's owner may declare this in effect at any time during a combat round (including when the ship is under fire during the Combat step). However, should this declaration not occur prior to a ship's destruction, no evacuation of that ship was possible.

Once a ship is declared to be under evacuation, the following procedure is used. For each carried craft capable of spaceflight, roll 2D x10; this result is the percentage of the craft's passenger capacity that is occupied upon evacuation. Lifeboats (any carried craft with emergency low berths) have a DM of +2 on this roll, due to easy accessibility. Note that an evacuating craft may be overloaded, and the life support systems onboard may suffer.

Ships equipped with drop capsule launchers may also use them for evacuation.

Crew remaining aboard after all the small craft have departed may escape in vacc suits. Roll 2D and multiply by 10 for the percentage which escapes out of those remaining (results over 100% are considered to be equal to 100%).

BOARDING

Disabled enemy ships may be captured by boarding. In order for boarding to take place, two conditions must be satisfied.

First, the ship to be boarded must be disabled; it must be incapable of maneuvering, all of its offensive weapons must be disabled, and it must not have a working globe generator (black or white).

Second, it must be separated from protecting friendly ships; this is assumed to occur if, at any point after the ship is disabled, the owning player has the initiative and changes range from short to long (retreating, in effect).

At any time thereafter, the ship may be boarded. Any ship capable of maneuver may attempt to board, and may do so from the safety of the reserve. A boarding party consists of the ship's troops. If the ship has no marines, it will have security troops (consisting of one-third of the ship's service crew section); only marines and troops may board. The entire remaining crew of the disabled ship may defend.

Boarding actions may be resolved using deck plans and **Traveller** personal combat rules, or the *Snapshot* or *Azhanti High Lightning* rules, or the following abstract system may be used.

Boarding Action Resolution: Each player rolls one die, and applies the following DMs. For each five marines, +1. For each ten (non-marine) troops, +1. For each 50 (non-marine, non-troop) crew, +1. If there is a tech level difference between the two sides, the higher TL side applies the difference as a +DM to their throw. The player with the higher modified die roll gains (or retains) control of the ship. In the case of ties, roll again. Win or lose, each side takes casualties equal to twice the other side's modified die roll. If a boarding attempt succeeds, all surviving enemy crew are taken prisoner; the boarding party becomes a prize crew and may make use of all still-operating ship systems. Additional crew may be transferred to the captured ship, to make repairs, and perhaps even to return it to combat. If the attempt fails, the boarding player is forced outside the ship. They (or anyone else) may attempt to board again in a later combat round. A captured ship may be the target of a boarding party from the original owning player.

THE FROZEN WATCH

A ship's frozen watch is a reserve pool used to replace crew casualties. If a ship has a frozen watch, it may be revived and used to replace one or more crew sections; for instance, a ship which has been reduced to a crew factor of 2 may restore its factor to 3 by reviving a crew section from the frozen watch.

This process takes two combat rounds. Obviously, if the frozen watch has been revived and the ship suffers another crew hit, the frozen watch may not be revived a second time.

For all crew sections damaged during combat, a dice roll of 9+ indicates that crew section survived after combat. A similar roll is allowed if a ship suffers the frozen watch or ship's troop critical hits in combat.

Transfers to Other Ships: Frozen watch personnel may be transferred to other ships, but only between battles. A battle must end before frozen watch personnel can be transferred to other ships in order to crew them.

DAMAGE CONTROL AND REPAIR

It is possible for a ship to undertake emergency repairs during a battle. The ship must be in the reserve and its crew must be intact (at least half of its original crew sections available). The crew may attempt to repair one ship system for every three active crew sections (minimum one repair per combat round).

Attempts may be made to repair weapons (both offensive and defensive), screens, drives and power plants, and computers. The effects of critical hits may not be repaired. A repair attempt takes one combat round, and succeeds on a dice roll of 9+. A successful repair attempt negates the effect of one hit; in most cases, this means that the repaired system regains one lost factor; weapons batteries that were knocked out with one hit are restored to full function.

The crew may not attempt to repair the same system more than once in a combat round (although different batteries of the same weapon type may be repaired). The referee should keep in mind that these emergency repairs are jury-rigged and may not survive long under hard usage.

Field Repairs: Any ship system not the victim of *a* critical hit may be repaired after battle at no cost and in no time, provided the ship's crew factor is intact (at least half of its original crew sections available). All systems which suffered a partial loss (loss of factors) have half their lost factors restored, rounding fractions up. Fuel tanks are restored to full capacity (although lost fuel is not replaced). Half of all batteries which were knocked out are restored to full factor, and half are restored to half factor, rounding fractions up. Crew losses may not be repaired, although many of those lost will be only wounded and will be frozen pending delivery to naval base hospitals. Critical hits (including lost armor) may not be repaired.

Breakdown: Field repairs tend to break down. Roll 8+ once a week per repaired system for breakdown: once for each drive, screen, battery, or other system. The roll is made the first time the system is used; if it is not used roll at the end of the week. Consequences of breakdown (aside from the system not working) are up to the referee. Allowable DMs are –1 for each previous week in which the system did not break down and –2 if an entire week is spent doing nothing but repair (no jumps, battles, refueling, etc.). The best possible total DM is –3. The referee may impose additional DMs for heavy (or careful) use of the system. If a system breaks down it must be repaired again, but there are no further penalties.

Starport Repairs: Full repairs may be done at any class A or B starport, but jump drive repairs require double cost and time at class B starports. In any case, repairs must be conducted at shipyards of the required tech level (although the referee may make exceptions). The time required for repairs is one to four weeks for non-critical damage and four to eight weeks for critical hits.

Field repairs are ignored: all original combat damage must be repaired. The cost is full cost of the system for a critical hit and one-fourth the cost of the system for other damage. Systems which were reduced to partial factor cost one-fourth the full cost times the percentage lost; for instance, if a level 8 meson screen were damaged to level 7, the cost of repair would be 1/4 x 1/8 or 1/32 the cost of a new meson screen.

Repair of a destroyed fire control system (a critical hit) costs one-tenth the cost of all ship batteries except the spinal mount.

Crew or frozen watch casualties are replaced free at any naval base.

In campaign games, repairs at starports require shipyard capacity equal to the ship's tonnage.

Jump Failure: Ships unable to jump because of critical hits on their power plant, jump drive, computer, or bridge present a special problem. If the bridge or computer is out, another ship may be linked to it for jump; the linking ship must have a computer and bridge as least as large as that of the damaged ship, and linking takes one week. Both move at the jump rate of the slowest ship and maneuver is

impossible while linked. Roll for breakdown of the link after every jump; repair takes another week. Ships whose power plants or jump drives have been destroyed must either be transported to a starport inside a tender or be repaired in place. To repair a ship in place, first a message must be sent to a starport capable of repair; a new drive must be transported to the damaged ship; and it must be inserted, taking double the normal repair time (although not double cost).

INDIVIDUALS

The skills of individual participants in a battle may affect its outcome, and the reverse is certainly true.

Skills. The skills of player characters, if sufficiently higher than average, may have a noticeable effect on the battle. The average skill level of a non-player character in his assigned job (and hence the background level of the combat system) is assumed to be two. Higher skill levels are useful in four cases:

Leader: The skill level of a ship's captain affects the crew significantly. Subtract one from the skill level of the captain of the ship or craft and divide by three, dropping fractions. The resulting number is used as a +DM or split up as +DMs to other skill rolls. If the ship's captain is providing +DMs using other skills (such as Pilot or Ship's Tactics), he cannot provide +DMs using Leader in the same combat round.

Fleet Tactics: The skill level of the fleet commander is a +DM to the initiative die roll. See the initiative determination step. Rather than apply this DM to initiative, the fleet commander may specify one ship on their side and apply it as Ship's Tactics skill to that single ship (or squadron); if this is done, it may not stack with a Ship's Tactics +DM already provided by that ship's captain or squadron commander.

Ship's Tactics: The skill level of a ship's (or small craft's) captain affects its performance. Subtract one from the skill level of the captain and divide it by two, dropping fractions. The resulting number is used as a +DM to the ship's effective computer level (a computer model/5 is treated as a model/6). The computer must be operating at a minimum of level 1 for the modifier to apply. When used by the commander of a small craft squadron, this DM extends to all craft in the squadron.

Pilot: The skill level of a ship's command pilot affects its maneuver. Subtract one from the skill level of the ship's command pilot and divide by two, dropping fractions. The resulting number is used as a +DM to the ship's effective agility. The ship's agility must be at least one for the modifier to apply. This modifier applies after any reduction for the ship's maneuver factor being less than its agility factor, and applies to emergency agility as well.

Ship's Boat: Treat ship's boat for small craft in the same way as pilot for ships.

