ALTERNITY®

Science Fiction Roleplaying Game

WARSHIPS

BY RICHARD BAKER

FOR THE OFFICERS AND CREW OF THE *USS TORTUGA* (LSD-46)

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INTRODUCTION

From the beginning of time, humankind has engaged in warfare. Conflict, violence, and conquest are a part of the human condition, which is a fact of life that seems unlikely to change with the simple advance in technological progress. While science fiction often features benevolent aliens and incredible social advances, it is ultimately a genre of speculation about the human condition. And that means that war is a central theme of a great amount of science fiction.

Some of the most famous works of the genre feature interplanetary, interstellar, or even intergalactic conflicts of staggering scale. Even the stories that present humanity as a united, advanced species often pit terrifying and implacable aliens against the forces of civilization; science fiction stories without the specter of warfare are the exception, not the rule.

THE WARSHIP AS A WEAPON . . .

Of all the weapons that may be employed in these futuristic conflicts, the warship is the most complex and powerful. Like any weapon, it may be used in the defense of the innocent, the oppression of the weak, or the destruction of a mortal enemy. Unlike a pistol or a rifle, though, the warship has the capacity to affect issues on a planetary scale. Heroes serving aboard a warship are affecting the plot at an epic level, and deciding the fates of entire worlds.

. . . AND AN INSTRUMENT OF DIPLOMACY

The most effective weapon is the weapon that is never needed. In the delicate balance of power between rival societies, a warship is a statement of intent and resolve. It is a deterrent¾threat in being.

As the visible symbol of a nation's strength and certainty, the warship is often a center of diplomacy and intrigue. Showing the flag over the skies of distant worlds can bolster weak allies, intimidate enemies, and sway undecided parties in favor of the nation that has demonstrated its ability to project force to the planet in question. Just being in the right place at the right time can sway the course of events in favor of the nation willing to show its teeth.

When showing the flag is not enough, gunboat diplomacy is still one of the most direct tools of statesmanship available to a society's leaders. If the presence of a warship is the most powerful factor in a contentious situation, the judicious application of a little force may produce results that diplomacy alone couldn't match. Quick strikes to neutralize the capabilities of rivals, replace difficult local leaders, or simply seize a better position may not call for the military destruction of those who oppose the cause the warship supports.

Finally, the ancient art of espionage is one more aspect of diplomacy. A warship is an excellent platform for all kinds of secret operations, covert strikes, sabotage, intelligence-gathering efforts, and clandestine meetings. In fact, most warships spend as much time in diplomatic missions as they do in fleet exercises or similar preparations for war.

Surveys, Exploration, and Research

For centuries, the navies of Earth's maritime powers backed extensive efforts to explore and chart the world around them. While some of this effort produced clear national benefits–the discovery of new lands to colonize, for instance–these same efforts were also instrumental in shaping our understanding of the world we inhabit. Military vessels carried scientific expeditions to the far corners of the world and contributed greatly to the advance of knowledge.

Major warships detached to exploration or scientific missions are a staple of science fiction. Knowledge is power, after all, and the more the heroes discover about the universe, the better they can represent their society's interests. Even if a ship is assigned to strictly military tasks, space is full of anomalies, mysteries, and uncharted systems for the heroes to explore and study.

SPACEPOWER

As soon as humanity mastered the technology of crossing seas and oceans, seapower began to shape the course of history. It only stands to reason that, as humankind expands into the galaxy, the control of space as the common ground between myriad island-worlds will be just as important as seapower was to the historical interaction of Earth's rival nations.

The ultimate point of spacepower is to use space travel to support your own goals and ends, while denying your enemy the ability to do the same. The logical extension of this philosophy is simple. Most naval enterprises consist of one of four basic missions: Protection of the homeland, defense of the spaceways, projection of power against enemy states, and the disruption of another nation's use of commerce, communications, and transport.

A warship under the command of a group of player characters in a roleplaying game is not a license to threaten or destroy any who offend the characters. It's an instrument of national policy, and characters in command of major warships aren't looking out just for themselves–they're looking out for the interests of their nations.

In time of war, they may be required to serve as part

of a fleet raiding enemy territory, defending a vital sector, or quietly avoiding enemy contact in preparation for a major clash. They might be tasked with extended missions of commerce raiding, tedious blockades of enemy systems, or convoy duties. In other words, the great majority of naval missions are designed to impede the enemy's command of the spaceways or to use spacepower to advance the nation's war aims. Seeking out and destroying the enemy fleet wherever it hides is a strategy reserved for a fleet confident in its superior strength or desperate enough to take a big gamble.

How Do I Use This Book?

Warships consists of five basic parts. *Chapter 1* through *Chapter 3* outline the mechanics of combat between capital ships and their escorts, first as a system suitable for miniatures and then as an expansion of the Alternity game space combat rules.

Chapter 4 covers some of the issues of real science in a space battle. If you want your space battles to be more "realistic," you'll find information here for adding more science to your science fiction.

Chapter 5 contains a detailed ship construction system for creating warships, heavy transports, and space stations for your own Alternity campaign.

Finally, *Chapter 6* introduces the concepts of space stations and other bases to the game..

Getting Started

Before you start a combat, you'll want to track down a large mat or poster printed with hexagons, preferably at least 3/4" or 1" in size. Smaller hex maps are printed in the *Appendix* for you to photocopy. Spaceship miniatures are fairly easy to find in any good hobby store; if you can't find real metal miniatures, buy a five-pack of MicroMachines or *Star Wars* or *Star Trek* plastic miniatures. Of course, cardboard counters work, too.

As you explore the rest of the book, try building your own spaceships using the rules in Chapter Five. You don't need to run an Alternity game to play *Warships* as a set of tactical and strategic rules for interstellar warfare.

As an ALTERNITY Rules Expansion

If you're reading this book, it's pretty likely that you're both an Alternity player and a fan of epic space combat. *Warships* should be very useful to you, since it expands your game on several fronts. Not only do we present rules for all kinds of starships in this book, but there's also a tremendous amount of information that will help you to put your players on the bridge of their very own capital ship.

Use the rules in *Chapter 5* to create the setting for your gaming group's next adventure. Imagine what your players will do when they have the whole galaxy ahead of their heroes, and the perfect plot device—a starship—to explore its most distant corners.

What's New Here?

If you're already an ALTERNITY fan, you'll notice that Warships replaces much of the previously existing game material about starship construction and combat. Here's a summary of the big changes:

First and foremost, the ship scale has been drastically extended to include ships of colossal size.

Durability score has been replaced by hull points, which range from 10 for a fighter on up to 10,000 (or more!) for a fortress ship.

The damage track has been expanded to include a new category of damage beyond mortals—criticals. In addition, the damage track has been "de-coupled" from the ship's durability score. While a fortress ship may have 1,000 times as many hull points as a fighter, it does not have 1,000 times as many stun, wound, and mortal points. This means that small ships are easier to destroy than they used to be, and that large ships are not necessarily as robust as their sheer size would indicate. Battleships are "eggshells armed with hammers"; they can deal out devastating damage, and a small number of good hits will cripple the enemy.

To reflect the difference between small ships and large ships, the firepower and toughness grades have been extended to several new categories. Amazing firepower under the previous system is now defined as "small craft" firepower; light warship, medium warship, and heavy warship firepower and toughness grades work much like the Ordinary-Good-Amazing grades work for characters and smaller vehicles. Damage of superior firepower "upgrades" against inferior targets, so that a single hit from a battleship's primary battery usually blasts a scout or trader to atoms.

Many details of ship construction and combat have been re-scaled for better game balance and consistency. For example, some weapons from the starship construction system in the Alternity Gamemaster's Guide have been assigned new firepower ratings based on the new system, and some common systems such as engines and FTL drives are now proportionally based on the size of the ship's hull.

Finally, we've streamlined the ship combat system so that space battles run a little faster. You'll make more decisions based on tactical considerations such as weapon range and effectiveness instead of rules minutiae. Controlling a battleship in a space battle is different than controlling a scoutship or an escort, and you'll be making different decisions about how best to fight the ship under your command.

DEFINITIONS

A quick primer to some of the concepts contained in these rules:

Acceleration: Acceleration is the amount of velocity a ship can add to its current speed in a single phase. For example, a ship with an acceleration of 1 (one megameter per turn per turn) can increase its speed from 2 to 3 megameters per turn in a single turn. That's about 4,000 Gs, in case you were wondering.

Accommodations: Accomodations are any facility installed to provide living space for crewmen, officers, troops, passengers, and passengers traveling in cold sleep.

Armor Check: An armor check is a roll of the ship's armor rating to negate some or all of the primary damage of an attack. Secondary damage always leaks through a ship's armor.

Artificial Gravity: Artificial gravity is any means of simulating Earth-normal gravity on a spaceship. Constant acceleration or centrifugal force can simulate gravity, but this term normally refers to advanced technology that actually generates a controlled gravity field for a ship.

Attack Roll: An attack roll is a crew check for the purposes of attempting to use a weapon against an enemy ship.

Battery: A battery is a grouping of weapons of the same type. For example, a battleship with four strong force guns might group all four into a single battery. Batteries are often referred to as primary, secondary, and tertiary, depending on how many the ship carries.

Class: Class is a general measure of the ship's size and capability, ranging from small craft to super-heavy.

Compartment: A compartment is one room or a small number of rooms dedicated to the same purpose and located in the same part of the hull. In *Warships*, systems need not be assigned to specific compartments–the hit location check indicates what systems are endangered by any enemy shot.

Control Die: All Attack Rolls and crew, sensor, and damage checks are based on the ALTERNITY game system Core Mechanic. The control die is always a d20, rolled as a part of one of these checks.

Core Mechanic: Almost all die rolls in the ALTERNITY game system are based on the core mechanic: Roll a d20 control die and add or subtract a second situation die. A roll is successful if the total of the control die and situation die is less than or equal to the appropriate skill score or target number. The core mechanic is explained in Chapter 1: Basic Combat.

Course: Course is the current heading of the ship. A ship must maneuver to change its course.

Crew Check: A crew check is a roll against the quality rating of the crew. Sensor checks, attack rolls, and damage checks are all just varieties of the crew check.

Critical Damage: Ships have four damage tracks: stun, wound, mortal, and critical damage. Compartment damage represents damage that can destroy one or more of the ship's compartments with a single hit.

Damage: Weapons inflict some amount of stun, wound, mortal, or critical damage points with a successful attack roll. Exceeding the target's wound damage track cripples the vessel; exceeding the mortal damage track destroys the vessel; and exceeding the critical damage track causes the target to explode or disintegrate.

Damage Check: A damage check is a crew check made to determine whether or not a system exposed to damage continues to function or not.

Demand: Demand is the amount of fuel, stores, or power consumed per day by a system. For example, a crew of ten men demands ten days of stores per day.

Downgrade: When a weapon strikes a target whose toughness exceeds the weapon's firepower, the weapon's damage roll downgrades one or more damage categories–mortal to wound, wound to stun, stun to no effect.

Drive: The drive is the ship's faster-than-light engine or mechanism.

Efficiency: Efficiency is a measure of how many days of power a single hull point of fuel contains. For example, a fuel with an efficiency of 20 holds 20 power-days per hull point; a single hull point could power a demand of 1 per day for 20 days, or a demand of 10 for 2 days.

Embarked Craft: Embarked craft are fighters, launches, strike craft, and so on carried in a ship's hangar or docking clamps.

Engine: The engine is a ship's slower-than-light engine or propulsion.

Fire Mode: Fire mode is the type of attack a particular weapon can make: normal fire (F), battery fire (G), burst fire (B), or autofire (A).

Firepower: Firepower is the general power of an attack, which is compared to the target's toughness to determine if the damage is upgraded or downgraded. Firepower ratings range from Small (the same as an Amazing rating in the ALTERNITY game) to Super-Heavy, and generally correspond with the class of the ship.

Fuel: Some power plants and engine systems require large amounts of fuel–usually, hydrogen.

Hull: Hull refers to the ship's specific type–destroyer, battleship, carrier, and so on.

Hull Points: Hull points is a measure of the hull's size. Systems installed in the ship take up hull points.

Launched Ordnance: Launched ordnance are missiles, mines, bombs, and similar weapons that deliver a warhead to the target.

Life Support: Life support is a system that provides heat, oxygen, and a safe environment to the ship's crew in the middle of deep space.

Mm (Megameter): A megameter is a unit of measurement equal to 1,000 kilometers. Each hex on the mapsheet is assumed to be 1 megameter wide.

Mortal Damage: Mortal damage is serious damage to the ship's structural integrity and systems function. Mortal damage is more serious than wound damage, but less dangerous than compartment damage.

Power: Many of a ship's most vital systems require large amounts of power. Power is produced by the ship's power plant, and then distributed to the various systems that are

needed at that moment. Along with hull points and money, power is one of the key limitations in ship design.

Power Points: Power points is a measure of how much power a system produces or requires. A ship producing 100 power points could power five systems requiring 20 points each, 10 requiring 10 points, and so on.

Primary Damage: All weapons are rated for how much damage they produce on an Ordinary, Good, or Amazing hit. The die range and type (stun, wound, mortal, or critical) of damage listed for the weapon is considered to be the primary damage of the attack. In addition, a weapon hit inflicts secondary damage equal to half the primary damage in all categories (stun, wound, or mortal) below the primary damage.

For example, a CHE missile inflicts 1d6+1 points of wound damage on a Good hit; if the damage roll came up 5, the primary damage of the attack would be 5 wound points. The secondary damage is 2 stun points.

Primary damage can be partially or completely blocked by the target's armor check. Secondary damage is never affected by armor.

Primary damage may upgrade or downgrade depending on the weapon's firepower and the target's toughness.

Progress Level: Progress Level is a measure of the technology a particular society or civilization has achieved. Progress Level ranges from 0 (the Stone Age) through 6, 7, 8, and 9–the Fusion, Gravity, Energy and Matter Ages.

Secondary Damage: A successful weapon strike causes secondary damage equal to half the primary damage in all damage categories below the damage inflicted by the initial strike. In other words, if a weapon inflicts 6 points of mortal damage as its primary damage, it also inflicts 3 wound points and 3 stun points as secondary damage. Always round down.

Armor has no effect on secondary damage.

Sensor Check: Sensor checks are a special kind of crew check made for the purpose of using the ship's sensors to detect a target.

Situation Die: The situation die is the second half of the Alternity game's core mechanic. It may be a d4, d6, d8, d12, or d20 that is either added to or subtracted from the d20 Control Die as part of a skill roll, Crew Check, or similar task. The situation die reflects conditions that make success more or less likely. A minus die (-d4, -d6) is an advantage, since it reduces the result of the control die and makes it more likely that the roll succeeds against the target number.

Step: A step indicates an increase or decrease in the difficulty of an attack roll or crew check. A bonus step (or minus step) lowers the situation die by one type–d8 to d6, d6 to d4, d4 to d0, d0 to –d4, and so on. A penalty step (or plus step) increases the die by one type–d6 to d8, d8 to d12, and so on.

Stores: Stores are food, water, and other expendable materials required by a crew in space. A ship's crew consumes one day of stores per crewman per day, so a crew of 400 requires 400 days of stores per day in space.

Stun Damage: Stun damage is minor damage that is unlikely to cause a major system failure, hull breach, or structural damage.

System Damage: When a ship suffers damage from a successful attack roll, one or more of the ship's systems may be affected. The hit location check is a roll on TABLE 2-4 to see what system a particular hit affects.

Target Modifier: The target modifier bonus or penalty to any attack roll made against a particular ship, based on its size. Large ships are bigger targets and easier to hit than small ships.

Tech Track: Not every device or technology may be available to all civilizations at the same Progress Level. The tech track codes certain types of ship systems to particular branches of technology, which may or may not be available to a particular civilization.

Toughness: Toughness is a measure of the ship's resistance to weapons fire. While armor negates some or all of the damage of an attack, a ship's toughness may cause the category of damage inflicted (stun, wound, mortal, or compartment) to downgrade before armor is even rolled for.

Type (Damage): The nature of an attack–low impact, high impact, or energy. Various types of armor protect against different types of attacks at different levels.

Upgrade: When a weapon strikes a target whose toughness is less than the weapon's firepower, the weapon's damage roll upgrades one or more damage categories–stun to wound, wound to mortal, or mortal to compartment.

Warhead: The warhead is the business end of a missile, bomb, or mine. The warhead determines how much damage the weapon inflicts.

Wound Damage: Wound damage is significant damage that may knock out minor systems, create holes in unimportant compartments, or wreck unprotected equipment on the exterior of the ship. More serious than stun damage, but not as bad as mortal or compartment damage.

CHAPTER 1: BASIC COMBAT

Science fiction movies, books, and games are filled with thrilling combat scenes between space-going dreadnoughts and star fighters. A big space battle might include dozens or hundreds of ships on a side, but for now we'll concentrate on the classic duels between a handful of ships on each side.

In this chapter, we'll present a starship combat system adaptable to a variety of technologies, tactics, and situations.