Gunnery: The skill level of a craft's gunner affects its combat ability. Subtract one from the skill level of the gunner of a battery and divide by two, dropping fractions. The resulting number is used as a +DM to hit in combat.

Engineering: The skill level of a craft's chief engineer affects damage control. Subtract one from the skill level of the chief engineer and divide by two, dropping fractions. The resulting number is used as a +DM for damage control attempts.

Medical: The skill of a ship's medical officer affects crew survival after combat. Subtract one from the skill level of the medical officer and divide by two, dropping fractions. The resulting number is used as a +DM for crew section survival, and repairing critical hits suffered against the frozen watch and ship's troops.

Communications: The skill of a ship's communications officer affects detection. Subtract one from the skill level of the communications officer and divide by two, dropping fractions. The resulting number is used as a +DM for detection activities.

COMBAT RESOLUTION

All listed Combat Modifiers apply to all weapon types (including ramming attempts).

COMBAT MODIFIERS

DMs Allowed To Hit:
- +Attacker computer factor.
- –Attacker size modifier.
- –Target computer factor.
- +Target size modifier.
- –Target agility factor.
- *Meson Gun: +2* at short range.
- *Missiles:* –1 at short range.
- *Lasers:* –1 at long range.
- *Energy Weapons:* not allowed at long range.
- *Tractors:* not allowed at long range.
- *Squadron Close Attack:* +2
- *Target Making Close Attack:* +1

DMs Allowed To Penetrate:
- +Attacker computer factor.
- –Attacker size modifier.
- –Target computer factor.
- +Target size modifier.
- *Energy Weapons: +2.*
- *Squadron Close Attack:* +1

SIZE MODIFIERS

Size Factor	*Modifier*
0 (zero)	0
1 to A	1
B to K	2
L to P	3
Q+	4

MISSILES

Missiles must be designated explosive, nuclear, or antimatter before the attack. Explosive missiles ignore nuclear dampers and proton screens. Nuclear missiles stopped by nuclear dampers, or antimatter missiles stopped by proton screens, have no effect.

Missiles must achieve the to hit number or greater on two dice. If a hit is achieved, then sandcaster, beam weapons (pulse or beam laser, and plasma or fusion gun), defensive missiles, disintegrators, repulsors, and possibly nuclear dampers or proton screens must be penetrated (throw the number shown or greater on two dice). If all throws succeed, go to the damage tables.

	Attacking Missile Factor												
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*A*	*B*	*C*	*D*
To Hit	6	6	5	5	4	4	3	3	2	2	1	1	0

Beam, Missile or Sand

	Attacking Missile Factor												
To Pen	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*A*	*B*	*C*	*D*
1	5	4	3	2	1	0	0	0	0	0	0	0	0
2	6	5	4	3	2	1	0	0	0	0	0	0	0
3	7	6	5	4	3	2	1	0	0	0	0	0	0
4	8	7	6	5	4	3	2	1	0	0	0	0	0
5	9	8	7	6	5	4	3	2	1	0	0	0	0
6	10	9	8	7	6	5	4	3	2	1	0	0	0
7	11	10	9	8	7	6	5	4	3	2	1	0	0
8	12	11	10	9	8	7	6	5	4	3	2	1	0
9	13	12	11	10	9	8	7	6	5	4	3	2	1
A	14	13	12	11	10	9	8	7	6	5	4	3	2
B	15	14	13	12	11	10	9	8	7	6	5	4	3
C	16	15	14	13	12	11	10	9	8	7	6	5	4
D	17	16	15	14	13	12	11	10	9	8	7	6	5
E	18	17	16	15	14	13	12	11	10	9	8	7	6
F	19	18	17	16	15	14	13	12	11	10	9	8	7

Disintegrator or Repulsor

	Attacking Missile Factor												
To Pen	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*A*	*B*	*C*	*D*
1	15	14	13	12	11	10	9	8	7	6	5	4	3
2	16	15	14	13	12	11	10	9	8	7	6	5	4
3	17	16	15	14	13	12	11	10	9	8	7	6	5
4	18	17	16	15	14	13	12	11	10	9	8	7	6
5	19	18	17	16	15	14	13	12	11	10	9	8	7
6	20	19	18	17	16	15	14	13	12	11	10	9	8
7	21	20	19	18	17	16	15	14	13	12	11	10	9
8	22	21	20	19	18	17	16	15	14	13	12	11	10
9	23	22	21	20	19	18	17	16	15	14	13	12	11
A	24	23	22	21	20	19	18	17	16	15	14	13	12
B	25	24	23	22	21	20	19	18	17	16	15	14	13
C	26	25	24	23	22	21	20	19	18	17	16	15	14
D	27	26	25	24	23	22	21	20	19	18	17	16	15
E	28	27	26	25	24	23	22	21	20	19	18	17	16
F	29	28	27	26	25	24	23	22	21	20	19	18	17

Nuclear Damper (nuclear) or Proton Screen (antimatter)

	Attacking Missile Factor												
To Pen	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*A*	*B*	*C*	*D*
1	10	9	8	7	6	5	4	3	2	1	0	0	0
2	11	10	9	8	7	6	5	4	3	2	1	0	0
3	12	11	10	9	8	7	6	5	4	3	2	1	0
4	13	12	11	10	9	8	7	6	5	4	3	2	1
5	14	13	12	11	10	9	8	7	6	5	4	3	2
6	15	14	13	12	11	10	9	8	7	6	5	4	3
7	16	15	14	13	12	11	10	9	8	7	6	5	4
8	17	16	15	14	13	12	11	10	9	8	7	6	5
9	18	17	16	15	14	13	12	11	10	9	8	7	6
A	19	18	17	16	15	14	13	12	11	10	9	8	7
B	20	19	18	17	16	15	14	13	12	11	10	9	8
C	21	20	19	18	17	16	15	14	13	12	11	10	9
D	22	21	20	19	18	17	16	15	14	13	12	11	10
E	23	22	21	20	19	18	17	16	15	14	13	12	11
F	24	23	22	21	20	19	18	17	16	15	14	13	12

LASERS AND ENERGY WEAPONS

Lasers (pulse and beam) and energy (fusion and plasma) guns all use the same table (with DMs shown above). After hits and penetration, proceed to the ship damage tables.

	Attacking Beam Factor														
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*A*	*B*	*C*	*D*	*E*	*F*
To Hit:	8	7	7	6	6	5	5	4	4	3	3	2	2	1	1

Sand

	Attacking Beam Factor														
To Pen	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*A*	*B*	*C*	*D*	*E*	*F*
1	6	5	4	3	2	1	0	0	0	0	0	0	0	0	0
2	7	6	5	4	3	2	1	0	0	0	0	0	0	0	0
3	8	7	6	5	4	3	2	1	0	0	0	0	0	0	0
4	9	8	7	6	5	4	3	2	1	0	0	0	0	0	0
5	10	9	8	7	6	5	4	3	2	1	0	0	0	0	0
6	11	10	9	8	7	6	5	4	3	2	1	0	0	0	0
7	12	11	10	9	8	7	6	5	4	3	2	1	0	0	0
8	13	12	11	10	9	8	7	6	5	4	3	2	1	0	0
9	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
A	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
B	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2
C	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3
D	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4

PARTICLE ACCELERATOR

Particle accelerators attacking a target must achieve a hit by throwing the to hit number (or greater) on two dice. Proceed to the damage tables.

	Attacking Particle Accelerator Factor															
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*A*	*B*	*C*	*D*	*E*	*F*	*G*	*H*
To Hit:	8	8	7	7	6	6	5	5	4	3	3	3	3	3	2	2	2

	J	*K*	*L*	*M*	*N*	*P*	*Q*	*R*	*S*	*T*	*U*	*V*	*W*	*X*	*Y*	*Z*
To Hit:	2	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0

MESON GUNS

Meson guns attacking a target must achieve a hit by throwing the to hit number (or greater) on two dice. If a hit is achieved, then the meson screen and configuration must be penetrated (throw the indicated number or greater on two dice). If the throws are successful, proceed to the ship damage tables.