SETTING UP

So, you're playing in your weekly ALTERNITY game, and all of a sudden a Thuldan battlecruiser shows up and starts shooting at the heroes' ship. Where do you start?

The Ships

First of all, who's on each side? If you're in the middle of a roleplaying scenario for your ALTERNITY game, you probably have a good idea of what ship the heroes are flying, and who's likely to be on the other end of the heroes' guns.

If you're setting up a starship combat scenario just to play out a battle, create a couple of ships and set them up on each side. Try to keep the number of ships on each side to five or less, unless you've got a lot of time on your hands and you don't mind slugging out an epic battle. If you're trying to referee the outcome of a Jutland-like engagement in which the heroes' ship is involved, it might be better to set up two to four sequential engagements with a small number of enemy ships representing hard-fought encounters within the grand scope of the epic battle.

The Map

Several companies manufacture cardboard or felt maps printed in starfields. You can play the game without a map (see *Chapter 3: Narrative Combat*) but you'll find that the subtleties of movement and position may be difficult to keep track of without some kind of physical representation of where each ship is in relation to the others.

If you can find the space, set up several map sheets to create a large battlefield so that you don't have to keep shifting ships that would otherwise "go off the edge" during their movement.

The Crew

You may have your own ALTERNITY characters manning critical stations, but for the basic combat rules, we're going to assume that all crewmen on a ship are equal.

Crew quality determines the skill score (or target number) of attack rolls, pilot checks, repair checks, and similar die rolls.

Table 1–1: Crew Quality

Quality	Description	Score
Marginal	Green	10
Ordinary	Trained	12
Good	Veteran	14
Amazing	Crack	16

For example, all attack rolls made by a ship with a green crew hit on a roll of 10 or less, while a veteran crew scores hits on a roll of 14 or less. Crew quality is often decisive in encounters between fleets with roughly equal numbers and technology.

For more information on how your ALTERNITY character can affect the course of a major battle, refer to *Chapter 2: Advanced Combat* and *Chapter 3: Narrative Combat*.

GAME SCALE

In the basic rules, we're going to concentrate on battles between ships of Progress Level 7 (the Gravity Age) or 8 (the Energy Age). The best scale for an encounter between ships of this technology is about 1,000 kilometers per hex. One thousand kilometers equals 1 megameter, so weapon ranges are given in hexes or megameters.

Each game round represents about 30 seconds of real time. A ship moving at a speed of 4 hexes per round actually travels at a rate of 8,000 kilometers per minute, or 480,000 kilometers per hour. By comparison, the speed of light is 300,000 kilometers per second. A ship moving at a speed of 15 hexes per round is flying at the speed of 30,000 kilometers per minute, or roughly 1/600th the speed of light. Space battles take place at a small fraction of light speed.

SEQUENCE OF PLAY

In the basic game, play proceeds in a number of rounds. Each round follows the sequence of play outlined below:

- Edge Phase
- Movement Phase
  - a. Capital Ships
  - b. Medium and Light Ships
  - c. Small Craft
  - d. Missiles
- Fire Phase
  - a. Beams and Projectiles
  - b. Torpedoes and Special
  - c. Missile Attacks
  - d. Bomb Attacks
- Launch Phase
- Repair Phase

EDGE

The edge represents a tactical or situational advantage held by one side or the other. The commander with the edge can discern enemy movements and respond to them more effectively than his foes. In a close-fought battle, the edge may shift a number of times from one side to the other.

The side currently holding the edge is called the edge player or edge fleet; the side without the edge is called the opposing player or opposing fleet.

Determining Edge

At the beginning of each round of combat, the commander of each fleet should roll a crew check against the crew skill of the flagship. Any medium, heavy, or super-heavy ship can be designated as the flagship of a fleet. If the fleet contains no ships large enough to qualify, any light ship present can become the flagship. Finally, if no light ships are present, any small craft can be designated the flagship. The captain with the best success in the crew check wins the edge.

If both sides achieve the same level of success, the commander with the fewest ships wins the edge. If both sides have the same number of ships, then reroll to break the tie.

Effects of Edge

The chief effect of edge is simple: During each step of the movement phase, the edge player may move his ships after the opposing player moves hers. In other words, the edge player gets to see where his opponent is moving to before he commits to moving his own forces.

This is a serious advantage, since it means that the edge fleet can choose the range for each round of fire, and it may "cross the T" or pull off similar tactical coups with some careful positioning.

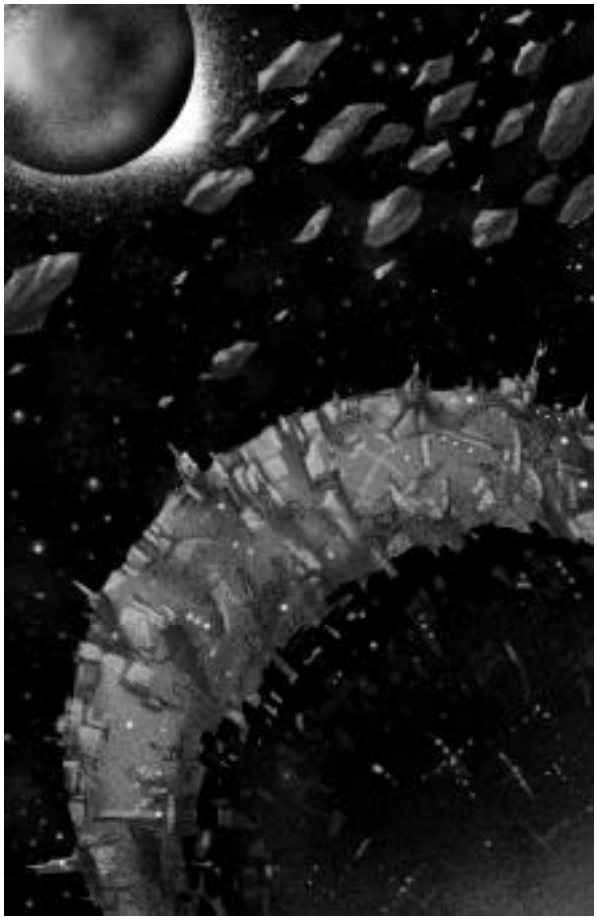
Edge Check Modifiers

Several circumstances may modify the edge check for one side or the other. These include the following:

- +1, +2, or +3 step penalty if the flagship is shaken, disabled, or crippled (see "Damage").
- +4 step penalty if the flagship is destroyed (this applies to the new flagship's first edge check).
- –1 step bonus per enemy ship destroyed in the previous round (excluding small craft).
- –2 step bonus if the commander received reinforcements in the previous round.

MOVEMENT

Positioning is key in any battle. While space usually lacks any terrain features worth exploiting for tactical advantage, the decision of how close to get to the enemy and which side of the ship to expose to enemy fire can be just as important. Many battle doctrines are founded on the idea of exploiting a range at which your weapons are superior to the enemy's.



Movement Steps

The movement phase is broken up into several steps: capital ship movement, medium and light ship movement, small craft movement, and missile movement. This doesn't mean that heavy ships move faster than small ones; it means that heavy ships must commit to their maneuvers and positioning before smaller vessels, so small ships have the advantage of seeing where the big ships are going before they perform their own movement.

Movement Steps
a. Heavy and Super-heavy Ships
b. Medium and Light Ships
c. Small Craft
d. Antiship Missiles
e. Counter-missile Missiles

During each step, ships of the opposing fleet move first, followed by ships of the edge fleet. If one player doesn't

have any ships of the appropriate size, she simply skips steps until she reaches a step matching the ships under her command.

Movement Basics

In space, an object in motion remains in motion. Even if a ship makes no maneuvers or puts no power into its engines at all, it will continue on its last course and speed forever (or until it's captured in a celestial body's gravity well). Simply move a coasting ship the same number of hexes on the same heading it used last round.

Speed

A ship's speed is the number of hexes it will move in the current round. Speed is retained from round to round, regardless of whether or not a ship actually maneuvers or even provides power to its engines. For example, if a cruiser enters a battle traveling at a speed of 4, it will move 4 hexes per round in each subsequent round until it maneuvers, accelerates, or is destroyed. If the cruiser accelerates in the third round of the battle to a speed of 6, it will move 6 hexes each round until it does something to change its speed again.

Unless the scenario states otherwise, assume that all ships begin the first round of the battle with a speed of 0. They must accelerate to move across the map sheet.

There is no upper limit to a ship's speed. It just depends on what the ship's acceleration rating is and how many rounds the ship spends accelerating. However, the faster a ship is traveling, the harder it is to perform maneuvers or change heading.

In general, most battles will take place at speed ranges of 0 to 10 hexes per round. Relativity effects begin to kick in around a speed of 2,000 or so, but ships moving this fast are so hard to engage and have so little ability to engage their targets that there's no point in describing the exact details. (See *Chapter 4: The Cold Hard Facts* for more information.) Ships moving at very high speeds may be harder to hit than slow-moving targets.

A speed of 1 is roughly equal to 120,000 kilometers per hour.

Heading

A ship's heading is the course it is currently traveling. Like speed, it remains the same from round to round until the ship takes some action to change its heading. To change heading, a ship must perform a maneuver during the course of its movement.

Acceleration

Every ship has an acceleration rating that measures how much it can change its speed in one round. For instance, a cruiser might have an acceleration of 3. If its current speed is 5, the cruiser can set any speed from 2 to 8 in its current move.

Acceleration or deceleration takes place at the *end* of the ship's movement. In other words, a ship that begins the round at speed 3 and then accelerates to speed 5 is moving at a speed of 3 until it moves three hexes—and then it moves two more hexes, traveling at a speed of 5. Most of the time this doesn't matter, but it may be important for maneuvering purposes.

Ships need not change facing to decelerate. The engines used by ships in the basic combat rules are not reaction drives, and they don't have to maneuver like real rocket-propelled spacecraft do.

An acceleration of 1 is roughly equal to 3,300 G—ships of PL 7 and higher require powerful inertial dampers or compensation to survive maneuvers this violent.

Maneuvers

For the basic combat game, we're assuming that starships are equipped with engines that permit cinematic maneuvers—banks, loops, turns, and rolls. In effect, the gravity induction engine engages a medium against which it can exert force—the omnipresent gravitational energy of the universe. We'll examine other methods for moving and maneuvering ships in *Chapter 2: Advanced Combat*.

Ships may perform a number of maneuvers in one round equal to their Maneuverability Class.

A speed of 5-8 reduces a ship's MC by 1 point; a speed of 9-12 reduces MC by 2 points; a speed of 13 to 16 reduces MC by 3 points. (Every 4 points of speed reduces maneuverability class by an additional point.)

A ship at MC 0 can only make maneuvers once every other round. A ship at MC –1 can maneuver once per three rounds; MC –2, once per four rounds; and so on.

There are four basic maneuvers available to a ship:

Straight: The ship simply moves forward one hex per point of speed. This isn't really a maneuver. A ship doesn't have to use its engines or perform any maneuvers to keep moving straight ahead.

Roll: The ship moves into any one of the four hexes on either side instead of moving into the hex directly ahead of it and maintains its current heading. Executing a roll does not cost any speed points.

Turn: The ship moves forward one hex and then changes its heading by one hexside. Changing heading counts as one point of speed, so a ship with a speed of 5 could move 5 hexes in a straight line, or 4 hexes and turn.

Loop and Turn: The ship moves straight ahead one hex and then selects any new heading desired. This costs two extra points of speed, so a ship with a speed of 5 could move 3 hexes and execute a loop and turn maneuver.

Missile Movement

Missiles are placed on the map during the launch phase. In the movement phase of the following round, they can begin to maneuver toward their target. For purposes of the basic game, all missiles have an acceleration of 6 and a Maneuverability Class of 5. Missiles move last in the movement phase, since their targeting systems predict ship movement with uncanny accuracy. Missiles that don't reach their target with 6 rounds run out of power and coast.

Note that missiles don't automatically detonate the instant they reach their target. In fact, missile detonations are the last step in the fire phase. This reflects the fact that antimissile fire may knock down the missile before it delivers its warhead.

To make an attack in the fire phase, the missile must move into or through the same hex as its intended target. (The missile's movement stops when it enters its target's hex.) If the missile can't get into the target's hex in the current round, it can't make an attack roll.

Counter-Missiles

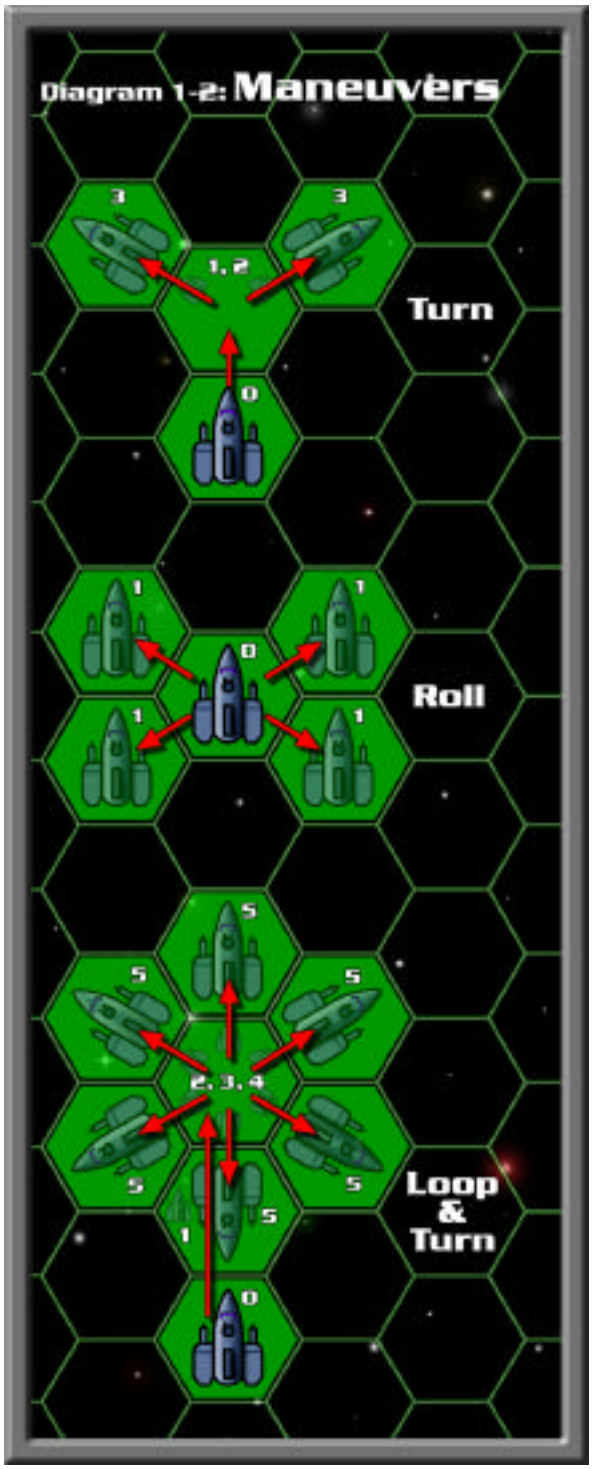
Missiles assigned to attack other missiles have a special advantage; they move after all antiship missiles have moved, regardless of which side has the tactical edge. For the sake of sanity, you can assume that it's possible for a missile to target an enemy antiship missile, but not an enemy countermissile missile. In other words, there are two valid targets for a missile: an enemy ship (in which case it's an ASM, or antiship missile) or an enemy antiship missile (in which case it's a SAM, or ship-to-air missile).

Launch and Recovery

Missiles, fighters, and other embarked craft don't begin play on the map. They must be launched before they can begin to move. The launch phase takes place after the fire phase, so just-launched missiles and fighters can't be attacked until after they've had a chance to move at least one time.

During the launch phase, the opposing player must declare her launches first, followed by the edge player. New missile markers or ship miniatures are simply placed in the same hex as the launching vessel. They assume the launching vessel's speed and heading upon launch, but they don't get to maneuver independently until the movement phase of the following round.

Carriers may recover fighters and other small craft (or fighters can dock with other ships) by ending their movement phase in the same hex as the carrier, with the same heading and a speed equal to or not more than 1 point higher than the recovering ship. A determined commander could probably recover missiles that run out of power after a battle's over, but most prefer to self-destruct the weapons.



Fire

Players conduct their attacks in the fire phase. Like movement, the fire phase is broken up into a hierarchy of attacks: beams and projectiles, then torpedoes and special weapons, and finally missile and bomb attacks. A ship destroyed by beam fire in the first step can't fire its torpedoes in the second step; the beam fire knocked it out before it could use its own weapons. The exact order of fire looks like this:

- Opposing fleet beam fire
- Edge fleet beam fire
- Beam damage takes effect
- Opposing fleet torpedo fire
- Edge fleet torpedo fire
- Torpedo damage takes effect
- Opposing fleet antimissile fire
- Edge fleet antimissile fire
- Anti-missile hits take effect
- Opposing fleet antiship missile fire
- Edge fleet antiship missile fire
- Antiship missile damage takes effect
- Opposing fleet bomb attacks
- Edge fleet bomb attacks
- Bomb damage takes effect

Obviously, not every step is necessary in every battle. Just skip steps that aren't needed in the current game round or scenario.