	Attacking Meson Gun Factor															
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*A*	*B*	*C*	*D*	*E*	*F*	*G*	*H*
To Hit:	9	9	8	8	8	7	7	7	6	5	5	5	5	5	5	5	5

	J	*K*	*L*	*M*	*N*	*P*	*Q*	*R*	*S*	*T*	*U*	*V*	*W*	*X*	*Y*	*Z*
To Hit:	5	5	4	4	4	4	4	4	4	4	4	4	3	3	3	3

Configuration

	Attacking Meson Gun Factor																
To Pen:	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*A*	*B*	*C*	*D*	*E*	*F*	*G*	*H*
0	14	14	13	13	13	12	12	12	11	10	10	9	9	9	8	8	8
1	12	12	12	11	11	11	10	10	10	8	8	8	7	7	7	6	6
2	11	11	10	10	10	9	9	9	8	7	7	6	6	6	5	5	5
3	9	8	8	8	7	7	7	6	6	6	5	5	5	4	4	4	3
4	7	7	6	6	6	5	5	5	4	3	3	2	2	2	1	1	1
5	6	5	5	5	4	4	4	3	3	2	1	1	1	0	0	0	0
6	8	8	8	7	7	7	6	6	6	5	5	5	4	4	4	3	3
7	15	15	14	14	14	13	13	13	12	11	11	10	10	10	9	9	9
8	4	4	4	3	3	3	2	2	2	0	0	0	0	0	0	0	0
9	14	13	13	13	12	12	12	11	11	10	9	9	9	8	8	8	7

(cont'd)	Attacking Meson Gun Factor															
To Pen:	J	K	L	M	N	P	Q	R	S	T	U	V	W	X	Y	Z
0	7	7	7	6	6	6	5	5	5	4	4	4	3	3	3	2
1	6	5	5	5	4	4	4	3	3	3	2	2	2	1	1	1
2	4	4	4	3	3	3	2	2	2	1	1	1	0	0	0	0
3	3	3	2	2	2	1	1	1	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	3	2	2	2	1	1	1	1	1	0	0	0	0	0	0	0
7	8	8	8	7	7	7	6	6	6	5	5	5	4	4	4	3
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	7	7	6	6	6	5	5	5	4	4	4	3	3	3	2	2

TRACTORS

Tractors must achieve the to hit number (or greater) on two dice. If a hit is achieved, then repulsors must be penetrated (throw the number shown or greater on two dice). If all throws succeed, proceed to the ship damage tables. If the number of tractor weapon factors exceeds the target's size factor, agility and emergency agility are reduced by 1.

	Attacking Tractor Factor								
	1	2	3	4	5	6	7	8	9
To Hit:	6	6	5	5	4	4	3	3	2
To Pen:	Repulsors or Tractors								
1	2	1	0	0	0	0	0	0	0
2	3	2	1	0	0	0	0	0	0
3	4	3	2	1	0	0	0	0	0
4	5	4	3	2	1	0	0	0	0
5	6	5	4	3	2	1	0	0	0
6	7	6	5	4	3	2	1	0	0
7	8	7	6	5	4	3	2	1	0
8	9	8	7	6	5	4	3	2	1
9	10	9	8	7	6	5	4	3	2
A	11	10	9	8	7	6	5	4	3
B	12	11	10	9	8	7	6	5	4
C	13	12	11	10	9	8	7	6	5
D	14	13	12	11	10	9	8	7	6
E	15	14	13	12	11	10	9	8	7
F	16	15	14	13	12	11	10	9	8

DISINTEGRATORS

Disintegrators attacking a target must achieve a hit by throwing the to hit number (or greater) on two dice. If a hit is achieved, then the nuclear damper must be penetrated (throw the indicated number or greater on two dice).

If the throws are successful, proceed to the ship damage tables.

	Attacking Disintegrator Factor														
	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
To Hit:	6	5	5	4	4	3	3	2	2	1	1	0	0	–1	–1

Nuclear Damper To Pen:	Attacking Disintegrator Factor														
	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
1	9	8	8	7	7	6	6	5	5	4	4	3	3	2	2
2	9	9	8	8	7	7	6	6	5	5	4	4	3	3	2
3	10	9	9	8	8	7	7	6	6	5	5	4	4	3	3
4	10	10	9	9	8	8	7	7	6	6	5	5	4	4	3
5	11	10	10	9	9	8	8	7	7	6	6	5	5	4	4
6	11	11	10	10	9	9	8	8	7	7	6	6	5	5	4
7	12	11	11	10	10	9	9	8	8	7	7	6	6	5	5
8	12	12	11	11	10	10	9	9	8	8	7	7	6	6	5
9	13	12	12	11	11	10	10	9	9	8	8	7	7	6	6
A	13	13	12	12	11	11	10	10	9	9	8	8	7	7	6
B	14	13	13	12	12	11	11	10	10	9	9	8	8	7	7
C	14	14	13	13	12	12	11	11	10	10	9	9	8	8	7
D	15	14	14	13	13	12	12	11	11	10	10	9	9	8	8
E	15	15	14	14	13	13	12	12	11	11	10	10	9	9	8
F	16	15	15	14	14	13	13	12	12	11	11	10	10	9	9

JUMP PROJECTORS

Jump Projectors attacking a target must achieve a hit by throwing the to hit number or greater on two dice. If a hit is achieved, then the jump damper must be penetrated (throw the indicated number or greater on two dice).

If the throws are successful, throw one die to determine the number of dice thrown (1 to 6); throw that number of dice to determine the distance of the misjump in parsecs. Then throw one die to determine the direction of the misjump (one of the six directions possible on the hex grid). Finally, throw one die to determine the number of weeks spent in jump space before the ship re-emerges at its new location. Upon emerging from misjump, determining the ship's position and possibility of traveling to an inhabited world becomes paramount.

Attacking Factor		
	A	B
To Hit:	4	4

Jump Damper To Pen:	Attacking Factor A	B
1	9	8
2	10	9

RAMMING

At the end of the Combat step, after all weapons have been fired by both players, all Ramming attempts are resolved. If the Ramming vessel can still maneuver at the end of the Combat step, then the Ramming attack occurs.

All standard combat modifiers apply; ramming vessels must achieve a hit by throwing 10 or greater on two dice. If the throw is successful, the ramming vessel inflicts a number of critical hits on the target vessel equal to the ramming ship's USP size factor + its current agility – the target's armor factor. The target vessel inflicts a number of critical hits on the ramming vessel equal to the target ship's USP size factor + its current agility – the ramming vessel's armor factor.

SHIP DAMAGE TABLES

Weapons which penetrate the ship's defenses inflict damage on their targets. Each battery is allowed one roll on one or more damage tables, depending on weapon type. This roll may be modified by various factors:

- Apply armor factor of the defending ship as a +DM to rolls from all weapons on the Surface Explosions damage table and to all but meson guns on the Radiation damage table.
- Apply meson screen factor of the defending ship as a +DM to rolls from meson guns on all damage tables.
- If the weapon inflicting the hit has a factor of 9 or less, apply a DM of +6. If the weapon inflicting the hit was a nuclear missile or disintegrator, apply a DM of –6 on the Surface Explosion damage table; if the weapon inflicting the hit was an antimatter missile, apply a DM of –9 on the Surface Explosion damage table. If the weapon inflicting the hit was a pulse laser, apply a DM of –2 on the Surface Explosion damage table.
- Rolls resulting from other rolls (for example, interior explosion caused by surface explosion) are unmodified.

2D	*Surface Explosion Damage*	*Radiation Damage*	*Interior Explosion Damage*
2	Critical Hit	Critical Hit	Critical Hit
3	Interior Explosion	Crew–2	Critical Hit
4	Interior Explosion	Computer–4	Critical Hit
5	Interior Explosion	Crew–1	Crew-2
6	Maneuver–2	Computer–3	Computer–2
7	Fuel–3	Crew–1	Screens–3
8	Weapon–3	Computer–2	Jump–2
9	Maneuver–1	Computer–2	Power Plant–2
10	Fuel–2	Screens–2	Crew–1
11	Weapon–2	Weapon–4	Computer–1
12	Maneuver–1	Computer–2	Screens–2
13	Fuel–1	Screens–2	Jump–1
14	Weapon–1	Weapon–2	Power Plant–1
15	Weapon–1	Computer–1	Computer–1
16	Fuel–1	Screens–1	Screens–1
17	Weapon–1	Weapon–2	Jump–1
18	Weapon–1	Weapon–1	Power Plant–1
19	Fuel–1	Weapon–1	Screens–1
20	Weapon–1	Weapon–1	Jump–1
21	Weapon–1	Weapon–1	Power Plant–1
22+	No Effect	No Effect	No Effect
	Use This Column For:	*Use This Column For:*	*Use This Column For:*
	Energy Weapons, Lasers, Missiles, Particle Accelerators, Tractors and Disintegrators.	Particle Accelerators, Nuclear and Antimatter Missiles, and Meson Guns.	Meson Guns.

Extra Damage Rolls: All spinal mount weapons which hit and penetrate inflict one extra damage roll (on each appropriate table) for each letter by which their size exceeds 9. For example, a particle accelerator with a factor of A gets 2 rolls on both the Surface Explosion and Radiation damage tables; a factor of B receives 3 rolls, etc. The number of extra damage rolls is reduced by one for each factor of armor the target ship has (but a weapon always gets one damage roll).