Targeting

In each step of the fire phase, the opposing player announces her targets and conducts her attacks first. Damage is simultaneous, so there's no advantage in attacking first. In fact, the edge player has the advantage, since he can wait and see how his opponent's attacks go before he decides how his ships will respond.

Arcs of Fire

Most shipboard weapons can't fire in all directions at once. For purposes of the basic game, there are six arcs of fire: forward, aft, port, starboard, and zero-port and zero-starboard. Usually, ships are built so that their best weapons bear in a couple of arcs so that they can create an overwhelming amount of fire in a particular sector. Many large ships include a number of small weapons that can fire into the zero arc, so that fighters and missiles in the same hex as the ship itself can be attacked.

Zero-port and zero-starboard are simply the same hex as the firing ship. Not every weapon can hit extremely close targets due to masking by the ship's structure, inability to train quickly enough on rapidly changing target angles, and so on. When a ship moves into the same hex as another vessel, the moving ship can declare whether it's in the zero-port or zero-starboard firing arc of the nonmoving ship. The moving ship can declare that any one of its firing arcs faces the stationary ship.

Example: A destroyer moves into the same hex that an enemy battleship occupies (the battleship moved earlier in the round). The commander of the destroyer declares that his ship is located in the battleship's zero-port arc. He also declares that the battleship is in the destroyer's forward arc of fire, since he intends to torpedo it in just a moment.

Range

Over the great distances of a typical space battle, energy weapons slowly disperse and the smallest inaccuracy in a projectile creates a miss of thousands of kilometers. Range is counted in hexes from the firing ship to the target, not counting the hex the firing ship is in (that would be a range of 0).

If you're playing with miniatures, you'll find that some miniatures actually take up two or three hexes on a map sheet. The ship itself would be microscopic if the miniature was scaled correctly to the map, so use the highest mast or tower on the miniature as the hex the ship is actually located in.

Attack Rolls

An attack roll is a normal crew check. Like other checks, it begins at a bonus of +d0. An attack roll is modified by the following conditions:

- Weapon base accuracy
- Target size modifier
- Range modifier
- Fire control modifier
- Target defenses
- Fixed mount penalty (+3 steps if not on direct line)

Weapon accuracy is a property of the weapon itself. Record it on your ship record sheet under the weapon description.

Target size modifier is a characteristic of the ship, noted on your ship record sheet. Small ships are harder to hit than big ships.

Missiles have a +4 step target size modifier.

Range modifier depends on the weapon's range characteristics. A weapon may have a range of 2/4/8 hexes, indicating that a shot of 0–2 hexes is Short range, 3–4 hexes is Medium range, and 5–8 hexes is Long range.

Medium range attacks suffer a +1 step penalty.

Long range attacks suffer a +2 step penalty.

Fire control reflects the power of the attacking ship's computers and fire control systems. Mark it on your ship record sheet.

Target defenses account for defensive systems that make the ship harder to hit–jammers, deflection inducers, chaff, and so on These should be described on the ship record sheet of the target vessel.

The fixed mount penalty means that a weapon housed in a fixed mount suffers a +3 step penalty to any attacks that are not along a direct line of hexes. A weapon in a fixed mount forward can fire into the forward arc, but suffers a +3 step penalty to the attack roll unless the target is directly ahead.

Decoys

Decoys are a special type of defense. If a target deploys a decoy in response to enemy fire, the enemy ship must attempt an immediate crew check. On a success, the decoy is identified and ignored. On a failure, there is a 50-50 chance that any fire this round strikes the decoy instead of the target ship. Any hit scored on a decoy destroys it, so decoys rarely last more than a round or two.

Successful Attacks

An attack roll results in one of four possible results: a failure, or a hit of Ordinary, Good, or Amazing quality. Each weapon has a listed damage range for each type of hit. For example, a laser cannon inflicts d4 stun points on an Ordinary hit, d4 wound points on a Good hit, and d4+2 wound points on an Amazing hit.

Defensive screens may absorb damage or the target's armor can block it. In addition to causing some amount of damage points, successful hits may knock out key systems on the target or reduce its capabilities. See "Damage" for more information.

Launched Weapons

Missiles and bombs attack much like other weapons, with one extra step: getting there.

Missiles move during the movement phase, acting like small and maneuverable ships (see the movement rules for details). If a missile ends its movement in the same hex as its target, it may roll an attack in the fire phase. However, missile attacks are the last step in the fire phase, so it's possible for the target to shoot down an attacking missile with a last-second round of defensive fire.

Bombs must be carried to the hex in which they will be employed. In other words, the bomber must end its movement in the same hex as the target to make an attack roll in the fire phase. Bombs can't be hit by defensive fire, but defensive fire can shoot down the bomber before it executes its bombing attack.

Any ship can drop bombs on a stationary target such as a planet or base, but only ships of Maneuverability Class IV or better can drop bombs on enemy ships, and even then the target must have a Maneuverability Class lower than the bomber.

Damage

All ships possess a damage track, which is composed of four different components: stun (s), wound (c), mortal (m), and critical (e) damage. (This parallels the damage track for Al-

Damage Procedure

When a ship rolls a successful attack, follow this procedure:

1. Roll the damage, based on the weapon and the success level of the hit.
2. Compare the target's Toughness to the weapon's firepower; upgrade or downgrade the damage as necessary.
3. Apply the effects of an ablative shield, if any.
4. Determine the secondary damage of the attack.
5. Roll the target's armor (and particle screen, if any) and subtract the result from the primary damage.
6. Apply the results.

TERNITY characters and vehicles.) If it bothers you to think of the damage track this way, just consider them to be superficial, moderate, major, and extreme damage instead.

If a ship fires successfully on a target, it inflicts a range of damage based on the weapon used and the degree of success. For example, a plasma missile inflicts d6+3 wound points on an Ordinary success, d8+3 wound points on a Good success, and d6+2 mortal points on an Amazing success. Refer to your ship record sheet for damage figures.

Each track of damage is sometimes referred to as a grade. For instance, the plasma missile inflicts d8+3 points of damage on a Good hit, and the grade of the damage is wound damage.

Secondary Damage

When a weapon strikes a ship, it inflicts some amount of stun, wound, mortal, or critical damage points. This is referred to as the weapon's primary damage. For example, an Amazing hit with a boson gun inflicts 5d6 points of mortal damage (an average of about 18 points).

In addition, all hits automatically inflict secondary damage in each lesser grade equal to half the amount of primary damage (round down). In the case of the boson gun that inflicts 17 points of mortal damage, the target also sustains secondary damage of 8 wound points and 8 stun points.

Secondary damage is not blocked by the target's armor, so a heavily armored ship might stop all of the primary damage of a big attack, but still sustain some amount of secondary damage. Even if a battleship's armor stops the wound or mortal damage of a missile hit, some surface structures, power relays, and hull systems will be affected by the strike; secondary damage represents these collateral effects of a major weapon strike.

Armor and Screens

Warships protect themselves with two basic forms of defenses: systems that absorb or negate the effects of the attack and systems that make it less likely that an attack will be on-target. Defenses of the first type include armor and some kinds of energy screens. These affect the actual damage inflicted by a successful attack. Defenses of the second type include ECM, chaff, or deflection inducers–gravitic shields that deflect incoming fire. These defenses affect the success or failure of the attack by adding step modifiers to the firing ship's attack roll.

Armor

A ship protected by armor has an armor rating. This is the number of points of incoming damage the armor blocks. For example, a ship is struck for 9 points of mortal damage. If the ship is equipped with heavy cerametal armor, the armor stops d8 points of damage. On a roll of 6, the armor would stop 6 points of damage, leaving 3 points of mortal damage to be marked off on the ship's damage track.

Important: The secondary damage of the attack is based on the original damage roll, before armor reduces the primary damage. In the example above, a hit for 9 mortal points inflicts 5 wound points and 5 stun points, even though the ship's armor reduces the mortal damage from 9 points to 3 points.

Screens

Some ships may possess energy screens or shields that absorb damage. Damage is always downgraded or upgraded for attacker firepower versus defender toughness (see the following section) before the effects of screens, shields, and conventional armor are applied.

Deflection inducers and displacers simply add a step penalty to the firing ship's attack roll. They tend to make attacks miss, but don't really attenuate the energy of the attack (other than the fact that attack penalties usually result in hits of lower quality and less damage potential).

Particle screens add d4 (low impact and high impact) or d6 points (energy) to a ship's armor rating. This is totaled with the target's normal armor roll, so if a ship has cerametal armor (d8 versus energy) and a particle screen, its armor value is d6 + d8, or 2 to 14 points. Particle screens have no effect on secondary damage, just like normal armor.

Ablative shields work differently. An ablative shield has a protective value based on the total shield point capacity of the ship's capacitors. For example, a destroyer might have capacitors capable of absorbing 50 shield points of damage. One stun point of damage equals one shield point; more dangerous grades of damage fill the ship's capacitors as shown below:

Table 1–2: Ablative Shields

Damage Grade	Shield Points
1 Stun	1 point
1 Wound	2 points
1 Mortal	3 points
1 Critical	5 points

Note that upgrading or downgrading effects for firepower versus toughness take place before the amount of shield points taken up by an attack is calculated. If the primary damage of the attack is entirely absorbed, there is no secondary damage and no system damage. If the attack is partially absorbed by a failing shield, the "leftover" damage creates secondary damage and may cause system damage.

Typically, a ship fitted with an ablative shield will be impervious to enemy fire for a couple of rounds at the beginning of the battle, but then the shield will fail as the ship's capacitors fill.

Damage Type

In addition to the number of points and the grade of damage inflicted by an attack, weapons are characterized by what *type* of damage they inflict: low impact (LI), high impact (HI), or energy (En). Low impact weapons strike like physical blows, collisions, or blasts. High impact weapons penetrate the target. Energy attacks both penetrate and irradiate, heat, or vaporize the target.

Damage type is important because different types of armor and defensive devices work better against some attacks than others. For example, light crystallis armor is designed to handle energy weapons, so its En value is d6+2. However, it's not as good against high impact attacks, so its HI value is only d6.

Firepower and Toughness

In addition to their damage, range, and accuracy characteristics, all weapons are rated for firepower. Firepower roughly measures how the weapon affects targets of different sizes. It incorporates penetration, destructive potential, and general potential for mayhem. Firepower ratings correspond to ship classes: small craft, light, medium, heavy, and super-heavy.

Toughness measures how large, heavily compartmented ships can stand up to weapons fire. It's not just armor–it's mostly about size. Toughness is based on the class of the ship and whether or not the design is a military hull. Toughness grades include small craft, light, medium, heavy, and super-heavy.

Whenever a weapon strikes a ship, compare the firepower of the weapon to the toughness of the target. High toughness targets may shrug off low firepower weapons, while high firepower weapons devastate low toughness targets.

- If firepower equals toughness, there is no special effect.
- If toughness exceeds firepower, the weapon's damage downgrades.
- If firepower exceeds toughness, the weapon's damage upgrades.

Downgrading

If a weapon's firepower falls short of the target's toughness by one class, all damage inflicted drops by one grade. Mortal hits become wounds, wounds become stuns, and stuns are negated entirely. If the weapon's firepower falls short by two classes, damage inflicted drops by two grades: mortals to stun, and wound or stun disappear entirely.

Table 1–3: Downgrading

Damage	Number of Grades		
Grade	One	Two	Three
Stun	None	None	None
Wound	Stun	None	None
Mortal	Wound	Stun	None
Critical	Mortal	Wound	Stun

Example: A destroyer fires a fusion laser (a medium weapon) at a battleship (a heavy target) and inflicts 6 wound points. Since the laser's firepower falls one class short of the target's toughness, the damage becomes 6 stun points. Then, the battleship may roll its armor vs. energy attacks to negate some or all of this stun damage.

Upgrading

If a weapon's firepower exceeds the target's toughness, all damage increases by one grade. Stuns become wounds, wounds become mortals, mortals become compartment damage, and compartment damage dice are doubled. If the firepower is two classes over the target's toughness, damage increases by two grades; three classes over, three grades.

Table 1–4: Upgrading

Damage.	Excess of Firepower		
Grade	One	Two	Three
Stun	Wound	Mortal	Critical
Wound	Mortal	Critical	2x Crit
Mortal	Critical	2x Crit	3x Crit
Critical	2x Crit	3x Crit	4x Crit

Critical damage upgrades a little differently. For one step, simply double the critical damage rolled. For two, triple it, and for three, quadruple it. For example, if a zero bore (super-heavy firepower) hits a battleship (heavy toughness) for 11 critical points, the damage upgrades to 22 critical points. This will prove to be lethal quite frequently.

Example: The battleship returns fire with its primary battery, a heavy matter beam (heavy). It scores a hit inflicting 7 mortal points. However, since the destroyer is only a light target, these upgrade one step to criticals, and then a second time to double the number of criticals–14 in this case. Don't mess with battleships.

Effects of Damage

A ship is shaken when all the boxes in its stun track are marked off, disabled when all the boxes in its wound track are checked off, crippled when all boxes in its mortal track are checked off, and destroyed when all boxes in its critical track are checked off.

Shaken

When all of a ship's stun boxes are checked off, the ship is shaken. Minor systems failures, ionizing damage, and fluctuations in system operations generally reduce a ship's effectiveness in battle. Shaken ships suffer the following penalties:

- All crew checks suffer a +1 step penalty.
- The ship remains shaken until it repairs at least 1 stun point. Excess stun damage that strikes a ship with no stun boxes left is marked off the wound track at a 2-for-1 rate (two stun points become one point of wound damage).

Disabled

A ship is disabled when all of its wound points have been lost to damage. Important systems are no longer working or require constant attention to compensate for damage, portions of the ship's interior have been holed to space, and the overall integrity of the hull is failing. A disabled ship suffers the following penalties:

- All crew checks suffer a +2 step penalty.
- The ship's Maneuverability Class drops by one point.
- Enemies firing on the disabled ship gain a –1 step bonus to their attack rolls.

The ship remains disabled until it repairs at least one point of wound damage. Excess wound damage that penetrates the ship's armor when it has no wound boxes left rolls into mortal damage at a 2-for-1 rate.

Crippled

A crippled ship has lost all boxes on its mortal damage track. Most systems can function only through heroic efforts and jury-rigging on the part of the crew. Extensive portions of the hull have been demolished, and most of the ship's interior is open to vacuum. A crippled ship suffers the following penalties:

- All crew checks suffer a +3 step penalty.
- The ship's Maneuverability Class drops by two points.
- Enemies firing on the crippled ship gain a –2 step bonus to their attack rolls.

In almost all cases, a ship cannot repair lost points of mortal damage during the course of a space battle. This means that a ship crippled in a battle remains crippled for the rest of the fight. However, some special damage control systems may make it possible for mortal damage to be repaired in a matter of rounds. If a crippled ship regains at least 1 box of mortal damage, it is no longer crippled. Excess mortal damage that strikes a ship with no mortal damage boxes remaining becomes critical damage, at a 2-for-1 rate.

Destroyed

A ship is destroyed outright when it loses all of its critical damage boxes. If the damage is more than the ship's critical damage rating but less than twice that number, the ship remains more or less in one piece–a lifeless derelict hurtling through space, continuing on its last course and speed.

If the damage exceeds twice the derelict's critical damage rating, the wreck immediately breaks up or explodes. Remove the miniature from the map.

Repairs

At the end of a round, any ship with damage may attempt a repair check. A repair check is a normal crew check, modified by any damage control systems the damaged ship possesses. A repair check can do the following:

- Restore 1, 2, or 3 lost stun points for an Ordinary, Good, or Amazing success.
- Restore 1, 2, or 3 wound points for an Ordinary, Good, or Amazing success. Only ships equipped with repair bots or a nanite repair array can attempt this type of repair check.
- Restore 1, 2, or 3 mortal points for an Ordinary, Good, or Amazing success. Only ships equipped with a nanite repair array can attempt this repair check.

Ship Class and Repair Checks

Small ships don't carry enough crewmen to both fight and attempt repairs at the same time.

Small craft cannot attempt a repair check unless they either coasted (made no maneuvers or speed changes) or did not fire any weapons in this game round.

Light and medium ships may attempt one repair check per round, regardless of what other actions they take in that round.

Heavy ships may attempt two repair checks per round.

Super-heavy ships may attempt three repair checks per round.

Repair Check Limitations

If a ship is capable of performing multiple repair checks in the same round, no type of damage can receive more than one repair attempt per round. For example, a fortress ship with three repair checks per round couldn't use all three to correct wound damage. One check could be used for stun damage, one for wound damage, and the last one for mortal damage (if the ship possessed systems that allow it to correct mortal damage).

The Battleground

Since it's nearly impossible to bring a fast-moving ship to battle, most space battles take place in the vicinity of planets or bases where one side or the other has an interest. Raids, blockades, and invasions are far more common than open-space encounters. While each hex on the battle mat is extremely large (1,000 kilometers across), there are still some terrain features that can affect the way a battle develops.

Planets

When a scenario takes place in the vicinity of a planet, the planet is far and away the dominant feature on the map. For the sake of convenience, we'll assume that planets come in three sizes: small, medium, and gas giant.

Small planets are 5,000 kilometers in diameter (five hexes). Planets such as Mars, Mercury, or Pluto might be represented by small planets. It's not precise, but it's a reasonable approximation for game play.

Medium planets are 9,000 kilometers in diameter (nine hexes). This is a little small for representing Earth-sized planets, but it's good enough for game play.

Gas giants may be 50,000 to 150,000 kilometers (or more!) in diameter. For the sake of convenience, you can indicate the presence of a gas giant by simply marking a "wall" (give it a slight curve if you like) across one side or corner of the map sheet. With a radius of 25 hexes, the circumference of a gas giant would be more than 150 hexes! Indicating a 20- or 30-hex long arc of the gas giant's surface is about the best you can do for most tabletop games.

Planets and Movement

Ships that move adjacent to a planet or onto the planet marker (see "Low Orbit," below) may use the gravitational influence of planet to immediately change their heading by 60 degrees (one hex side) in the direction of the planet. This is not mandatory; even a ship with an acceleration of only 1 hex per round generates hundreds of G's, and can easily compensate for the relatively weak gravity field of a planet.

Beyond the "slingshot" move, planets have four distinct regions for movement purposes.

Impact Zone: The center hex of a small planet, central three hexes of a medium planet, or any hex more than one hex "deep" in a gas giant is an impact zone. Any ship that enters an impact zone hex at a speed greater than 1 is destroyed. A ship in the impact zone at a speed of 1 or less preparing to land.

Low Orbit: If a ship moves onto a planet marker but doesn't enter the impact zone, it's considered to be in low orbit. If the ship reduces its speed to 0, it can begin to orbit the planet or it can land in the following game round.

Ships orbiting in low orbit move along the orbital path at a rate of one hex per ten rounds. (The orbital path is the ring of hexes that circles the planet at the ship's current distance.) This is a gross simplification of orbital mechanics, but it works for game play. Ships in low orbit can fire on or be fired on by any enemy within range.

Landed: A ship can land only by spending the previous round in low orbit. A landed ship can be fired upon only by (or fire on) enemy ships in low or high orbit.

In the case of a gas giant, "landing" means that the ship is sinking a little deeper into the atmosphere. Under no circumstances can any ship move more than one hex deep into a gas giant.

High Orbit: A ship within three hexes of a planet marker but not actually on the planet marker is in high orbit. If the ship reduces its speed to 0, it can begin to orbit the planet, or it can drop to low orbit in the following game round.

Ships orbiting in high orbit move along the orbital path at a rate of one hex per twenty rounds. You can treat them as motionless for game play. Ships in high orbit can fire on (or be fired on by) any enemy within range.

Most orbital stations are located in high orbit, where their weapons can cover a broad portion of the planet's surface.

Planets and Fire

Ships can trace a line of fire "over" a planet, as long as the line of attack doesn't have to pass more than one hex "deep" on the planet marker. In other words, every hex of a planet blocks fire, except for the outermost hexes. If necessary, use a string or a straight-edge of some kind to draw a line of sight from the "high point" of the firing ship to the "high point" of the target. If the line of sight crosses any portion of a hex that blocks fire, the target is obscured by the planet and can't be attacked from the firing ship's location. (Note that missiles can still be launched and maneuvered to strike at a target that can't be hit by beams or torpedoes.)

Ships that have landed can be attacked only by enemy ships that assume a high or low orbit.

Orbital Bombardment

To conduct an orbital bombardment, the attacking ship must assume a low or high orbit over the specified hex of the target planet and remain there for at least one fire phase.

Asteroids and Moons

Asteroids or small moons are one-hex bodies. They cannot provide a gravitational slingshot, since they're just too small to have any appreciable gravity field.

A ship that moves into the same hex as an asteroid or moon with a speed of 1 or less may choose to land on the asteroid (there's no low orbit or high orbit for a body this small, at least in game terms). A ship that has landed on an asteroid may fire or be fired upon normally, but enemy fire suffers a +2 step penalty due to the masking effect of the target's surroundings.

An asteroid or moon blocks fire, if the line of sight from the firing ship to the target passes through any portion of the hex the asteroid is located in.

Impact Zone: An asteroid or moon functions as an impact zone only if a ship moves onto the marker with a Maneuverability Class and acceleration rating of 0. Usually, this happens only after a ship has suffered severe battle damage.

Rings and Debris Fields

The classic asteroid belt as depicted in the movies is fairly misleading—in our own asteroid belt, tumbling boulders and plummeting planetoids are thousands of kilometers apart, and a pilot would never have to weave in and out of them like a crazed taxi driver on the Long Island Expressway. However, local areas may have a much higher concentration of small debris—ice crystals, pebbles, dust, and so on—than normal interplanetary space.

Rings and debris fields are found near planets. A planet or asteroid with a debris field is surrounded by a "haze" of debris one hex wide. A gas giant may be surrounded by a band of debris 1d4 hexes wide, paralleling the planet's surface at a distance of 1d8 hexes.

Debris fields and rings add a +2 step penalty to any weapon fire that passes into or through at least one hex of the field.

Moving Through Debris

Debris fields can also be dangerous to moving ships. For each point of speed a ship currently has, it suffers 1d4–1 points of stun damage (low impact) for entering a ring or debris hex, to a maximum of 10d4–10 stun points. If the ship has no kind of deflection inducer, particle screen, or ablative shield, the damage increases to 1d4–1 wound points per point of speed. The firepower of the attack is equal to the size of the moving ship.

TACTICS

There's a lot going on in these combat rules, and the best way to fight a ship effectively isn't always apparent. Here are some good tactics you may want to consider using in your game.

Missile Saturation

If you think it's going to take ten missile hits to cripple or destroy an enemy ship, don't fire one or two missiles a round for several rounds. If you can, launch all ten at once. Dealing with one or two incoming missiles is a simple matter for any defensive system, but a large flight of missiles can "saturate" the enemy defenses and guarantee that some missiles will slip through and score hits.

High-Speed Bomb Runs

It takes some careful maneuvering to execute a bombing attack. It's extremely useful to keep your fighter squadrons 10 to 15 hexes from the target you want to bomb, while keeping their speed at about the same value. Then, when you see a good opportunity, have your fighter squadrons close to attack distance in a single move. You want your fighter squadrons to be in the enemy's zero arc or out of range of his weaponry altogether; getting caught at a range of 4 or 5 hexes is death for most fighter squadrons.

Concentrated Fire

Okay, so it's not sporting, but consider having a number of your ships concentrate fire on a single enemy target to cripple or destroy it as quickly as possible. It's much better to kill a couple of ships fast to reduce the firepower pointed at your own fleet than to gradually wear away at every ship in the enemy fleet.

Crossing the "T"

When possible, use the edge to maneuver your ships into the least dangerous enemy firing arcs you can reach. If you know that an enemy cruiser has a great concentration of firepower forward, look at where your ships are in relation to the enemy's forward firing arc and get out of Dodge.

If you can't escape a powerful concentration of enemy fire, you can instead deliberately group as many of your ships as possible so as to take advantage of their weapon arc. The enemy will smear one of your ships, but the others won't be sitting in firing arcs where enemy weapons have nothing better to do but shoot at them.

The Range Game

Determine if a short, medium, or long range between you and your enemy is good for you or good for her. For example, a battleship fighting several destroyers should try to stand off at long range and hope for lucky hits with its main batteries. If the destroyers can't return fire because the range is too long, sooner or later the battleship is going to annihilate them. Similarly, if you have close-range weapons, you want to close the distance fast and get into a knife-fight with your enemy. Loitering out in open space where she can clobber you and you can't hit her is not a good plan.

CHAPTER 2: ADVANCED COMBAT

In this chapter, we'll present a number of optional rules sets that can be added on to the rules in *Chapter 1: Basic Combat* to customize your space combat game. Each set of rules you add increases the complexity and the time required to play out a ship-to-ship battle, but provides an additional level of detail for the game.

The advanced rules include an expanded Sequence of Play, Power phase, sensor phase, expanded maneuvering rules, fire modes for shipboard weapons, a detailed damage system, special orders, and rules for ships fighting in the Fusion Age or Matter Age. None of the rules contradict each other, but you may want to try them out one or two at a time instead of wrestling with all the detailed rules systems at once.

In order of detail, we recommend the following:

a. Fire Modes
b. System Damage
c. Maneuver Checks
d. Sensor Checks
e. Power Distribution
f. Varying game scales

SEQUENCE OF PLAY

The expanded rules in the advanced combat system add several steps to the sequence of play. The advanced sequence of play is as follows:

Edge Phase
Power Phase
Sensor Phase
Movement Phase
    a. Capital Ships
    b. Medium and Light Ships
    c. Small Craft
    d. Antiship Missiles
    e. Counter-missile Missiles
    f. Mine attacks
Fire Phase
    a. Beams and Projectiles
    b. Torpedoes and Special
    c. Missile Attacks
    d. Bomb Attacks
Launch Phase
Repair Phase
Special Orders

EDGE PHASE

Edge is determined as described in the basic rules–each round, both commanders make crew checks (or Tactics–*space tactics* skill checks, if a player character is one of the commanders). The side that achieves the greatest success wins the edge.

In addition to the edge check modifiers, you may add the following modifiers:

- +3 step penalty if no enemy ships are currently held by successful sensor checks.
- –3 step bonus if the ship performed a successful Break maneuver in the preceding round (see Movement) and there are no other friendly ships in play.

POWER

Most ships are built with sufficient power generation to simultaneously run all combat-critical systems. However, battle damage to power-stingy ship designs may make it necessary for the ship commander to decide from round to round which systems will receive power.

You need to assign power points only if you wish to change which systems the ship is actually powering, or if damage to the ship's power plant has reduced the total number of power points available. With the exception of engines, there's no such thing as partial power–a system is either powered or it isn't (although you can save power points for use in later rounds by accumulating power in weapons that aren't fired this round). For engines, you only need to spend power for the amount of acceleration you want to use in the movement phase.

List power costs for each weapon, sensor, defense, and engine system on your ship record sheet. You may find it useful to record power distribution as well.

Accumulating Power

Some heavy weapon systems require an enormous amount of power–so much power that a ship can't muster all of the energy needed to fire the weapon. Power points can be stored or accumulated in a weapon system until it's ready for use.

For example, let's say that a destroyer is built around a heavy matter beam–an oversized weapon for a destroyer. The matter beam requires 24 points of power to fire. If the destroyer generates 40 points of power and the captain allocates 32 points to other systems this round, he has 8 points to spare, which he can pour into the big gun. The heavy matter beam has received 8 of the 24 points it needs to fire, so it needs only 16 to power up the heavy matter beam in any subsequent round.

Weapons Hot

Since ships can store extra power in the power banks of their major weapons systems, you can assume that all ships begin a battle with "weapons hot." Hot weapons are powered to within 1 point of firing. In other words, the first time a ship fires a weapon during combat, it takes only 1 power point–regardless of the size of the weapon or its normal power demands.

This rule assumes that the ship has a few minutes before

the shooting starts to stack power into its weapon accumulators. In some cases, a surprise attack may catch a fleet with its weapons cold. Instead of firing the first volley for a measly 1 power point per weapon, a ship with cold weapons must pay the full cost to power its weapons and fire.

Note that this makes it possible for ships built around a high-power weapon to deliver one good punch fast–but then it might take a number of rounds to accumulate power for the next shot of the ship's big gun.

SENSORS

Space is big, and ships are small. Sometimes the best defense for a starship commander is hiding in plain sight. A ship that hasn't been detected can't be hit.

Ships that are on the map sheet during a battle are considered to be contacts. Contacts may not be attacked until they have been successfully localized by a sensor check (a crew check or a System Operation–sensors skill check) and reclassified as targets.

Contacts

For ease of play, there are no special rules for hidden movement or movement plots in *Warships.* All ships involved in a battle are contacts. You can assume that telltale radio emissions, heat signatures, or even visual observation of stars occluded by a ship's passage provide commanders with a rough idea of where the enemy is. The miniature or counter you use to mark your ship's location on the map represents this level of general sensor information available to the enemy.

Targets

Firing solutions are a different story. Before a ship can be attacked, it must first be detected by means of a successful sensor check.

Each ship may attempt one sensor check per sensor per enemy ship in range. For instance, if a destroyer has three sensor systems and there are two contacts in range, the player controlling the destroyer rolls three checks against each target–one for each sensor system. The following modifiers apply:

Condition	Modifier
Long range	+3 steps
Medium range	+1 step
Short range	+0
Range 1 hex or less	–3 steps
Contact size	by ship
Contact fired in preceding round	–3 steps

Many sensors have specific advantages or disadvantages. For example, ships equipped with EM detectors gain a –2 step bonus to sensor checks against contacts that are using active radar systems.

Tactical Datalinks

A target detected by any ship in a multi-ship force is detected by all ships in the force. Shipboard computers and fleet communications automatically relay targeting data from the detecting ship to all other allied ships in the area. However, if all the ships that currently hold successful sensor checks against an enemy ship are destroyed or drop track for some reason, the task force then loses its detection against the target.

Tracking

Once a contact has been detected and reclassified as a target, no more sensor checks are necessary–the ship that detected the contact automatically tracks the contact in each subsequent round, unless something makes the detecting ship drop track. The following conditions may break a detection:

- The detecting ship is reduced to 0 stun, wound, mortal, or compartment points;
- The detecting ship suffers a hit that knocks out the sensor used to acquire the target;
- The target moves into a sensor shadow of the detecting ship.
- The detecting ship fails to provide power to the sensor used to acquire the target.
- The target moves beyond the sensor's maximum range.

Tracks are dropped at the end of the phase in which the triggering event occurs, regardless of the current phase of the round. For example, if a ship suffers damage that knocks out a sensor in the fire phase, the target reverts to a contact at the end of the phase. Fire against the target in the current phase is resolved, but no further fire is possible until the contact is re-acquired as a target.

Active and Passive

Sensors fall into one of two general categories: active and passive. Active sensors generate some kind of energy signal and transmit it, evaluating the target based on how the contact reflects the signal. Active sensors are very good for targeting, but they give away the originating ship's position, and they can be detected at a greater distance than they can detect targets.

Passive sensors simply detect energy emissions generated by the target itself. The target's exact range and location are a matter of interpretation and data processing, so most passive sensors aren't as good at targeting as active sensors. However, passive sensors do not give away the sensing ship's location, since no energy is being generated and transmitted at the target. Passive sensors can usually detect a ship using active sensors at a greater distance than the active ship can detect the passive ship at.

The decision of whether to go active or stay passive can

have a lot of tactical significance. Two common sensor systems—the EM detector and the CE passive scan—confer significant bonuses to the sensor check if used against a target that has "gone active."

Battle Damage Assessment

One of the most critical uses of sensor data in the course of a space battle is battle damage assessment—the evaluation of damaged enemies to determine if they need to be attacked again. Determining whether an enemy battleship has had all of its power knocked out by a hail of matter cannon fire may be crucial to a commander's decision on whether to stay and fight or flee the scene.

Battle damage assessment requires careful study of fleeting images and returns. Many sensor systems simply don't provide the right kind of data. The following sensor systems are useful for battle damage assessment:

- Hi-res video
- Probe and advanced probe (if fitted with video systems)
- Spectroanalyzer (+2 step penalty to battle damage assessment checks)
- CE passive scan

On a successful sensor check, the player whose ship is scanning for battle damage may examine the target ship record sheet and make a note of the amount of damage the ship has suffered, which systems are knocked out, and so on.

MOVEMENT

The movement rules are expanded by the addition of the maneuver check—a type of crew check that allows a ship to exceed its normal performance, take evasive action, or seize the initiative in a limited combat. In addition, these rules introduce an insidious new threat for the warship commander: the mine.

Maneuver Checks

All ships are assigned a Maneuverability Class based on the size and hull type. However, a ship may attempt a crew check (or Vehicle Ops-*spacecraft* skill check on the part of the character at the helm) to increase its Maneuverability Class by 1, 2, or 3 for an Ordinary, Good, or Amazing success.

For example, a destroyer has a base Maneuverability Class 3. If it's traveling at a speed of 9, its MC is reduced by two points to MC 1. Under normal circumstances, the ship is limited to one maneuver per round. If the helmsman rolls an Ordinary success on the check, the destroyer's Maneuverability Class is increased to 2, allowing it to perform one more maneuver this round than it would normally due to its high speed.