Meson gun extra damage rolls are not reduced by armor, but are reduced by one for each factor of meson screen the target ship has (but a weapon always gets one damage roll). Disintegrator extra damage rolls are reduced by armor, but the armor is reduced by one factor for every extra roll blocked (but a weapon always gets one damage roll).

EXPLANATION OF DAMAGE RESULTS

If an indicated damage location on a ship does not exist, apply the next highest result until "No Effect" is reached.

Bridge Disabled: One of the ship's bridges is disabled. If all bridges are disabled, the ship may not maneuver or jump, is treated as agility=0 and all weapons fire as if its computer were half its actual factor (drop all fractions).

Computer–n: The computer USP factor is reduced by the indicated amount. If this result is rolled on the radiation damage table and the computer has a fib computer, it is ignored. If the computer USP factor is reduced to zero; the ship may not jump, or launch subordinate craft through launch tubes, although it may continue to fire weapons and maneuver.

Computer Disabled: The computer USP factor is reduced to zero; the ship may not jump, or launch subordinate craft through launch tubes, although it may continue to fire weapons and maneuver.

Crew – n: The indicated amount of crew sections are disabled. When more than half of a ship's crew sections are unavailable, the ship may no longer fire its weapons or attempt repairs in combat, although it may use its passive defenses, maneuver, or jump. This result does not affect the frozen watch or ship's troops.

Critical Hit: Roll again on the Critical Hit Table. Reduce the ship's armor USP factor by one for each critical hit received.

Frozen Watch/Ship's Troops Disabled: On a die roll of 1-3, all low berths are disabled, preventing use of the ship's frozen watch; on a roll of 4-6, all ship's troops (including marines and security troops) are disabled.

Fuel – n: Current fuel is reduced by the indicated amount as a percentage of total fuel capacity (at least 10 tons). The first such hit on the Surface Explosion table destroys drop tanks and exterior demountable tanks.

Fuel Tanks Shattered: 1d6x10% of the ship's fuel is lost, and all future **Fuel – n** damage is multiplied by 10. If all fuel on the ship is lost, no ship systems requiring energy points may operate.

Hangars/Boat Deck Disabled: 1d6x10% of the ship's subordinate craft are disabled (a minimum of 600 tons of various small craft, or one craft of 600 tons or more). One launch facility or launch tube is also disabled. The specific craft and facilities disabled are determined by the referee or random die rolls.

Interior Explosion: Roll again on the interior explosion table.

Jump – n: The jump drive USP factor is reduced by the indicated amount. For ships of size factor K-Q (10,000 to 99,999 tons), halve the indicated amount of damage, keeping track of fractions. For ships of size factor R+ (100,000 tons or more), quarter the indicated amount of damage, keeping track of fractions. Reduce the USP accordingly when whole damage is received.

Jump Drive Disabled: The jump drive USP factor is reduced to zero.

Maneuver – n: The maneuver drive USP factor is reduced by the indicated amount. For ships of size factor K-Q, halve the indicated amount of damage, keeping track of fractions. For ships of size factor R+, quarter the indicated amount of damage, keeping track of fractions. Reduce the USP accordingly when whole damage is received. Remember that a ship's agility cannot be greater than its maneuver factor.

Maneuver Drive Disabled: The maneuver drive USP factor and agility are reduced to zero. The unit must continue moving with its last course and heading unchanged.

One Screen Disabled: One screen (nuclear or jump damper, meson or proton screen, or black globe) of the firing player's choice has its USP factor reduced to zero.

Power Plant – n: The power plant USP factor is reduced by the indicated amount; ship's agility is also reduced. For ships of size factor K-Q, halve the indicated amount of damage, keeping track of fractions. For ships of size factor R+, quarter the indicated amount of damage, keeping track of fractions. Reduce the USP accordingly when whole damage is received.

Once the power plant USP factor is reduced to one-half, spinal mount weapons (if any) no longer work, and the effective maneuver drive factor drops by half.

Power Plant Disabled: The power plant USP factor is reduced to zero; only missiles and sandcasters work, and the ship cannot jump or maneuver, or launch subordinate craft through launch tubes.

Screen – n: The USP factor for one screen (nuclear or jump damper, meson or proton screen, or black globe) selected by the firing player is reduced by the indicated amount. Damage must be divided as evenly as possible: no screen may receive two hits until all other screens have at least one, or three hits until all others have at least two.

Ship Vaporized: The ship is utterly destroyed.

Spinal Mount/Fire Control Out: On a die roll of 1-3, the spinal mount USP factor is reduced to zero; on a roll of 4-6, fire control is out, and no offensive weapons except the spinal mount may fire.

Weapon-n: The indicated number of batteries of one type of weapon (meson gun, particle accelerator, etc) have been destroyed, either offensive or defensive. If a ship has only or is reduced to one battery of a particular type (including turrets, bays and spinal mounts), then a weapon hit reduces its USP factor by the indicated amount; it does not eliminate the battery (this also applies to spinal mount weapons). Damage must be divided as evenly as possible: no type of weapon may receive two hits until all other types have at least one, or three hits until all other types have at least two. Within a specific type of weapon, damage must also be divided as evenly as possible between turrets, bay weapons and spinal mounts, in the same fashion.

CRITICAL HIT TABLE

Die (2D)	*Critical Hit Result*
2	Ship Vaporized.
3	Bridge Disabled.
4	Computer Disabled.
5	Maneuver Drive Disabled.
6	One Screen Disabled.
7	Jump Drive Disabled.
8	Hangars/Boat Deck Disabled.
9	Power Plant Disabled.
10	Fuel Tanks Shattered.
11	Spinal Mount/Fire Control Out.
12	Frozen Watch/Ship's Troops Disabled.

Critical Hits: In addition to Critical Hits rolled from the Ship Damage tables, all batteries whose weapon USP factor exceeds the USP size factor of the target ship will inflict (if they hit and penetrate) automatic critical hits equal to the size difference. For example, if a missile battery of factor 9 hits a size 4 ship, it will (in addition to any other damage) inflict 5 critical hits. These automatic critical hits are reduced in number by one for each two factors of armor the target ship has; round odd numbers down.

Meson gun automatic critical hits are not reduced by armor, but are reduced in number by one for each two factors of meson screen the target ship has, rounding odd numbers down.

Disintegrator automatic critical hits are reduced by armor, but the armor is reduced by one factor for every critical hit blocked.

In addition, each critical hit roll reduces a target's armor factor by one (but not to less than zero).

If the result on the Critical Hit table is inapplicable to the target ship (for example, no frozen watch or ship's troops), roll again to determine the result of the Critical Hit.

STATISTICAL COMBAT RESOLUTION

In many cases during battle, a large number of identical small craft or batteries will be firing at a single target or at many identical small craft targets. At these times, much die rolling may be saved by resolving hits, penetration, and damage by use of statistical probabilities. Instead of rolling dice, players may use the statistical combat table, which gives the expected results of a large number of identical die-rolls.

The firing player may choose to resolve combat statistically whenever he is firing at least ten identical shots. Identical shots are those fired by identical weapons under identical conditions (most importantly, all firing computers must be the same) at the same or identical targets. For example, if a ship fired 20 factor-4 laser batteries, four each at five identical small craft, statistical resolution could be used.

For resolution, no dice are rolled. Instead, once the modified die roll needed to hit has been determined (and it must be the same for all shots), the following formula is used to determine the number of hits. In the formula, *H* is the expected number of hits in 36 shots, as listed for each *to hit* die roll on the statistical combat table; *N* is the number of shots. For example, in the example above, suppose the number needed to hit is 6+. The statistical combat table shows that the expected number of hits is 26 in 36

shots, so the actual number of hits is 26 x 20 ÷ 36, or 14.4; fractions may be rounded off to the nearest whole number. Hits in statistical combat should be evenly and randomly distributed among targets.

Hits = H x N ÷ 36

The statistical procedure may also be used for defensive fire and penetration die rolls; the procedure is identical. Statistical resolution may also be used for damage resolution if there are very many identical damage rolls (i.e., rolls on the same table with the same modifiers). The *damage* column of the table gives the number of times a given number will be rolled in 36 rolls. To resolve damage, first determine the number of times each number from 2 to 12 will be rolled, using the formula above, and then add all applicable damage DMs to each number. For instance, in the example above, 14 hits were scored; an unmodified damage die roll of 9 can be expected to occur 4 x 14 ÷ 36 or 1.56 times. If the total damage DM is 10, this is the number of times a damage result of 19 occurs.