Acceleration and Maneuver Checks

Each point of acceleration "left over" after the ship adjusts its speed for the round adds a –1 step bonus to the maneuver check (or skill check). If the destroyer in the preceding example had two points of acceleration unused in the current phase, the pilot would roll his maneuver check with a –2 step bonus.

Limits of Maneuvering

A ship can't attempt maneuver checks on consecutive rounds. Since a maneuver check represents the pilot's efforts to push the ship to its maximum performance, it takes at least one round to recover from the stresses on both machinery and personnel before another extreme maneuver can be attempted.

Jinking

Instead of using a maneuver check to increase its maneuverability, a ship can instead use a maneuver check to "jink," making itself harder to hit. An Ordinary, Good, or Amazing result on the maneuver check adds a +1, +2, or +3 step penalty to any incoming enemy fire, missile attacks, or bomb attacks in the following fire phase.

Just like a normal maneuver check, unused acceleration in the current round adds a –1 step bonus per point left over to the maneuver check. In addition, the ship's size modifier is reversed and added to the pilot's skill check. For example, a fighter has a +3 step size modifier for targeting, but this becomes a –3 step bonus for jinking attempts.

Mine Attacks

If a ship or missile passes through a hex in which enemy mines are present, the movement phase is interrupted to perform an immediate mine attack. A ship passing through several mined hexes may have to check for mine attacks multiple times in the same move. Friendly mines never endanger ships.

Mining a hex requires at least one pattern of ten mines.

Facing

A ship's facing is the hex side that its bow is pointed toward. Usually, this is the same as the ship's heading, but not always. In space, a coasting ship (a ship that is not accelerating or performing any other maneuvers) may assume any facing the commander chooses. Basically, all ships feature maneuvering thrusters that can quickly rotate the ship in all three axes of motion. Before maneuvering or accelerating in a subsequent round, a ship with a facing other than its current heading automatically resumes the "normal" facing.

Multiple patterns may be laid to create a denser and more dangerous minefield. For each mined hex, the moving ship must roll a crew check (or Tactics-*space tactics* skill check by the commanding officer) and consult the table below:

Table 2–1: Mine Attacks

No. of Patterns	Check Result M	O	G	A
1	1	–	–	–
2	2	1	–	–
3	2	1	1	–
4	3	2	1	1

The result is the number of mine attacks the moving ship sustains in that hex. For example, a cruiser moving through a hex with three mine patterns rolls an Ordinary success on a crew check, so it suffers one mine attack in that hex. A mine attack is not an automatic hit; the opposing player simply gets a chance to make a normal attack roll for the mine, taking into account its warhead, guidance system, the target size, and so on.

The effects of a mine hit take place immediately. A ship destroyed by a mine halfway through its move obviously doesn't finish its movement for the round. Similarly, a ship that suffers mine damage that knocks out all of its power can't make any maneuvers after it hits the mine.

Laying Mines

A ship carrying mines in an ordnance cell, missile rack, or similar launcher places mines in the launch phase. The mines can be placed in any hex adjacent to the ship, as well as the hex it's currently located in. Since it takes ten mines to make a mine pattern, a ship that lays less than ten mines in a single launch phase may have to loiter in the same hex for several rounds to complete its mine pattern.

Mines are marked on the map by a mine counter, which indicates that there are telltale signs that a minefield may be in that hex. Every time a ship lays a pattern of mines, it can place a second marker on the map in a hex it *might* have mined. This dummy marker should make the opposing player uncertain about the actual location of the minefield.

Detecting Mines

Mines are typically designed to be small, stealthy, and hard to detect. A ship that moves into a minefield marker is entitled to one sensor check to determine if the marker is a real mine pattern or a dummy counter. If mines are detected, the moving ship may attempt a maneuver of some kind to avoid plowing through the hex, provided it has enough maneuverability to do so (in other words, it hasn't used all of its maneuvers this round). Otherwise, the ship must move into or through the mined hex.

Clearing Mines

Getting rid of a mine pattern is easy, as long as a ship has time to do so. During each special orders phase spent adjacent to the minefield, the warship may attempt a sensor check to detect one, two, or three mines. The mines may then be detonated by one weapon hit apiece. A mine pattern is defeated if it is reduced to four mines or less.

Attack Phase

In this chapter, we'll introduce three new concepts for the attack roll: targeting sensors, weapon fire modes, and missile salvoes and flights.

Weapons and Sensors

Before a warship can fire on an enemy vessel, it must obtain a successful sensor check. The simple presence of the enemy miniature or marker represents a contact, a set of weak signatures and telltale emissions that gives away the ship's general location. This isn't good enough for a firing solution. The firing ship can fire only at targets that have been detected with a successful sensor check in a previous sensor phase.

It is possible to launch missiles at a contact in the hope that the missiles' seeker heads will successfully detect the contact when the missile reaches the enemy ship. But a missile that doesn't have a detected target to attack simply flies past without detonating.

Power

A weapon must be powered before it can fire, and the act of firing discharges all power the weapon has stored. A powered weapon doesn't *have* to fire; the captain can hold fire and save the weapon's charge for a later attack phase if he so chooses.

Fire Modes

Each weapon described on your ship record sheet may fire in one or more of four different modes: single-shot (F), burst (B), automatic (A), or battery (Group). If a weapon is capable of firing in multiple modes, the player may choose from round to round how the weapon will be employed.

It's impossible to combine two fire modes at the same time. For example, four plasma cannon with burst fire capability could shoot as individual weapons using burst fire mode, or they could fire as a single four-weapon battery, but they can't do both at the same time.

Single Shot (Mode F)

This is the easiest firing method. The weapon fires one shot. All you need to do is make one attack roll per weapon firing in single-shot mode, taking all relevant fac-

tors into consideration (range modifiers, target modifiers, fire control modifiers, and so on.).

Burst Fire (Mode B)

Some quick-firing weapons are capable of firing several shots in rapid succession. To represent the increased effectiveness of a burst of fire, make one attack roll with a –1 step bonus for burst fire. Make sure to take all other fire modifiers into account before rolling the attack. Burst fire is better than single-shot fire, but not all weapons are capable of firing in burst mode.

Autofire (Mode A)

Sometimes rate of fire is the most important weapon characteristic. Weapons capable of full automatic fire make a special kind of attack roll: an autofire attack.

Add up all the factors applying to the attack roll as you would for a normal single-shot attack. Then add a +1 step penalty, a +2 step penalty, and a +3 step penalty. Roll all three situation dice with the same control die. This will give you three results for the same attack–with autofire, it's possible to score up to three hits with a single attack from one weapon.

All targets of a weapon's autofire attack must be in the same hex as each other.

Example: The *Augusta* is firing one autofire-rigged plasma cannon at an enemy fighter that's too close. The weapon accuracy, range, target size, and fire control modifiers net out at a +d0 for a single-shot attack. Firing in full auto means that the plasma cannon will make three attack rolls at a +1, +2, and +3 step penalty.

The *Augusta* player rolls a d20 (the control die) and a d4, d6, and d8 (the situation dice). Let's say that they come up a 6, 2, 1, and 4 respectively. These come out as attack rolls of 8, 7, and 10. Assuming the *Augusta* has an average crew (skill score 12), the autofire attack results in three Ordinary-quality hits.

Autofire is especially useful for close-range defense with small, accurate weapons against attacking fighters and missiles.

Battery Fire (Mode G)

Heavy weapons are characterized by low rates of fire and some inaccuracy due to the extreme ranges at which they're used. To overcome these drawbacks, a number of heavy weapons are grouped together and fired as a battery. By concentrating the fire of several heavy weapons, it becomes much more likely that at least one will score a hit.

Battery fire works a lot like an autofire attack–except in reverse. The base situation die for the battery fire attack is figured normally, taking into account the range, fire control modifiers, the target's defenses, and so on. Then, *each additional weapon firing in the battery adds another situation die with a cumulative one-step bonus.* Up to four weapons can fire as a single battery at a single target. Each situation die modifies the same roll of the control die, yielding a different result for each gun participating in the battery fire.

Example: The *Revenge* is a battlecruiser armed with four heavy matter beams. She fires all four at the *Tiger*, an enemy battleship. The basic attack modifiers for the *Revenge* give it a net modifier of +1 step to the attack. The battery attack is rolled at a d20 (the control die) +1d4 (the first beam), +d0 (the second), -d4 (the third), and –d6 (the fourth).

Assume that the *Revenge* needs a 14 to hit. The d20 comes up 15; the first d4 is a 3, the d0 is a 0, the second d4 is a 2, and the d6 is a 6.

The results: attack rolls of 18, 15, 12, and 9. In this case, the *Revenge* scores two misses and two Ordinary hits with its battery fire.

Each hit scored by several weapons firing as a battery is a separate hit for purposes of secondary damage, ablative shields, hit locations, armor rolls, and so on. It's just like hitting the same target multiple times with different weapons.

All weapons firing in battery must be identical. All must be powered, and all must bear on the same target. Each battery fire attack can only target one specific target, but a large ship with a number of weapons eligible for battery fire might form several batteries to engage two or three targets at the same time, especially if the targets happen to be located in different firing arcs.

Salvoes and Patterns

Attacking missiles and bombs may be grouped together to increase the chance of scoring a hit. Up to four missiles or bombs can attack in this way. Just like battery fire, each warhead after the first receives a cumulative –1 step bonus to its attack roll. See "Battery Fire" for more information.

Missile Flights

A missile flight is an overwhelming number of missiles designed to saturate the enemy defenses and score multiple hits on a high-value target. A flight consists of ten salvoes, or forty individual missiles. Instead of rolling forty separate attacks, you can make one attack roll using all applicable modifiers against the crew score of the ship that fired the missiles. The level of success of the attack roll dictates how many hits of what success levels the flight scores:

Table 2–2: Missile Flight Attacks

Attack	No. of Hits of Success...		
Roll	O	G	A
Failure	10	6	4
Ordinary	12	7	5
Good	14	8	6
Amazing	16	9	7

For example, a missile flight attacks a battleship. The attacking ship's crew has a crew check score of 14, and the modifiers for the attack add up to a –2 step bonus. If the attack roll (a d20 minus a d6) is an 11 and a 5, respectively, the total would be 6—a Good success with the missile flight. The battleship suffers 14 Ordinary hits, 8 Good hits, and 6 Amazing hits from the attacking missiles. Chances are, it's badly damaged or destroyed.

Each hit scored by a missile flight requires a separate damage roll, armor roll, damage location, and so on.

If the number of missiles in the flight is reduced by defensive fire, eliminate one potential hit per missile downed. Reduce hits in this order: one Ordinary, one Good, one Amazing, one Ordinary, and then repeat the cycle until you've accounted for all the missiles downed by defensive fire.

In the preceding example, the battleship receives twenty-eight missile hits. However, if its defensive fire knocked down nine attacking missiles in the flight, the battleship only suffers nineteen missile hits. The fourteen Ordinary hits are reduced to nine, the eight Good hits are reduced to six, and the six Amazing hits are reduced to four. It's probably a crippling strike in any event, but it's better than getting pasted by the whole flight of missiles.

DAMAGE

A ship is more than its four damage tracks. It's also an extremely complex piece of machinery featuring many hundreds of sub-systems designed to work together. This set of rules adds extra effects for marking off damage boxes, plus system damage linked to the hit location of a major impact.

Additional Damage Effects

In addition to simply marking boxes off a ship's damage track, damage may cause extra penalties or effects when a damage track is completely crossed off. A ship is shaken when all stun boxes are crossed off; disabled by the loss of all wound boxes; crippled by the loss of all mortal boxes; and destroyed when all critical boxes are gone.

Shaken

When all of a ship's stun boxes are checked off, the ship is shaken. Minor systems failures, ionizing damage, and fluctuations in system operations generally reduce a ship's effectiveness in battle. Shaken ships suffer the following penalties:

- The target must roll a hit location and check for system damage.
- All current sensor detections are lost and must be re-acquired to fire weapons.
- All crew checks suffer a +1 step penalty.
- The ship may not perform any maneuver checks in the following round of combat.

The ship remains shaken until it repairs at least 1 stun point. Excess stun damage that strikes a ship with no stun points left is marked off the wound track at a 2-for-1 rate (two stun points become one point of wound damage).

Disabled

A ship is disabled when all of its wound points have been lost to damage. Important systems are no longer working or require constant attention to compensate for damage, portions of the ship's interior have been opened to space, and the overall integrity of the hull is failing. A disabled ship suffers the following penalties:

- The target must roll for hit location and check for system damage.
- All current sensor detections are lost and must be re-acquired to fire weapons.
- All crew checks suffer a +2 step penalty.
- The ship may not perform any maneuver checks.
- The ship's Maneuverability Class drops by one point.
- Enemies firing on the disabled ship gain a –1 step bonus to their attack rolls.

The ship remains disabled until it repairs at least one point of wound damage. Excess wound damage that penetrates the ship's armor when it has no wound points left rolls into mortal damage at a 2-for-1 rate.

Crippled

A crippled ship has lost all boxes on its mortal damage track. Most systems can only function through heroic efforts and jury-rigging on the part of the crew. Extensive portions of the hull have been demolished, and most of the ship's interior is open to vacuum. A crippled ship suffers the following penalties:

- All current sensor detections are lost and must be re-acquired to fire weapons.
- All crew checks suffer a +3 step penalty.
- The ship may not perform any maneuver checks.
- The ship's Maneuverability Class drops by two points.
- Enemies firing on the crippled ship gain a –2 step bonus to their attack rolls.

In almost all cases, a ship cannot repair lost points of mortal damage during the course of a space battle. This means that a ship crippled in a battle remains crippled for the rest of the fight. However, some special damage control systems may make it possible for mortal damage to be repaired in a matter of rounds. If a crippled ship regains at least one box of mortal damage, it is no longer crippled. Excess mortal damage that strikes a ship with no mortal damage boxes remaining becomes critical damage, at a 2-for-1 rate.

Destroyed

A ship is destroyed outright when it loses all of its critical damage boxes. If the damage is more than the ship's critical damage rating but less than twice that number, the ship re-

mains more or less in one piece–a lifeless derelict hurtling through space, continuing on its last course and speed.

If the damage exceeds twice the derelict's critical damage rating, the wreck immediately explodes. Exploding wrecks inflict damage on nearby ships as shown below. The parenthetical notes the firepower of the attack:

Table 2–3: Explosion Damage

Class of Wreck	Range in Hexes 0	1	2
Small	d6s (S)	¾	¾
Light	d6s (L)	d4 (S)	¾
Medium	d6s (M)	d6s (L)	d4s (S)
Heavy	d8s (M)	d8s (L)	d6s (S)
S-heavy	d12s (M)	d12s (L)	d8s (S)

For example, an exploding battleship (a heavy ship) inflicts d8 stun points (medium firepower) to any ship in the same hex, d8 stun points (light firepower) to ships in adjacent hexes, and d6 stun points (small craft firepower) to ships two hexes away.

System Damage

In addition to losing points off the damage track, a ship that sustains a serious hit is likely to have a major system knocked out or degraded–a weapon mount, an engine, power generation, and so on. In fact, a ship may be "mission-killed" through the loss of important systems long before its hull is destroyed outright.

Checking for System Damage

System damage is possible any time one of the following occurs:

- The target suffers mortal or critical damage.
- The target marks off its last stun or wound box.
- The attacker achieves an Amazing success with her attack and at least 1 point of primary damage penetrates the target's armor.

If same hit qualifies for system damage on multiple counts (for example, a hit for mortal damage with enough secondary damage to exhaust the target's wound track), it's still just one hit for purposes of system damage.

Damage Checks

A damage check is a crew check made to determine whether or not a system exposed to damage continues to function or not.

Hit Location

After a hit qualifies for system damage, the next step is to determine what part of the target is affected. Refer to TABLE 2-4: HIT LOCATIONS.

Roll the appropriate die and use the target aspect column that corresponds to the firing arc the attack is coming in through. In other words, the target aspect is the firing arc the target presents to the attacking ship. A ship attacked from directly astern would use the "Aft" column, since the attack is coming in through the target's aft firing arc.

The result of the hit location roll will be a zone–for example, the FC (or forward center) zone, the AP (aft port) zone, etc.

Order of Damage

Each zone of a warship is further divided into a hierarchy or progression of damage. The first system damage check may affect the first item on the list, the second may affect the next one, and so on. Basically, this represents the fact that systems that are close to the surface of the ship will tend to be affected by enemy fire before systems near the ship's core, and large systems will tend to be affected before small ones because there's more of them to be hit.

When a system is destroyed, it is scratched off the order of damage for that zone. A future hit in that zone affects the next item on the list. If everything in the zone has been destroyed, damage then proceeds to the next adjacent zone noted on the hit location diagram on the next page.

How Many Checks per Hit?

Some hits may cause damage checks for multiple systems in the same zone. The default answer is always at least one check against the first item in the damage order.

- One item is checked per 2 points of primary critical damage inflicted.
- One item is checked per 3 points of primary mortal damage.
- One item is checked for any other kind of system damage hit.

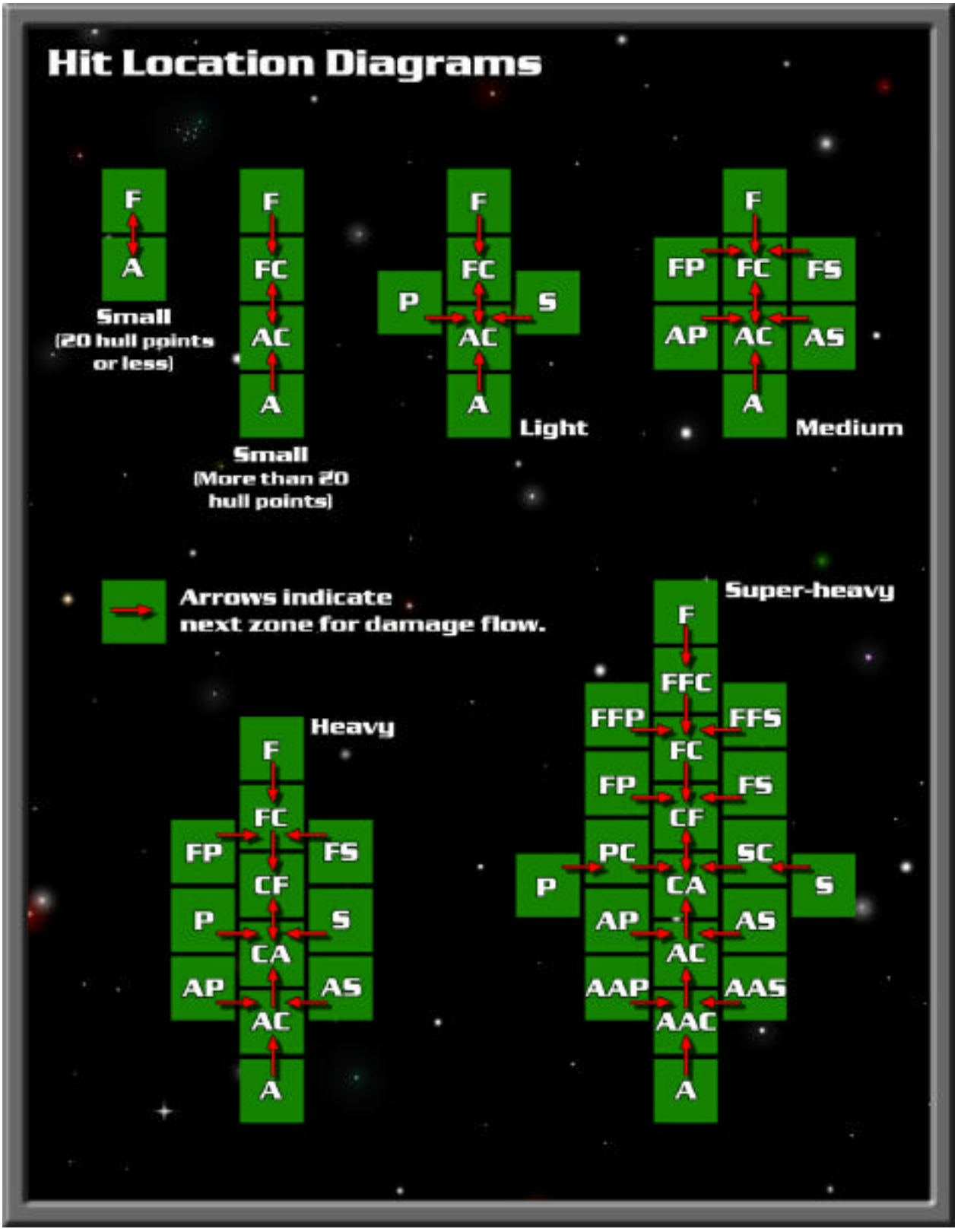
Note that the number of hits inflicted is determined *after* upgrading or downgrading for firepower and the effects of armor are taken into account. For example, if a fusion beam hit inflicts 7 points of critical damage but the target's armor stops 4 of these, the zone affected must check against the first 3 items on the damage order. (Of course, the ship also marks off 3 points of critical damage, plus secondary damage of 3 mortals, wounds, and stuns.)

Degraded, Knocked Out, and Destroyed

Many of the following results indicate that a system is "degraded," "knocked out," or "destroyed." Refer to the appropriate entry for more information.

Degraded: Some special effects apply to this entry. Check the description of the result in the following section. A degraded system that is degraded a second time is knocked out.

Knocked Out: The system has been knocked off-line by damage. However, it's possible to make some minor repairs or adjustments and get it running again, negating the result.



When a system is destroyed, it is scratched off the order of damage for that zone. A future hit in that zone affects the next item on the list. If everything in the zone has been destroyed, damage then proceeds to the next adjacent zone noted on the hit loca - tion diagrams above and TABLE *2-4:* HIT LOCATIONS *on the next page.*

Table 2-4: Hit Locations

		Target Aspect									
Ship		Forward		Port		Starboard		Aft		High/Low	
Class	Die	Roll	Location	Roll	Location	Roll	Location	Roll	Location	Roll	Location
Small (2)	d6	1-5	F	1-3	F	1-3	F	1	F	1-3	F
		6	A	4-6	A	4-6	A	5-6	A	4-6	A
Small (4)	d8	1-3	F	1-2	F	1-2	F	-	F	1-2	F
		4-6	FC	3-4	FC	3-4	FC	1-2	FC	3-4	FC
		7-8	AC	5-6	AC	5-6	AC	3-5	AC	5-6	AC
		-	A	7-8	A	7-8	A	6-8	A	7-8	A
Light	d8	1-2	F	1-2	F	1-2	F	-	F	1	F
		3-4	FC	3	FC	3	FC	-	FC	2-3	FC
		5-6	P	4-5	P	-	P	1-2	P	4	P
		7-8	S	-	S	4-5	S	3-4	S	5	S
		-	AC	6	AC	6	AC	5-6	AC	6-7	AC
		-	A	7-8	A	7-8	A	7-8	A	8	A
Med.	d12	1-3	F	1-2	F	1-2	F	-	F	1-2	F
		4-5	FP	3-5	FP	-	FP	1	FP	3	FP
		6-7	FC	6	FC	3	FC	2	FC	4-5	FC
		8-9	FS	-	FS	4-6	FS	3	FS	6	FS
		10	AP	7-9	AP	-	AP	4-5	AP	7	AP
		11	AC	10	AC	7	AC	6-7	AC	8-9	AC
		12	AS	-	AS	8-10	AS	8-9	AS	10	AS
		-	A	11-12	A	11-12	A	10-12	A	11-12	A
Heavy	d20	1-5	F	1-2	F	1-2	F	-	F	1	F
		6-7	FC	3-4	FC	3-4	FC	-	FC	2-3	FC
		8-11	FP	5-7	FP	-	FP	-	FP	4-5	FP
		12-13	CF	8	CF	5	CF	1	CF	6-7	CF
		14-17	FS	-	FS	6-8	FS	-	FS	8-9	FS
		18	P	9-12	P	-	P	2	P	10	P
		19	CA	13	CA	9	CA	3-4	CA	11-12	CA
		20	S	-	S	10-13	S	5	S	13	S
		-	AP	14-16	AP	-	AP	6-9	AP	14-15	AP
		-	AC	17-18	AC	14-15	AC	10-11	AC	16-17	AC
		-	AS	-	AS	16-18	AS	12-15	AS	18-19	AS
		-	A	19-20	A	19-20	A	16-20	A	20	A
Super-	d20	1-3	F	1	F	1	F	-	F	1	F
heavy		4-5	FFC	2	FFC	2	FFC	-	FFC	2	FFC
		6-8	FFP	3-4	FFP	-	FFP	-	FFP	3	FFP
		9	FC	5	FC	3	FC	-	FC	4	FC
		10-12	FFS	-	FFS	4-5	FFS	-	FFS	5	FFS
		13-14	FP	6-7	FP	-	FP	-	FP	6	FP
		-	CF	8	CF	6	CF	-	CF	7	CF
		15-16	FS	-	FS	7-8	FS	-	FS	8	FS
		17-18	P	9-10	P	-	P	1-2	P	9	P
		-	PC	11-12	PC	-	PC	-	PC	10	PC
		-	CA	13	CA	9	CA	-	CA	11	CA
		-	SC	-	SC	10-11	SC	-	SC	12	SC
		19-20	S	-	S	12-13	S	3-4	S	13	S
		-	AP	14-15	AP	-	AP	5-6	AP	14	AP
		-	AC	16	AC	14	AC	7	AC	15	AC
		-	AS	-	AS	15-16	AS	8-9	AS	16	AS
		-	AAP	17-18	AAP	-	AAP	10-12	AAP	17	AAP
		-	AAC	19	AAC	17	AAC	13-14	AAC	18	AAC
		-	AAS	-	AAS	18-19	AAS	15-17	AAS	19	AAS
		-	A	20	A	20	A	18-20	A	20	A

In the damage control phase, the commander may have her crew attempt to repair a system that is out and bring it back on-line. If a knocked-out system is knocked out a second time, it's destroyed.

Destroyed: The system has been destroyed. It can't be repaired in the course of this battle. Strike the item off of the damage order for this zone–it no longer counts as a potential hit location.

System Effects

The effects of damage to each type of ship system are summed up below. Note that these effects apply for purposes of the basic game; more detailed effects are covered in the next chapter.

Many of these effects call for a damage check to determine if one result occurs or another. A damage check is simply a crew check, modified by any damage control systems the ship possesses.

Accommodations

One of the ship's bunkrooms, staterooms, cabins, or similar facilities is hit.

Stun: No effect.

Wound: System knocked out (damage makes it uninhabitable until repaired).

Mortal: System knocked out and may be destroyed. Make a damage check. On a failure, room is destroyed and explosive decompression inflicts d8–3 points of additional wound damage to the ship. This damage has a firepower equal to the ship class and ignores armor and other defenses.

Critical: System destroyed. Explosive decompression occurs as described above.

Cargo Space

One of the ship's cargo spaces, cargo bays, or cargo holds is hit.

Stun: No effect.

Wound: System knocked out (damage makes it unusable until repaired). About 20 percent of the area's cargo is ruined.

Mortal: System destroyed. About 50 percent of the cargo is ruined.

Critical: System destroyed. All cargo ruined. Make a damage check; on a failure, room is destroyed and explosive decompression inflicts d8–3 points of additional wound damage to the ship. This damage has a firepower equal to the ship class and ignores armor and other defenses.

Command Deck or Cockpit

The ship's command deck is hit.

Stun: The ship may not maneuver or change speed in the next movement phase.

Wound: The command deck is knocked out. The ship may not maneuver or change speed until the command deck is repaired.

Mortal: The command deck is destroyed. The quality of the ship's crew is reduced by one grade–crack to veteran, veteran to trained, and trained to green. Green crews drop to a crew check of 8. If the command deck is a cockpit, the crew is killed and the vessel may not maneuver or attack.

Critical: As above, plus explosive decompression inflicts d8–3 points of additional wound damage to the ship as described under "Cargo."

Other command systems (flag bridges or launch towers) are knocked out on wound hits and destroyed by mortals or criticals.

Computer Core

The ship's main computer is knocked out or lost. This renders all system computers inoperable, negating the bonuses the ship's system computers provide.

Stun: The ship loses all computer bonuses for one round, but the systems automatically reboot during the repair phase of the following round.

Wound: The computer is knocked out. All computer bonuses are lost until repaired.

Mortal: The computer is knocked out and may be destroyed. Make a damage check.

Critical: The computer is destroyed.

Comm System

One of the ship's communication systems may be knocked out or destroyed.

Stun: Make a damage check. On a failure, the system is knocked out.

Wound: The system is knocked out.

Mortal: The system is knocked out and may be destroyed. Make a damage check.

Critical: The system is destroyed.

Defenses

A defensive system may be knocked out or destroyed. Note that armor is never affected by enemy fire.

Stun: No effect.

Wound: System may be knocked out; roll a damage check.

Mortal: The system is knocked out and may be destroyed; make a damage check. Destroyed capacitors inflict 1 point of wound damage per point of stored shield energy to the damaged ship.

Critical: The system is destroyed.

Generators for deflection inducers, particle screens, magnetic screens, displacers, or ablative shields are a special case.

If one shield generator is knocked out or destroyed, the shield is degraded. Shields that add step penalties to the attacker's roll are reduced in effect by 1 step. Particle screens are reduced to half effect. Ablative shield generators become half as effective (incoming damage creates twice as many shield points to absorb as normal).

If half of the ship's shield generators are knocked out or destroyed, the shield stops working altogether.

Engines

Hits to the ship's engines reduce its acceleration and maneuverability. Each engine destroyed or knocked out reduces the ship's acceleration by 1 and its Maneuverability Class by 1 point. (Obviously, if the ship's last engine is knocked out or destroyed, it can't accelerate or maneuver at all.) A ship reduced to an acceleration of 0 or less can't change speed, but a negative MC simply means that some maneuvers may require multiple rounds to accomplish.

Stun: The engine may be knocked out. Make a damage check; if the roll fails, the engine is knocked out.

Wound: The engine is knocked out.

Mortal: The engine is knocked out and may be destroyed. Make a damage check; on a failure, the engine is destroyed.

Critical: The engine is destroyed.

FTL

The ship's faster-than-light drive is knocked out or destroyed.

Stun: Drive may be knocked out. Make a damage check.

Wound: The drive is knocked out.

Mortal: The drive is knocked out and may be destroyed. Make a damage check; on a success, the drive is just knocked out, but on a failure it has been destroyed.

Critical: The drive is destroyed. Secondary explosions (jump drive, stardrive, or warp drive only) inflict d12–6 points of critical damage.

Hangar Hit

One of the ship's hangars is hit.

Stun: No effect.

Wound: System knocked out (damage makes it unusable until repaired). 10 percent of the hangar's stored craft are ruined.

Mortal: System destroyed. About 25 percent of the stored craft are damaged beyond repair.

Critical: System destroyed. About 50 percent of the stored craft are ruined.

Life Support

The ship may lose its life support equipment or related machinery. A ship suffers a +1 step penalty to all crew checks if no life support units remain functional. If all life support units are destroyed, the ship loses artificial gravity and may not maneuver.

Stun: No effect.

Wound: Life support may be knocked out; roll damage check.

Mortal: Life support is knocked out and may be destroyed; make a damage check.

Critical: Life support is destroyed.

Miscellaneous System

If it's not covered by an entry above, here's a basic list of effects.

Stun: The system is degraded in some way, if possible. No effect if it can't really be degraded.

Wound: The system is knocked out.

Mortal: The system is destroyed.

Critical: The system is destroyed, and explosive decompression or secondary explosions inflict an additional d8–3 wound points to the target vessel.

Power Plant

Hits to the ship's power plants and power distribution system result in a loss of available power. Each power plant destroyed or knocked out reduces available ship power by the corresponding amount. If a ship loses all of its power plants to damage, it may not maneuver or fire weapons until at least one knocked-out power plant is brought back on line.

Stun: The power plant may be knocked out. Make a damage check; on a success, the power plant is unaffected. On a failure, the power plant is knocked out.

Wound: The power plant is knocked out.

Mortal: The power plant is destroyed.

Critical: The power plant is destroyed. Secondary explosions inflict 2d6 points of wound damage to the ship, which are unaffected by toughness or armor.

Sensor

One of the ship's sensors may be knocked out or destroyed.

Stun: On a failed damage check, the system is knocked out.

Wound: The system is knocked out.

Mortal: The system is knocked out and may be destroyed. Make a damage check.

Critical: The system is destroyed.

Stores

One of the ship's support systems that supply the crew with food or water is hit. There are no immediate effects to losing a stores system, but it may cause trouble after the battle.

Stun: No effect.

Wound: System knocked out.

Mortal: System knocked out and may be destroyed; make a damage check.

Critical: System destroyed.

Weapons

A hit to a weapon system may degrade its performance, knock it out, or destroy it outright.

Stun: The weapon mount is degraded and suffers a +1 step penalty to all attack rolls until repaired. If a degraded weapon is degraded again, it's knocked out.

Wound: The mount is degraded and may be knocked out. Make a damage check.

Mortal: The mount is knocked out and may be destroyed. Make a damage check.

Critical: The mount is destroyed. Make a damage check; on a failure, magazine or accumulator explosions inflict internal damage equal to a Good-quality hit from the affected weapon system.

Special Orders

Desperate times demand desperate measures. On occasion, commanders may need to consider unorthodox tactics such as ramming, boarding, and self-destruction to achieve their goals or to deny the enemy victory.

Ramming

An accidental collision is just not possible under normal circumstances. Each hex of the map is 1,000 kilometers across, and two ships a few hundred meters long maneuvering in that area just won't hit each other–unless one of the captains is *trying* to ram the other. Then the odds improve from near-impossible to just highly unlikely.