STATISTICAL COMBAT TABLE

Die Roll	*To Hit*	*Damage*
2+	36	1
3+	35	2
4+	33	3
5+	30	4
6+	26	5
7+	21	6
8+	15	5
9+	10	4
10+	6	3
11+	3	2
12+	1	1

The probabilities of similar results, such as weapon-1 or fuel-1, may be added together before rounding off. For instance, in the previous example, with a total damage DM of +10, fuel-1 results will occur on the surface explosions table on an unmodified die roll of 3, 6, or 9. The total probability of these results is 11 in 36, for a total of 11 x 14 ÷ 36 or 4.26 fuel hits.

Aliens

The design rules in *High Guard* can also be used to design ships from other cultures; obviously, there will be some differences both physically and culturally. This chapter discusses how that relates to aliens in the **Traveller** universe.

Aslan: The Aslan Hierate does not have a navy as such; rather, Aslan space forces encountered will operate under the auspices of one or more clans. Clans which are members of the Tlaukhu will have access to higher technology equipment, operating between TLs 12 – 14, but could have ships of any convenient TL from 9 – 14.

The only significant difference between Imperial ships and Aslan will be in the makeup of the crew. Males will serve in command, flight and gunnery positions; females in staff and technical positions. Medical and general crew positions will be open to either, but noble males will never serve as crew.

K'kree: K'kree need a great deal of space, both because of physical size and because of the need to avoid the claustrophobia so dominant in K'kree makeup. K'kree hulls are flattened spheres with all decking on one level, and all drive spaces below the deck.

"Staterooms" are not constructed; K'kree ship interiors are large open spaces featuring synthetic grass, a sky-like overhead, and, frequently, holographic images of prairie on all sides. A few areas (the bridge, for instance) may be partitioned off by curtains or light, translucent dividers, but this is the extent of K'kree internal compartmentalization.

K'KREE ACCOMODATIONS

Details	*Tons*	*Cost (MCr)*
Passenger staterooms	48	1.00
Crew staterooms (per person)	24	1.00
Sleeper berths	24	0.10
Acceleration couches	4	0.05
Low berths	0.5	0.05

Accommodations: It should always be remembered that a starship must have accommodations not only for the crew, but also for each member of the crewmember's family who is not involved in the operation of the ship, and for each passenger carried on board. This can necessitate the use of very large ships. Living areas are shared jointly by the crewmembers and their families.

Crew staterooms can be used, but the cost is expensive, reflecting the need for assembling and training a crew to withstand the claustrophobic conditions required.

When outfitting the rare K'kree small craft, sleeper berths and acceleration couches require more space than normal as well. Low passage berths are not generally used. Suspended animation is anathema to K'kree, and used only in medical emergencies. Emergency low berths are not available.

Streamlining: All K'kree ships are configuration 6 (dome/disk), and streamlined.

Armaments: Armaments of various types are installed as per *High Guard*, but all tonnages and costs are doubled. All K'kree gunnery is conducted from remote fire control stations, and fire control equipment is more complex than on most human ships. The weapons systems on K'kree craft are not actually larger (in fact, they are often smaller); these requirements reflect extra equipment to permit remote handling.

Ship's Vehicles: K'kree ships hardly ever carry small craft, and carry other vehicles only if such are absolutely necessary—and trained operators are available.

Vargr: Ship design and construction rules from *High Guard* remain unchanged. The final cost of a starship may randomly vary by up to 10% higher or lower, seemingly without either reason or predictability. Vargr ships are rarely constructed without installed armament, due to the likelihood of piracy in the Extents.

Zhodani: The Zhodani Consulate operates at TLs 12 -14. Regional (subsector) navies operate at TLs 11 – 14. System (planetary) navies operate at TLs 9 – 14.

The one major difference between Zhodani ships and those of other cultures is the abundance of psionic switches. Simple psionically sensitive switches are components of iris valves, simple automatic doors, and many convenience items such as lights, temperature or environment controls, and entertainment or communication devices. Psionically trained individuals with Telepathy-1 or greater can activate such switches with a minor flick of their minds (and no actual cost in Psi points).

Droyne: Droyne ship design is essentially identical to Imperial ship design, but rarely at higher than tech level 13.

The major difference is in the stateroom requirements. Droyne have lower metabolic requirements for life support and they have a basic need for the companionship of their fraternity or family. On any normally designed ship, one stateroom will easily hold two Droyne, and life support costs per individual are about half normal. As a result, two Droyne can occupy one passenger stateroom; double occupancy allows two Droyne per crew stateroom.

Specifically designed Droyne ships have one large stateroom for each six individual Droyne; the staterooms themselves are constructed to have interconnecting doors enabling the entire family or fraternity to live together.

Solomani: The maximum tech level of the Solomani Confederation is 14.

Solomani ships may have fixed weapons mounts (as opposed to turret-mounted weapons). Fixed weapons mounts allow up to two weapons to be attached per each hardpoint on the ship and do not require fire control tonnage or a turret. Weapons in fixed weapons mounts are operated by a dedicated gunner and are subject to an attacker's DM –2 in space combat. A ship is allowed fixed weapons mounts equal to the model number of the computer installed on the ship (Model/2 computer allows two hardpoints to have fixed weapons mounts).

Hivers: The Hiver Federation navy ranges in tech level from 11 to 15.

The majority of Federation starship design elements are identical to those presented in the basic rules. The following changes are imposed:

Costs: No design discounts or architect's fees apply to Federation ship designs.

Bridge: Bridge controls are generally less expensive to install using Hiver electronics technology, but mixed crews (especially mixed Hivers and non-Hivers) require duplication of controls and readouts to conform to differences in physiology. Installation of a bridge costs Cr4,000 per ton of ship if a vessel is being fitted out entirely for use by members of a single race. If mixed races are to be involved, the cost is Cr5,000 per ton of ship.

Computers: Each computer model listed has twice the program capacity and half the cost indicated in the standard rules.

Fittings: Low berths and emergency low berths are generally not available for Federations designs. If they are available, they will cost ten times the indicated amount.

Statistics

Ships designed using *High Guard* are presented in a certain format for ease of reference. At the top of the page are the *High Guard* statistics given in the normal format. Tonnage on the Universal Ship Profile is shown in kilotons (thousands of tons) where necessary.

Ship No. and Name AA-0000000-000000-000000-0 MCr500.00 500 tons
batteries bearing TL=15.
batteries Crew=10.
Passengers=0. Troops=0. Low=0. Cargo=0. Fuel=0. EP=0. Agility=0.
NOTE: Drop tanks add 100 tons of fuel and mass (AA-000000) and cost MCr0.00.

The listing attempts to provide all information which may possibly be of use to the players and referee, while not being cumbersome or confusing. The first line contains the most important information: ship number and name, USP, cost, and tonnage. Batteries bearing and total batteries are listed below to show how many times the specific factors may be used in a combat round (this information may be omitted if all factors are of one battery each). The number of personnel in the crew and the tech level are also shown. Other possible items that might be listed include Magazines=0, No Bridge, Fib Computer, and any USP code modifiers unique to the design (Y=30, Z=50, etc). Carried craft and hardpoints are not indicated in the USP text, as they are better explained in the additional details, below.

Following the *High Guard* Universal Ship Profile and data, additional details are presented in the format shown here.

Tonnage: Given in tons and cubic meters. Size Mod +4.

Crew: Expressed in terms of officers, ratings, small craft pilots, and troops. Scout service vessels, because they have no officer rank system, are indicated in number of persons total.

Performance: Includes notation of jump capability, acceleration in Gs, power plant factor (noting fission, fusion or antimatter), energy points produced by the ship, and agility.

Electronics: Indicates the computer model carried by the vessel.

Hardpoints: Indicates the presence of a spinal mount, if any, the number and tonnage of bays, and the number of turret hardpoints on the vessel.

Armament: Indicates the complement of offensive weaponry assigned to the ship's spinal mount, bays, and turrets. Each spinal mount is one battery. Each bay is one battery. The organization of the turret weapons into batteries is noted.

Defenses: Indicates the screens mounted on the ship, hull armor, and any defensive weaponry mounted.

Craft: Small craft and vehicles carried by the ship are noted.

Fuel Treatment: Fuel scoops and fuel purification plants are noted if installed on the vessel.

Cost: The base cost for the ship is indicated as standard; this base cost includes architect's fees. A quantity cost (based on a 20% discount) is also indicated.

Construction Time: The time required to construct the first ship of the class is indicated; a quantity time span based on roughly 80% of initial construction time is also shown.

Comments: Brief statements about the ship class, exploits, history, purpose and function, and other relevant details are provided.

Note that secondary listings would identify and explain small craft carried by the ship.