Executing a Ram

To conduct a ramming attack, a captain must end his move in the same hex as his target and be moving at a speed equal to or greater than the target. Rams take place in the special orders phase, after all weapon fire.

The ramming ship makes a crew check (or a Vehicle Ops–*spacecraft* skill check on the part of the pilot) with a +1 step penalty for each point of difference in speed between the target and the ramming ship.

If the ramming ship succeeds in its attack roll, the target is at risk of collision. The target vessel can automatically avoid collision if its Maneuverability Class is currently higher than the ramming ship's Maneuverability Class. If the ramming ship currently has an equivalent or better MC, the target vessel is entitled to a crew check (or Tactics–*space combat* skill check by the captain) to avoid the collision. Add the target vessel's target size modifier to the avoidance check.

Ramming Damage

Ramming damage is low impact (LI) damage. The target of a ram suffers damage based on the ramming vessel's size, as shown below:

Ramming Vessel	Base Damage	Base Firepower
Small	2d4m	Medium
Light	3d4m	Heavy
Medium	3d8m	S-Heavy
Heavy	4d8m	S-Heavy
S-Heavy	6d12m	S-Heavy

Add +1 die per point of speed difference between the ramming ship and the target (maximum of twice the listed damage).

The ramming vessel suffers damage equal to the damage inflicted to the target, with a firepower equal to the class of the target. A fighter that crashes into a fortress ship traveling at the same speed inflicts 2d4 points of mortal damage with medium firepower; it suffers 2d4 points of mortal damage, of Super-heavy firepower.

Position after Ramming

If the ramming vessel or the target is destroyed outright, the collision has no effect on the surviving vessel's position. A fighter can't stop a fortress ship in its tracks with a head-on ram, whereas the fortress ship would just plow through a squadron of kamikaze fighters without slowing down.

If both ships survive, the larger ship loses half of its current speed and the smaller ship has its speed reduced to zero. If they're both the same class (heavy, medium, and so on) the ship with the larger number of hull points is the larger ship. Both ships lose half their current speed if they're the exact same size.

A ship reduced to speed 0 by a collision is assigned a random facing. Roll a d6 to see which way it's pointing after the collision.

If the either ship is immobilized and the enemy vessel is traveling at an adjusted speed of 2 or less after the hit, either side may initiate a boarding action in the special orders phase.

Boarding

Basically, no ship can be boarded unless it consents to the act or is rendered completely unable to maneuver in its own defense. Any ship with some amount of maneuverability remaining can evade boarding pods or spaceborne troops indefinitely. The only exception to this rule is ships equipped with boarding transporters, which can beam their boarding teams directly on board the enemy vessel provided no functional energy screen interferes with the transport.

Boarding is resolved in three steps: approach, entry, and assault.

Approach

In the boarding approach, the boarding party faces its most vulnerable moment. An assault can be broken in moments of enemy fire while the boarding teams remain exposed in open space.

Boarding Pods: Boarding pods are deployed during the launch phase and maneuver like small ships. They have an acceleration of 0.5 and a Maneuverability Class of 2. Boarding pods have 5/5/2 stun/wound/mortal points, a target size modifier of +3 steps, Good toughness, and 1d4 points of armor. Boarding pods move in the small craft segment of the movement sequence.

To board a target, a boarding pod must end its move in the same hex as the target. Boarding occurs in the special orders segment of the round–after the attack phase, so boarding pods that are hit by last-ditch defensive fire probably won't survive to deploy their troops.

Spaceborne Troops: In lieu of a boarding pod, troops may be equipped with powered armor or E-suits and zero-G thrusters. To deploy spaceborne troops directly, the launching ship must end its movement phase in the same hex as the target, with the same speed and the same heading. Assum-

ing it survives long enough, the attacking ship deploys its troops in the launch phase.

The spaceborne troops may board and attack in the special orders phase of the round *after* their launch. In other words, troops deployed in the launch phase of round 3 don't land and attack until the special orders phase of round 4. The enemy ship can fire on spaceborne troops "in transit" during its attack phase; each troop has a +5 step target modifier and is killed (messily) by any shipboard weapon hit.

Boarding Transporters: Troops teleported via boarding transporter skip the approach step.

Entry

Upon reaching their target, boarding pods or spaceborne troops have to effect entry into the hull. This usually means cutting through an airlock, using a shaped charge to blow out a bulkhead, or something of the sort. Starting on the first round the marines reach the target, the boarding party may attempt a crew check to effect entry in each special orders phase. If the ship in question is shaken, disabled, or crippled by damage, the normal attack bonuses for these conditions apply to the boarder's entry check.

While effecting entry, boarders are "beneath the guns" and can't be targeted by shipboard weapons.

Boarding transporters skip the entry step.

Assault

On the special orders phase in which the boarding party effects entry, they may commence the assault. You could play out the assault as a mini-scenario using the ALTERNITY game rules, or you can simply use quick and dirty rule presented here.

Count up the attackers and defenders in the boarding action, assigning a point value based on the following chart:

Troop in powered armor	5
Nonpowered troop	2
Crewman	1
Passengers	0.5

For example, a boarding party consisting of twenty marines in zero-G body tanks has a boarding value of 100 points. A defending crew with 20 nonpowered troops, 30 crewmembers, and 10 passengers has a boarding value of 40+30+5, or 75.

Each round during the special orders phase, both sides make crew checks and inflict damage based on their own boarding value:

Result	% of value inflicted
Failure	5 percent
Ordinary	10 percent
Good	20 percent
Amazing	30 percent

Note that the losses are *based on the size of the attacking force.* In the preceding example, the defenders have 75 boarding points. They can inflict 3, 8, 15, or 23 boarding points of damage to the attackers.

Boarding damage reduces the enemy's own boarding value. The first side reduced to a boarding value of zero loses. Optionally, either side may surrender after any round of combat. If the forces are closely matched and neither side gets lucky, the assault is likely to be bloody and may last for a dozen or more game rounds.

Effects of Boarding

While a boarding assault is in progress, the ship in question suffers a +3 step penalty to all crew checks (except for the check made against the boarding party). The crew is far too distracted to perform their normal duties well while they're busy repelling boarders.

Ignore this penalty if the boarding value of the attackers is 10 percent or less of the boarding value of the crew. Ten marines can't seriously distract a fortress ship crewed by thousands of enemy troops.

Crew Quality: If a ship loses half of its initial boarding value in defense, its crew quality drops by one grade due to casualties. If a ship loses three-quarters of its boarding value in defense, its crew quality drops by two grades. If losses reach 90 percent, the crew drops by three quality grades. Green crews drop to a crew check number of 8, then 6, and so on.

Prize Crew: Normally, it will take a boarding party at least twenty to thirty minutes to make a captured ship ready for maneuvering or battle. They have to repair last-ditch sabotage efforts, release security lock-outs, coerce key members of the enemy crew into helping out, and so on. In general, a captured ship can't rejoin the battle on the enemy side before the battle is over.

Casualties: Assume that half of all losses in boarding value are killed in action. The other half of boarding losses are injured or incapacitated and will recover in time. If there are several different groups among an attacking force or a defending crew, assume that losses are proportional to each. For example, if a defending ship lost 80 percent of its boarding value before surrendering, you can assume that 4 out of 5 defending troops, 4 out of 5 defending crewmen, and 4 out of 5 defending passengers were casualties.

Self-Destruct

The ultimate tactic of desperation, self-destruction is normally reserved as a last measure to prevent the capture of a ship. Self-destruction requires a crew check with a –3 step bonus in the special orders phase, although normal penalties for disabled or crippled ships apply; badly damaged ships may not have the means to self-destruct anymore.

If successful, the ship self-destructs in the special orders phase designated by the commander. Usually, the captain will set the charges with a delay of several game rounds so that any surviving crew can reach escape shuttles or lifeboats

and abandon ship. However, this is not a requirement.

When a ship self-destructs, it creates an explosion equal to that caused by the loss of more than twice its critical point score. See Explosion Damage, on TABLE 2–3.

SQUADRON ACTIONS

Large groups of small craft can take up a lot of time and attention in a fleet engagement. To keep the game moving, you may want to use these squadron rules. A squadron is defined as any group of small craft that will maneuver and attack together.

Note that there is a slight game advantage in grouping into squadrons. Not only is it more convenient for the players, but a squadron attack is a little more effective than a number of individual attacks, especially for difficult targets. Ships in a squadron also tend to retain their combat effectiveness longer under enemy fire, because individual system failures just aren't as significant.

Creating Squadrons

Small craft of 20 hull points or less may group into squadrons by beginning the round in the same hex, with the same speed and the same heading. Usually this means that a carrier launches some number of fighters in a launch phase, and all the fighters launched at the same time then form a squadron. Fighters might also choose to "loiter" near their carrier while more small craft are launched and form up.

Every ship in the squadron must be identical in all characteristics. If a carrier launches six *Starwind* type fighters and four *Hammer* type fighters, these ships would have to be divided into two squadrons, not one ten-fighter squadron. It's generally not a good idea to use the squadron rules if any of the ships are going to be piloted by a player-controlled hero character.

Squadrons can "break up" into any smaller formations at any time. A twenty-fighter squadron might travel together for several game rounds, and then break up into two 10-ship elements to engage two different enemy targets.

For ease of play, we suggest that squadrons should consist of no more than twenty ships at a time. Whenever possible, the controlling player should try to create 10-ship elements and avoid very small or very large squadrons.

Squadron Maneuvers

A single marker or miniature on the map represents a squadron. All ships in the squadron move together. If the squadron leader makes a maneuver check, all ships in the squadron pass or fail the check with the leader's roll. For all movement purposes, the squadron is treated as a single ship whose movement is copied exactly by every other ship in the squadron. All ships in the squadron are located in the same hex, but are assumed to be spread out over dozens or hundreds of kilometers within that hex.

Squadron Attacks

A squadron attack works much like a missile flight. Make one attack roll for the entire squadron, taking into account all the factors that normally apply (target size modifier, weapon accuracy, range, enemy defensive systems, and so on.). Then, refer to the table below, using the success level of the single attack roll.

Table 2–5: Squadron Attacks

Attack	% of Hits of Success		
Roll	O	G	A
Failure	25%	15%	10%
Ordinary	30%	20%	10%
Good	35%	20%	15%
Amazing	40%	25%	20%

The percentage is simply the number of hits of that success obtained by the squadron, based on the total number of attacks it would have made as individuals. For example, a flight of ten fighters carrying two MRB bombs each is making twenty attacks, in effect. Under the squadron attack rule, only one ship actually rolls an attack die. If the result is a Good success, 35 percent of those twenty attacks (or 7 hits) are Ordinary-level hits for mass-reaction bombs; 20 percent (or 4 hits) are Good-level hits for mass-reaction bombs; and 15 percent (or 3 hits) are Amazing-level hits for mass-reaction bombs. The remaining six bombs miss the target.

The result of each hit is resolved normally. In the preceding example, there are a total of 14 MRB bomb hits on the target that will score damage, force armor rolls, and possibly cause system damage checks.

If the squadron is attacking with a weapon that is capable of battery fire (say, a fighter with four lasers in a battery), *each potential hit* is counted as part of the attack total. Ten fighters firing four lasers each is forty potential hits, so the number of hits is based on forty weapons. The *best* result of the battery fire attack roll is used as the success level of the squadron attack roll.

If the squadron attacks with an autofire weapon, the total number of weapons firing is *doubled.* The best result in the autofire attack acts as the success level of the squadron attack roll. For example, ten fighters each firing a single autofire-capable laser count as twenty weapons, not ten.

Squadron Damage

To speed play, squadrons take damage differently than individual ships. All weapons or attacks firing at a squadron make normal attack rolls. However, instead of rolling damage against individual fighters or bombers, simply track the number and level of successes scored by the attacking weapons. Then convert these into fighter losses, based on the attacker's firepower:

Small Craft Firepower
1 Amazing = 1 kill
2 Good = 1 kill
3 Ordinary = 1 kill
Light Firepower
1 Amazing = 1 kill
1 Good = 1 kill
2 Ordinary = 1 kill
Medium (or higher) Firepower
Every hit = 1 kill

Ignore all "fractional" kills. For example, a squadron attacks a battleship. The battleship's antifighter armament, a dozen plasma cannons (small craft firepower), scores 2 Amazing, 1 Good, and 4 Ordinary hits. The Amazing-level hits kill a fighter each, and three of the Ordinary-level hits get another one. The other hits aren't counted.

Squadron vs. Squadron

What happens when a squadron attacks a squadron? First, the squadron initiating the attack must move to a position within weapon range of the target squadron. It can fire on (and possibly be fired on by) the target squadron normally.

The target squadron must immediately decide whether to engage its attackers or to keep maneuvering normally. To engage the attackers, the target squadron must be traveling at a speed of 9 or less, and the attackers must be traveling at a speed no more than 3 higher than the target squadron. It's possible for an attacking squadron to avoid engagement by using hit-and-run tactics against a slow-moving target squadron.

If the target chooses to engage the attacking squadron, both squadrons stop maneuvering normally. They remain fixed in place at the site of the attacking squadron, caught up in a furious dogfight. The dogfight lasts until one squadron or the other is destroyed or withdraws. (The dogfight must last at least one round.)

To withdraw from a dogfight, a squadron must declare its intent in its step of the movement phase. The opposing squadron can let them go or can attempt to keep them engaged. Roll crew checks for each squadron; the winner decides if the fleeing squadron can withdraw or not. The side with the *most* ships left in the dogfight wins ties.

During a dogfight, apply squadron attacks and squadron damage normally. However, unengaged ships fire into the melee attack with a +3 step penalty (they have to be careful not to hit their own fighters by mistake).

Fusion Age Space Combat

Chapter 1: Basic Combat and most of the game systems described so far in *Chapter 2: Advanced Combat* are intended for use in games set at Progress Level 7, 8, and 9—the Gravity Age, Energy Age, and Matter Age. Ships of these technology levels possess powerful engines that can provide thousands of "Gs" of acceleration, and some method for protecting their human cargo from the effects of such radical maneuvers. Even though the weapons and systems available at each Progress Level are more and more capable than those available at the previous level, the change between PL 7 through PL 9 is an incremental change.

Space combat in Progress Level 6 is different. The difference between ships of the Gravity Age and the Energy Age is the difference between a World War II cruiser and an Aegis cruiser; by comparison, a ship of Progress Level 6 is a ship of the line from the Napoleonic Wars. It's an entirely different set of capabilities and style of combat.

In this section, we'll examine some of the special rules that apply to PL 6 ships and how ships of radically different Progress Level interact with each other on the battlefield.

Game Scale

Battles between ships of Progress Level 6 work better on maps with scales of 50 kilometers per hex.

Each game round is 5 minutes long (ten times longer than the 30-second round for normal space combat). The net effect is that hexes are twenty times smaller at PL 6, and rounds ten times longer, so PL 6 ships maneuver two hundred times slower than ships of PL 7 or higher.

At this scale, a ship moving at speed 1 is traveling 50 kilometers per 5 minutes—or roughly 600 kilometers per hour. Usually, ships are traveling this slowly only for the most delicate maneuvering; on interplanetary trips, ships might reach speeds of a million kilometers per hour, which is a speed of 1,600 hexes per round. An acceleration of 1 is approximately equal to 17 G. A ship with an acceleration of 1 would require 1,600 5-minute rounds—a little more than five days—to reach a speed of one million kilometers per hour.

Sequence of Play for PL 6

Changing the scale of the game makes it advisable to change the sequence of play. For Fusion Age combats, the recommended sequence of play is:

Edge Phase
Power Phase
Sensor Phase
First Attack Phase
Shipboard Weapons
Movement Phase
a. Capital Ships
b. Light and Medium Ships
c. Small Craft
d. Missiles
Second Attack Phase
a. Shipboard Weapons
b. Missiles
Launch Phase
Repair Phase

Note that there is a fire phase before movement for direct-fire weapons, and a fire phase after movement for direct-fire weapons and missile attacks.

Movement at PL 6

Most engines of the Fusion Age are reaction engines. Unlike the gravity drives or space-warping drives of higher Progress Levels, PL 6 engines do not permit impossible maneuvers such as banks, rolls, or loops in space. Ships of PL 6 fly like rockets.