Boarding: Boarding actions make use of the listed crew numbers and the listed troop and marine numbers. When specifying ship's troops, note either Troops=, or Marines= to note which type of troops is carried. In the rare instance where both naval security crew and marines are carried, be sure to note both.

Agility: The agility listing indicates the standard agility factor of the ship. Emergency agility can be determined from the lower of the power plant and maneuver drive numbers in the USP.

Fuel: Power plant fuel required for a ship is equal to its energy points; the remainder is available for use in jump.

Drop Tanks: Drop tanks can make radical changes in ship performance. The ship listing should indicate ship performance without drop tanks installed, and without the extra fuel tank capacity available. On an additional listing line, the comment that drop tanks are fitted should be made, with specification of total drop tank tonnage. The revised performance portion of the USP (the first third) should be stated to show ship tonnage and performance while burdened with the drop tanks. If agility factor changes with the addition or deletion of drop tanks, it should also be noted.

Vehicles: For adventuring purposes, the ship listing should indicate ship's vehicles (air/rafts and ATVs).

Vessels: The ship listing should include beneath it similar listings for all other craft carried aboard, such as pinnaces, gigs, fighters, or boats. The tonnage and cost of such craft are included in the overall tonnage and cost of the ship itself.

Pulse or Beam Lasers: Lasers are assumed to be beam lasers unless the notation "pulse lasers" is made on the listing.

Energy Weapons: There is no practical difference between plasma and fusion guns in the use of factors; there is no need to differentiate between them in the ship listing.

Frozen Watch: If a frozen watch is carried, it must be noted in the listing separate from the low berth listing, and the number in the frozen watch may not exceed the number of low berths available.

Computer: The standard and bis computer models are noted in the USP; if the computer has a fiber-optic core, the notation "Fib computer" is made on the listing.

Miscellaneous: Items not listed or enumerated are assumed to be zero (for example, if passengers are not listed, it is assumed that there is no special passenger space designated).

Vanguard Escort *Kinunir*: The vanguard escort *Kinunir*, subject of **Traveller** *Adventure 1*, has been re-constructed below according to the *High Guard* design system.

Description	*Tons*	*MCr*	*EPs*	*Crew*	*Factor*	*Notes*
Hull	–1200.00	120.000		4	A	1200 tons
Configuration		12.000			2	cone
Jump Drive	60.00	240.000		1	4	
Maneuver Drive	132.00	66.000		1	4	
Power Plant	84.00	252.000	–84	1	7	
Jump Fuel	480.00					
Power Plant Fuel	84.00					
Fuel Scoops		1.200				
Fuel Purification Plant	8.46	0.846				
Bridge	24.00	6.000		7		
Backup Bridge	24.00	6.000				
Computer	18.00	100.000	7		7	Model/7fib
Backup Computer	6.00	27.000				Model3/fib
Turret Lasers	3.00	9.000	9	3	4	3 batt/3 triple
Turret Particle	6.00	6.000	10	2	2	2 batt/2 single
Turret Missile	2.00	4.500		2	3	2 batt/2 triple
Nuclear Damper	2.00	6.000	10	4	1	
Globe Generator	10.00	400.000		4	1	
Drop Capsules	10.00	0.090		2		5 launchers+10 ready
Ship's Vehicles	22.00	11.100		1		3 air/rafts + Grav APC
Small Craft	52.00	22.804		1	0	40-ton pinnace
Passenger Staterooms	16.00	2.000				4 command staterooms
Crew Staterooms	152.00	19.000			2	76 crew staterooms
Totals	1195.46	1311.54	36	29		

After the ship has been designed using the construction system, the details can be presented in the *High Guard* format, as shown here:

EV-9514 *Kinunir* EV-A244772-00010100-40200003-0 MCr1311.54 1200 tons
batteries bearing 3 2 2 TL=15.
batteries 3 2 2 Crew=45.
Fib computer. Cargo=4.5. Fuel=564. EP=84. Agility=4. Marines=35.

And finally, all additional details about the *Kinunir* are presented in the Ship Information format:

Tonnage: 1,200 tons (standard). 16,800 cubic meters. Size Mod +1.
Crew: 11 officers, 34 ratings, 35 marines.
Performance: Jump-4. 4-G. Power plant-7. 84 EP. Agility 4.
Electronics: Model/7fib computer and standard avionics; a backup bridge is installed, along with a Model3/fib backup computer.
Hardpoints: 12.
Armament: Three triple beam laser turrets organized into three batteries. Two single particle accelerator turrets organized into two batteries. Two triple missile turrets organized into two batteries.
Defenses: Nuclear damper (factor-1). Black globe generator (factor-1).
Craft: One 40-ton pinnace. One 10-ton Grav APC and three 4-ton air/rafts are available as ship's vehicles.
Fuel Treatment: Fuel scoops and on-board fuel purification plant.
Cost: MCr 1,311.54 standard; MCr1,049.2 in quantity.
Construction Time: 36 months singly; 29 months in quantity.
Comments: The *Kinunir*-class vanguard escort (sometimes designated a vanguard cruiser, colonial cruiser, or battlecruiser) is not a true cruiser, being more properly termed an escort. This particular class is an ill-fated model discontinued after a production run of only 20 examples. Several have been lost in action, and one has been converted into an orbital prison.

Pinnace: The *Kinunir's* 40-ton pinnace has been re-constructed below according to the *High Guard* design system.

Description	*Tons*	*MCr*	*EPs*	*Crew*	*Factor*	*Notes*
Hull	–40.00	4.000			0	
Configuration		0.400			2	
Maneuver Drive	5.60	2.800			5	
Power Plant	3.20	9.600	3.2		8	
Power Plant Fuel	3.20					
Bridge	8.00	0.200		1		
Computer	2.00	9.000	0.0		2	Model/2
Turret Lasers	1.00	1.000	1	1	2	1 batt/1 single
Acceleration Couches	3.00	0.150				6 passenger couches
Totals	26.00	27.150	2.2	2		

After the small craft has been designed using the construction system, the details can be presented in the *High Guard* format, as shown here:

KK-9514.1 Pinnace KK-0205821-00000000-20000000-0 MCr27.15 40 tons
batteries bearing 1 TL=15.
batteries 1 Crew=2.
Passengers=6. Cargo=14. Fuel=3.2. EP=3.2. Agility=5.

And the pinnace's additional information in the Ship Information format:

Tonnage: 40 tons (standard). 560 cubic meters. Size Mod +0.
Crew: 1 pilot, 1 gunner. 6 passenger couches.
Performance: 5-G. Power plant-8. 3.2 EP. Agility 5.
Electronics: Bridge installed, Model/2 computer.
Hardpoints: 1.
Armament: One single beam laser turret organized into a single battery.
Fuel Treatment: Integral fuel scoops. No fuel purification plant required.
Cost: MCr 27.15 standard; MCr 21.72 in quantity.
Construction Time: 6 months singly; 5 months in quantity.
Comments: .

Campaign Rules

The design rules in ***High Guard III*** can also be used as the foundation for a campaign game involving the navies of several planets in one or two subsectors. The campaign may be set in the referee's ongoing universe (perhaps affecting the lives of player-characters) or it may take place in an area specifically generated for the event.

Two sides are the obvious minimum for a campaign; the upper limit depends on the number of players and the referee's ability to handle the work. Each side should have one player as commander-in-chief and several more as admirals.

In the context of a campaign, many of the rules and ship capabilities of *High Guard* assume greater importance than in a single battle, and design parameters will flow from the game situation rather than being imposed from above. The budget limit is not an arbitrary sum, but comes from taxes levied on the players' empires. With the necessity for maintaining a fleet through a campaign of many battles, breaking off action becomes an important element of battle strategy, and players must allocate a good percentage of their resources for maintenance and repair. And of course, jump drives and refueling capability become important.

In a campaign, victory goes not to the player with the best fleet-building or tactical battle skills (although these are important) but to the player who can best strategically maneuver his forces, concentrating them for local numerical superiority, outguessing or outwitting his opponent.

REVENUE

The navy gets its budget from the planetary government, which in turn gets it from the pockets of citizens. Funds are received each year on January 1, the amount depending on government type, population, and state of interstellar tension. Some governments are more militaristic than others are, and all governments spend more if war seems imminent than in peacetime.

Naval budgets are determined by the formula: **B = Cr500 x GM x P.** *B* is the budget in credits; *Cr500* is the amount of naval tax paid by the average citizen; *GM* is the government percentage modifier; and *P* is the population of the planet. The Government Percentage Modifier may be found on the table below. Each government type has its own modifier for peace and war conditions. These are extremes: the referee must decide on intermediate rates for each government as the situation heats up or cools down. The players have no control over tax rates; they are dependent on popular acquiescence or public opinion, as determined by the referee. All governments start the campaign at peace.

GOVERNMENT PERCENTAGE MODIFIERS

Type	*0*	*1*	*2*	*3*	*4*	*5*	*8*	*9*	*A*	*B*	*C*	*D*
Peace	0.50	0.80	1.00	0.90	0.85	0.95	1.10	1.15	1.20	1.10	1.20	0.75
War	1.50	1.40	1.50	1.20	1.45	1.40	1.20	1.20	1.50	1.20	1.50	1.50

Government type 6 (captive government) pays the same rate as its parent state, or the referee might decide they are being oppressed and set their rate somewhat higher; 1.50 is the absolute limit. Balkanized worlds (7) have different rates for the different governments.

All taxes are received in local credits, each worth one credit on its world of origin (when constructing or repairing ships there), but somewhat less in interstellar exchange. The only times this matters are when one world transfers money to another, such as foreign aid, loans, or taxes paid by a subject world to its owner. In such cases, consult the relative value table. Multiply the sums transferred by the credit value for the world giving the money and divide it by the value for the world receiving it. For example, if a tech level C, A starport world gave MCr20 to a tech level 8, B starport world, the world would receive MCr20 x 0.85 ÷ 0.60 or MCr28 in local credits. If there is an asterisk on the table for a world, there is too little trade going on for its currency to have a set value in interstellar exchange. The referee may allow periodic tax assessments to be made; their value should be variable and low.

RELATIVE VALUE

Tech Level	*Starport Type A*	*B*	*C*	*D*	*E*	*X*
M	1.65	—	—	—	—	—
L	1.45	—	—	—	—	—
K	1.30	1.15	—	—	—	—
J	1.20	1.10	—	—	—	—
H	1.10	1.05	1.00	—	—	—
G	1.05	1.00	0.95	—	—	—
F	1.00	0.95	0.90	—	—	—
E	0.95	0.90	0.85	0.80	0.75	—
D	0.90	0.85	0.80	0.75	0.70	—
C	0.85	0.80	0.75	0.70	0.65	—
B	0.80	0.75	0.70	0.65	0.60	—
A	0.75	0.70	0.65	0.60	0.55	0.45
9	0.70	0.65	0.60	0.55	0.50	0.40
8	0.65	0.60	0.55	0.50	0.45	0.35
7	0.60	0.55	0.50	0.45	0.40	0.30
6	—	0.50	0.45	0.40	0.35	0.20
5	—	0.45	0.40	0.35	0.30	0.10
4	—	—	0.30	0.25	0.20	*
3	—	—	0.20	0.10	0.05	*
2	—	—	—	0.05	*	*
1	—	—	—	0.01	*	*
0	—	—	—	—	—	*

INITIAL FLEETS

Players may initially build a fleet costing up to ten times one-year's naval budget. 20% of this budget must be spent on ships built at one tech level lower than the world's current maximum, although this cost may include the cost of refitting them to upgrade them to the current tech level (see the refitting rule below). Before building a fleet it is advisable to read the maintenance rule; it is possible to build a bigger fleet than can be maintained in peacetime.

There are no limits other than tech level and budget, although starships may be built only at A starports, non-starships only at A or B starports, and planetoid ships only in systems where planetoids are available. Pilots are effectively unlimited, given populations and revenues such as they are in any campaign game.

TIME SEQUENCE

For convenience, and to save the referee's sanity, time in the campaign is divided into weeks, and the events of each week are divided into six segments. In campaign terms, events either take one or more complete weeks or no time at all. The order of events within a week is given below and should be strictly adhered to.

1. Jumps: All ships which jumped at any time in the last week are placed in their systems of destination.

2. Communication and Intelligence: Players receive information from the referee regarding the system they have entered and the composition of enemy forces there. Players in the same system may talk to each other and may continue direct communication until one of them jumps out of the system. Ships with sufficient fuel may jump before combat if they wish.

3. Battle: All engagements in the same system are fought to a conclusion. Refueling from gas giants may take place during battle. Ships may escape from battle by jump or acceleration.

4. Changes of Control: Fleets which have driven off enemy forces (or which were uncontested) may take control of enemy planets. Enemy worlds will surrender to a fleet; any ship may take over a gas giant.

5. Refueling: The player who controls a source of fuel may refuel his ships there.

6. Final Operations: Ships which undertook operations lasting a week or more (such as refueling or repair) are ready for other operations. Ships which were in the process of being constructed, refitted, or other shipyard work are ready. Final orders for movement, reorganization, and other operations are given. Ships which have not already done so may jump.

BUILDING SHIPS

All construction rules are in effect. Each planet's shipyards have a maximum capacity expressed in the number of tons of ship they may work on at a time (including repair and refitting operations: see later rules). This capacity is determined by the formula: **C = P x GM ÷ 1000,** where *C* is shipyard capacity in tons, *P* is planetary population, and *GM* is the current government budget percentage modifier.

REFITTING SHIPS

Outmoded ships may be improved by refitting; obsolete systems are replaced by newer models. All refitting must be done at an A or B starport, and jump-drives may be refitted only at A starports. Refitting involves the complete removal of an old system and the installation of a new one; for instance, if a power plant is refitted, the entire power plant is removed and a new one put in its place. Refitting takes up shipyard capacity equal to the refitting ship's tonnage.

The degree to which a ship may be changed is limited. Power plant, M-drive, J-drive, and spinal mount weapons may not be increased in tonnage. There may be no additional launch facilities built (although they may be removed). Armor and configuration may not be changed. The number and size of weapons bays may not be changed.

Changes in power plant, maneuver drive, or jump drive are major changes. They cost 1.5 times the amount the new system would cost in a new ship; the time required to install major changes is one fourth the time required to build a new ship (from the construction time table).

Changes in any other ship component are minor changes. They cost 1.1 times the cost of the system in a new ship and take one tenth the time required for new ship construction.

Refitting is subject to the same time modifiers and weekly costs as in the shipbuilding rule. If several ships of a class are being refitted the same way, all ships after the first receive the time benefit. Work may proceed concurrently: if several ship systems are being replaced, the refit takes only the time required for the longest one.

CREW QUALITY

Crew Quality	*Average Skill Level*	*DM*
Green	1	–1
Trained	2	0
Line	3-4	+1
Crack	5-6	+2

MAINTENANCE

Maintenance of a ship costs 10% of its building cost each year, paid at the beginning of the year. The cost of a refitted ship is its original cost, minus the cost of old systems removed, plus the cost of new systems added. Ships being constructed do not require maintenance, but those being refitted or repaired do. If a player does not have enough money to maintain his entire navy, then some ships must be paid off or placed in ordinary.

Paying Off: The ship is removed from the navy list and disposed of. Such ships are usually destroyed; at any rate, they are no longer in the game.

Ordinary: Ships may be placed in ordinary; they are decommissioned and are no longer in service, but are stored away and may be returned to service at *a* later date. Ships in ordinary cost one-tenth their normal maintenance. The recommissioning cost is one-tenth the ship's cost and requires full shipyard capacity for one-tenth construction time. All time modifiers found in the shipbuilding rule may be used.

COMMUNICATION

As has been mentioned many times before, one of the fundamental facts of the **Traveller** universe is that the speed of communication is no faster than the speed of travel. Players who engage in a naval campaign using the following rules will find themselves uncomfortably reminded of this fact with every move they make. The communication rules provide a framework for limiting the transfer of information to its "actual" speed of one jump per game week, creating a genuine "fog of war" in which players must make decisions based on guesswork and information weeks out of date. The campaign can be played without the communications rules (and they do add considerably to the referee's and players' tasks) but if the rules are used the players will be guaranteed an exciting experience like no other in gaming.

Players: The central principle of the communication rules is that each fleet task force (each group of ships in a separate system) must be operated by a separate player, and that players in different systems may not communicate with each other except through the referee. Players will actually be unaware of what is going on in systems just one jump away; the lack of communication is not just simulated — it is real. This system requires a large number of players per side; the easiest way to handle it is to assign admirals at the beginning of the campaign and not to allow more independent task forces than there are admirals.

Referee's Personae: To save on players, the referee may take the part of non-player characters in command positions requiring little initiative: bases and planetary naval stations, ships returning to base with battle damage, and individual courier ships. These referee's personae should not be expected to demonstrate much cleverness or thought, just general professional competence; they will follow orders to the letter unless they obviously do not apply. Since these officers will go "by the book" players would be well advised to issue them with general orders planned for every conceivable contingency, and to make sure that other orders given to them are clear and precise. The referee, when making a decision for one of his personae, must be sure to make use of only that information the officer would actually know.

For example, suppose that a planetary base commanded by a referee's persona includes a small flotilla of system defense boats and three or four small courier ships. An enemy fleet jumps into the system. Looking at his orders, the referee reads *"...If enemy forces jump insystem contact Task Force 1 soonest...";* he immediately sends a courier ship to search for Task Force 1. His orders give the planned location of the task force for the next week, so the courier is ordered to jump to that system. Unknown to the base commander (but of course known to the referee), Task Force 1 was engaged in battle last week and is currently licking its wounds in another system entirely, and when the courier finds the supposed rendezvous point empty, the referee must again consider his orders. The courier captain (another referee's persona) might decide, based on his orders, to return to base, proceed to another possible location, or some other action.

Sometimes a referee must take over a command he knows will require individual initiative in order to avoid alerting the players that something is amiss, or conversely require a player to command a force he knows will encounter nothing but routine.

Messages: The only way a player can find out about events in another system is by receiving a message. Either a ship carrying the information jumps into the system or the player's task force jumps into a system where a message is waiting. Players (or referee's personae) in the same system may talk freely; in other cases a written message is required. Messages may be written from players to players, from players to referee's personae (and vice versa), and even from one referee's persona to another. The players themselves can keep track of messages they receive; the referee will find his task easiest if he makes up a folder for each of his personae, storing inside it all information the officer knows.

Each message must be given to the referee for delivery.

For clarity, each written message should carry several pieces of information besides the message itself:

1. The name of the person the message is from.
2. The name of the person the message is being sent to, and what others may be allowed to read it.
3. What ship it will be carried on, or which planetary base it has been given to.
4. The date (campaign week) and system in which it was dictated.

Messages may be disseminated in several ways. The same message may be sent to several places at once in hopes of finding the recipient. A ship may be instructed to go to a rendezvous point and wait for a courier from the recipient (and other ships instructed to go to such points to see what messages are

waiting). A message may be left at a friendly ground installation; there is assumed to be such an installation (not necessarily a base, but some naval ground presence) at any friendly planet.

Orders: Orders are a special class of messages, telling someone not just what has happened but what to do. Orders may be intended for players (in which case they may be general in nature) or for referee's personae (in which case they had better be precise and restrictive).

Before the campaign, a clear chain of command should be devised, stating which players are in a position to command which other players. No referee's persona should ever be in a position to issue orders to a player, although some players may not be in authority over some referee's personae. Of course, players may disregard orders if, in their opinion, they were issued without benefit of relevant information or are out of date. In turn, higher-ranking players may consider opening court martial proceedings once this becomes known.

An admiral may issue general or standing orders before a campaign, indicating actions to be taken in specific types of situations; these become the "book" that referee's personae follow.

Intercepted Messages: The referee should be alert to the possibility of capturing information. After a battle, there may be prisoners to be interrogated or undestroyed computer banks on captured ships (although standard procedure is to wipe the memory before capture, things sometimes go wrong). Radio intercept is also possible; although all messages are sent in code, an overused code may be broken. In general, the chance of capturing useful information is too small for definite rules to be written, but the referee should be thinking about it.

A player should keep this in mind when sending messages and in deciding who is to be entrusted with what information.

Civilians are another possible source of information. Ships or worlds may have witnessed some enemy operation.

Of course, players are fully capable of planting false information or allowing messages to be intercepted on purpose.

Campaign Diary: A limited-communication game such as this may become so confusing that players may be unable during the course of the game to see the "big picture" of the campaign. For this reason, the referee should keep a week-by-week record of events so that, after the war is over, he can sit down with the players and explain what really happened. The record may be as detailed or as general as the referee likes. Visual aids such as campaign maps may prove useful. All messages generated in the course of the campaign should also be retained as an additional source of information.

TACTICAL INTELLIGENCE

In the communication segment (before engaging in combat), it is possible to determine the approximate strength of enemy fleets in a system. Players should be told the general size and number of enemy ships (for example 1 gigantic ship, 8 large ships, 20 small ships, and 200 small craft) and their approximate maneuver drive sizes (but not agility). Ships carried inside other ships may not be detected. Once battle is joined, all factors are revealed.

THE OUTER SYSTEM

Ships which break off battle by acceleration flee to the outer system. Ships in the outer system may not be attacked (space is big) but an enemy in the system does receive tactical intelligence about them. Players in the outer system may receive all messages transmitted in the inner system (they may listen to friendly players talk) but may respond only in a limited way. They may send three messages per week, and the referee should delay receipt of these messages by one segment (for instance, if a message is sent in the communication segment it arrives in the battle segment).

Ships in the outer system with enough fuel may jump. The rest must hope to eventually return to the inner system to refuel. Fuel may be conserved while waiting by lack of maneuver; the ship's power plant will consume fuel as if it were a power plant-1, regardless of its true value. Every full load of fuel for a power plant-1 will last 4 weeks. Once all fuel is exhausted, all ship systems including life support no longer work.

At any time, a player may decide to return to the inner system. If he decides to return before the refueling segment he returns in time for refueling (of course, he cannot refuel unless his side owns the

system). If he decides to return during or after the refueling segment, he returns in the jump segment of the next week.

SURRENDER

For simplicity, to avoid the necessity to worry about armies, planetary bombardment, and other factors outside the scope of a purely naval campaign, the following abstract rule for planetary surrender is provided.

A given world's Surrender Factor is equal to its Population UWP factor multiplied by its Tech Level, and then multiplied by the modifier from World Surrender Factor Multiplier table.

WORLD SURRENDER FACTOR MULTIPLIER

Conditions	*Modifier*
Starting Multiplier	+1
Naval Base Present	+1
Subsector/Sector/Faction Capital	+1
Naval Depot Present	+2

If all defending ships have been incapacitated or disengaged, and the attacker has a number of weapon factors (adding up all functioning batteries on all ships, with A counting as 10, etc.) equal to the world's Surrender Factor, then the world surrenders.

If all defending ships have been incapacitated or disengaged, and the world did not surrender, the world's Surrender Factor is reduced each week by half the weapon factors the attacker has present.

Refueling facilities may be used immediately, and a small friendly naval shore station, suitable for transfer of messages, is established.

Starport repair facilities may be used after a 12-week waiting period; starport shipbuilding facilities may be used after a 48-week waiting period. Conquered worlds generate revenue as a captive government (type 6) for their possessor after 12 weeks, but such revenue is halved for the first 52 weeks (1 year).

Enemy ships awaiting repair on the planet may attempt to escape by disengaging through acceleration if they are capable of maneuver. If they do not escape, they are captured. Ships on the planet undergoing construction or refitting are automatically captured. Work may be resumed on captured ships where the enemy left off after the waiting period is over or, if capable of flight, they may be flown to a friendly starport. The referee may also consider the possibility that worlds will be able to partially or fully destroy ships before capture. Partial destruction is measured in weeks (and weekly cost) added onto a ship's construction time or refitting time; ships in ordinary or in port for repairs take battle damage (roll several times on the interior explosions and/or critical hit tables).

REFUELING

On the campaign level, a fleet either refuels in no time at all or in an entire week. Whether a fleet takes time to refuel or not depends on its refueling capability and the source of its fuel. Any ship may be refueled at a starport. Only streamlined and partially streamlined ships may refuel from gas giants. Only streamlined ships may refuel from planetary oceans or ice caps.

REQUIRED REFUELING TIMES

Fuel Source	*Streamlined*	*Partially Streamlined*	*Unstreamlined*
Gas Giant	0	0	1
Ocean/Ice	0	1	1
Base	0	0	0

Starport	*Fuel Available in Tanks*
A	2,000,000
B	1,500,000
C	1,000,000

D/F	500,000
E/X	no fuel available

A task force is considered streamlined if ships with fuel tankage equal to at least 50% of the total fuel tankage of the task force are streamlined, and partially streamlined if at least 50% are partially streamlined. It is considered unstreamlined in other cases. In order for an unstreamlined task force to refuel at a gas giant, at least 10% of its fuel tankage must be in fully or partially streamlined ships; in order for an unstreamlined or partially streamlined task force to refuel from a planetary ocean or icecap, at least 10% of its fuel tankage must be in streamlined ships. Task forces which do not meet these requirements may not refuel at those fuel sources. Of course, a task force could be reorganized, leaving out some of its ships, until it does meet a requirement. Refueling times for all types of task forces and refueling sources are given in the Required Refueling Times table. Starports are a special case. They each have a refueling capacity, giving the number of tons of fuel tanks they may refuel in zero time. Any ships in excess of this may be refueled in one week.

Streamlined or partially streamlined ships are also capable of refueling from a gas giant during battle. The ship must be part of the reserve during the operation, and if interrupted is considered not refueled. One pass through the gas giant's atmosphere is sufficient to fill all tanks and takes 7 turns. Fuel may be transferred between ships in two turns.