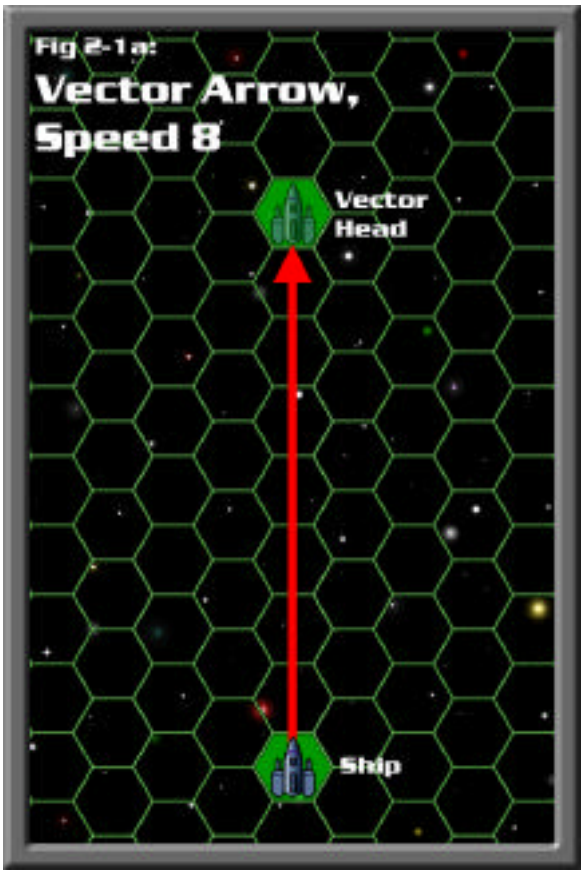
Vectors

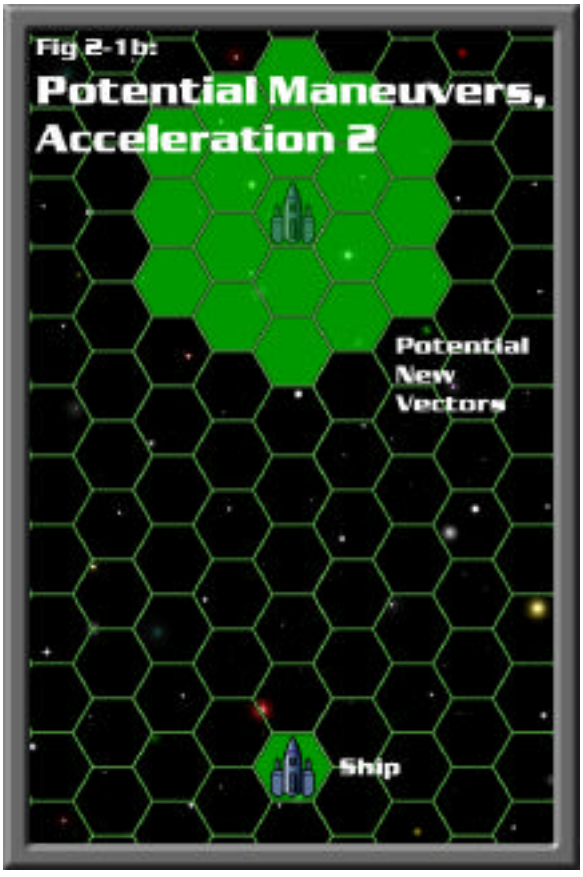
Forget everything we already told you about how ships change speed and maneuver. Fusion Age ships must abide by vectored movement. On the surface, this isn't all that different from the movement rules in *Chapter 1: Basic Combat*–unless some force acts on the ship, it will retain its current course and speed from now until the end of time. To mark the ship's current vector, place a marker of some kind in the hex the ship will end its next move in if nothing else happens.

To maneuver (which includes speeding up and slowing down), don't move the ship counter or miniature. Instead, *move the marker that indicates where the ship is heading to.* The entire sum of a ship's maneuverability is its acceleration rating, since this is the number of hexes the ship's vector head can be moved from its current location.

For example, a Fusion Age ship flying at a speed of 8 should mark its current vector as shown in Fig. 2-1a at lower right.

If the ship has an acceleration rating of 2, during its movement it can choose to shift its vector head 2 hexes in any direction. In other words, the ship can finish its move in any of the hexe indicated in Fig 2-1b directly below.





Whatever the ship does in this round becomes its beginning vector for the next. If the ship chose to slow down and round toward the right, its new vector is shown in Fig. 2-1c below right:

Facing

Adjusting a vector head requires a ship to continuously accelerate in the right direction. It doesn't happen all at once (that would turn the crew into raspberry jelly on the bulkheads). Instead, the ship points its main drives in the necessary direction and burns fuel to change its course and speed.

For game purposes, this is reflected by a simple rule: A ship's facing at the end of its move must match the direction in which its vector was adjusted. If the vector was adjusted two hexes straight back because the ship's trying to hit the brakes, then the ship *must* be facing straight back.

In the previous example, the vector head was adjusted two hexes back and to the right. The ship does *not* point its nose at its new destination hex; it points its nose at the new destination hex, as it would have to drive there from its old destination hex.

If a ship doesn't adjust its vector head, it can choose any facing desired during its movement.

Fusion Age Fire

Since the game round is so long for PL 6 ships, the round sequence includes an extra fire phase *before* movement. In addition, there is no hierarchy of fire for beams, torpedoes, missiles, and bombs. Direct fire weapons (beams, projectiles, torpedoes,

and special weapons) fire first, followed by any kind of launched or dropped ordnance.

Since the hexes are only 50 kilometers across, multiply all range figures for PL 6 weapons by five. A laser cannon has a range of 1/2/3 hexes on the standard scale, but on the Fusion Age scale the laser cannon has a range of 5/10/15 hexes for short/medium/long range. (Yes, it should be multiplied by a factor of 20, but you can assume that PL 7 ships mounting PL 6 weapons are actually carrying improved versions of those weapons with better rates of fire and better long-range targeting. In other words, a strictly PL 6 battle works better at this scale, and as long as it's internally consistent, don't worry about it.)

Crossing Scales

The best way to handle a PL 6 ship (or a ship with PL 6 propulsion technology, anyway) fighting a PL 7 ship is to treat the PL 6 ship as a flying bunker, locked to a certain course and speed. In other words, the Fusion Age ship must plod along a straight course while the Gravity Age ship flies rings around it.

Scale: Use the standard PL 7 game scale (1000 kilometers to a hex, 30 seconds to a game round).

Sequence of Play: Use the standard (PL 7) sequence of play.

Movement: PL 7 (or better) ships maneuver using the normal rules as presented in *Chapter 1: Basic Combat*. Frankly, the easiest thing to do is to rule that the PL 6 ship may maneuver normally on every tenth game round and must fly straight otherwise. This actually allows the PL 6 ship a lot more maneuvering than it should get, but it's marginally playable.

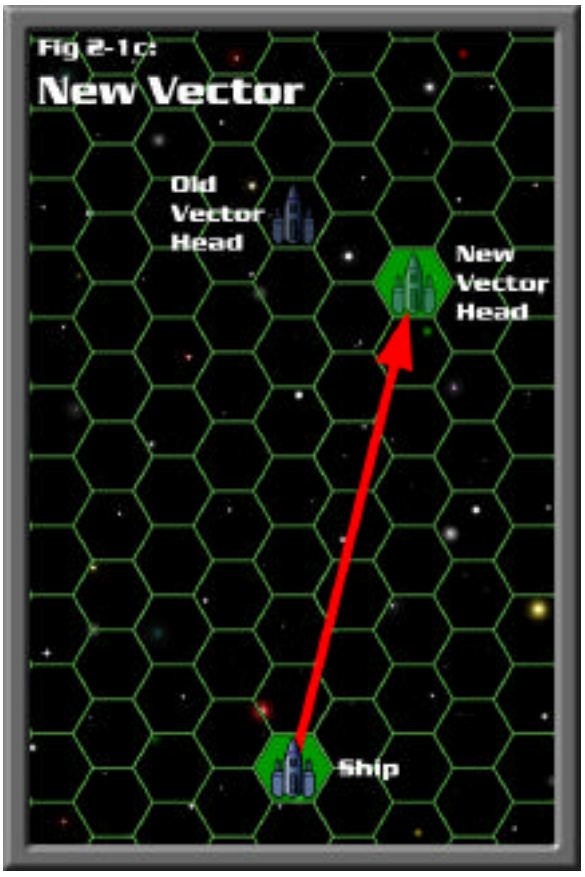
If you want to be precise about things, the PL 6 ship must divide its acceleration figures by 200 to determine just how much it can increase speed or how fast it can adjust its vector.

PL 6 Acceleration	Converts
1	0.005
2	0.010
3	0.015
4	0.02
5	0.025
6	0.03

This means that a PL 6 ship with an acceleration of 2 would have to accelerate continuously for *100 game rounds* to effect a vector change of one hex from its current vector head. This is why we suggest a separate game scale of 5-minute rounds and 50-kilometer hexes for Fusion Age space combats.

Fire: We recommend ignoring the change of range scales and time scales. Allow the PL 6 ship to fire just like a PL 7 ship on the normal combat scale. Obviously, this is a major improvement, but what's the fun of controlling a flying bunker if it never gets to shoot?

If you want to be more precise, divide the ranges of all the ship's PL 6 weaponry by four. If the ship's weapons have a range of less than 1 hex, assign a minimum range of 1 hex for a long range (+3 step penalty) shot. To account for the difference in rate of fire, the PL 6 ship may fire only once every five game rounds.



CHAPTER 3: NARRATIVE COMBAT

So far, we've discussed ship combat as a combat simulation played out on a mapsheet of hexes. Now we're going to shift our focus over to combat from a player character's point of view.

HEROES IN COMBAT

In the previous two chapters, we've used the term "crew check" as a catch-all for any kind of skill check that the hundreds or thousands of nameless crewmembers on board a major warship might make in the course of a space combat. Player-controlled heroes may make skill checks against their own skills at key battle positions instead of relying on the crew's general ability.

In general, you can ignore the normal action check procedure for characters in combat for a combat using the systems presented in *Chapter 1: Basic Combat* and *Chapter 2: Advanced Combat*. While the ALTERNITY action round conists of four 3-second phases, heroes who are manning stations on a major warship don't get to take three or four or five actions every game round. They make skill checks in place of attack rolls, sensor checks, tactics checks, and so on, but their individual action checks just aren't significant in the overall course of the battle.

If this feels like it denigrates the heroes' role in the fight, look at it this way. Manning a weapon station or a helm station during a battle presents the hero with a complex skill check that must be solved to maneuver the ship, fire a weapon, repair damage, or whatever.

A hero at the ship's main weapons console isn't just pushing the button as fast as she can. She's constantly computing fire control solutions, monitoring weapon recharge or reload procedures, compensating for shipboard damage that might knock down some of the weapon mounts under her control, choosing sensor input sources that give her the best view of the battle for her job, and trying to pay attention to any new firing orders that might be issued. She's performing a number of small tasks to make that one attack roll with that weapon or battery.

Hero Stations

When the battle begins, the Gamemaster should determine where each player-controlled hero is located and what each hero is going to try to do. Clearly, a character imprisoned in the ship's brig can't take any actions to help her shipmates fire the ship's guns. Possible stations include the following:

- Command
- Combat Information
- Communications
- Weapons and Defenses
- Repair
- Flight
- Bridge
- Computers
- Sensors
- Engineering
- Internal Security
- Boarding Party

Command

The command station decides which enemies to engage, where to engage them, and when to break off the action. Most of the command personnel are located in the ship's command deck, bridge, auxiliary command deck, flag bridge, or launch tower.

Officers: Command officers include the tactical officer (an officer charged with overseeing the details of the engagement), the strike commander (the officer in charge of flight operations), and the ship's captain. If the ship is the squadron flagship, the commodore or admiral and any officers on her staff are considered command officers.

Even in a battleship or fortress ship, the number of command officers is very limited. Only the captain and one or two chosen delegates are responsible for command in battle.

Enlisted: Enlisted are present as necessary to support the command officers. Usually, two or three messengers, comm operators, and comptechs assist the tactical officer or strike officer by watching over various battle comm nets and datalinks. Someone's got to keep the radio chatter straight.

Bridge

On many ships, the bridge and the command deck are the same space. Heroes on the bridge (or tasked with bridge responsibilities) are primarily concerned with the safe navigation and maneuvering of the ship. They continuously monitor the ship's position, the position of any obstacles or hazards (planets, for instance), and the ship's current course and heading.

Officers: The officer of the deck is the officer in charge of the bridge. She decides where the ship is going and answers to the captain and the tactical officer's requirements. The officer of the deck is usually assisted by a junior officer of the deck. The ship is actually "flown" by a helm officer, conning officer, pilot, or helm operator answering to the officer of the deck. The astrogator provides navigational information to the officer of the deck.

On small warships, the officer of the deck is probably the tactical officer. The helm operator may be a certified flight officer, or she may be an enlisted person who maneuvers the ship at the conning officer's orders.

Enlisted: The helm operator and lee helm operator actually drive the ship if the ship doesn't have an officer pilot. Messengers and comm operators help to keep the bridge in contact with other vital stations on the ship. The astrogator usually has a small team of quartermasters (navigators) to track the ship's position. The boatswain of the watch is the enlisted person who maintains order on the bridge and supervises the junior enlisted people under the officer of the deck's command.

Combat Information

On many warships, the command deck and the combat information center are located in the same space, along with the bridge. For example, a destroyer's command deck usually includes command, navigation, sensor, and weapon stations all in the same general area of the ship. The combat information center houses most of the ship's sensor, weapon, and communication stations.

Officers: The combat information officer ensures that the center works as it's supposed to and advises the tactical officer or captain as needed. The intelligence officer analyzes enemy vessels and advises the tactical officer of their capabilities. Depending on the size of the ship, sensor and weapon officers may supervise their system operators from the combat information center.

Enlisted: The combat information center is crammed full of consoles and control stations for most of the ship's sensor, weapon, defensive, and comm systems. A sensor operator or weapon operator mans every station.

Computers

The ship's computer core and its control computers are usually manned in battle by comptechs under the supervision of a computer officer. They make sure that the computers operate at peak efficiency and initiate or defend against data warfare as necessary. The computer officer may be stationed on the bridge or command deck.

Communications

Comm operators under the supervision of the communications officer man most communication systems on board the ship. The communications stations are typically located in the combat information center (or command deck), so the comm officer reports to the combat information officer or tactical officer.

Comm officers and techs ensure that the ship maintains clear and secure communications and data feeds with all friendly ships in the area. They also supervise attempts to jam enemy communications.

Sensors

Every sensor system on board is manned by a sensor operator reporting to the sensor officer (or science officer). The sensor stations are usually located in the combat information center.

Weapons and Defenses

Crewmembers serving the ship's weapons and defenses work in one of two places: the ship's command deck or the weapon mounts.

Officers: The tactical officer directs the activities of crewmembers manning central weapon stations. Most warships slave weapon controls to a central station near the ship's captain and her command team. However, large weapon mounts usually have crews associated with them who fire as directed by the central station. These mount crews can also fire independently if the ship's command deck is wiped out or communications and remote firing controls are knocked out by enemy damage. Therefore, most major mounts have a mount captain or battery commander who commands the local crew.

Enlisted: Enlisted gunners usually man the weapon control stations in the command deck or in the mount. A large mount may require a dozen or more highly trained specialists to operate in a battle.

Engineering

The ship's helmsmen or pilots normally "control" the ship's engines remotely through their own stations on the bridge or command deck. Control is slaved from the local consoles governing the exact operation of each individual engine to the main engineering console in the engineering control center. Then engine control is slaved up to the command level. It's the responsibility of the engineering department to keep the ship's engines and power plants available to the command team so that the ship can execute the weapon fire and maneuvering required in battle.

Officers: An engineering officer is usually present on the command deck or bridge to monitor systems status boards and handle orders that are more complex than simple maneuvering. She answers to the officer of the deck or the tactical officer. The nerve center of the ship's engineering section is the engineering control center or main engineering, a command station that controls and monitors all power plants, life support, drive systems, engines, and other engineering systems. Finally, large ships may have smaller control stations for major systems such as individual engines or power plants. Engineering, drive, and auxiliary officers supervise these stations.

Enlisted: Enlisted are similar to what was described above for the officers. Usually, enlisted specialists are stationed near the local control panels for the systems they're familiar with.

Repair

If everything works right and the ship sustains no damage, most crewmembers don't have much to do in a battle. Unfortunately, this is rarely the case. Repair parties stand by to patch hull breaches, aid wounded, fight fires, correct system failures, rig bypasses, and generally keep the ship spaceworthy as long as possible under enemy fire.

The chief engineer oversees damage control efforts through her representative, the damage control officer or assistant. Each repair party is under the leadership of a repair officer, usually a deck officer or supply officer since these jobs don't require their attention in battle. Dozens of enlisted men—again, largely consisting of deck, supply, and support staff—round out the party, with a handful of repair specialists who train exclusively on damage control procedures.

Flight

Carriers and assault ships that carry squadrons of small attack craft or fighters possess flight sections or departments.

The strike officer is usually a high-ranking officer of the embarked squadron. She mans the flight tower and directs the operations of strike and fighter craft that are away from the ship. The strike officer answers to the captain, much like the tactical officer. A team of junior officers and enlisted crewmembers in the tower or the ship's command deck provide traffic control, strike communications, and patrol command and control.

Obviously, any flight crews involved in flying strikes, intercepts, or combat patrols are on duty, too. There are three basic missions for small craft: striking enemy targets, providing fighter cover for friendly strike forces, and providing fighter cover for the carrier to defeat enemy strikes. Any strike force or fighter flight normally answers to a flight leader, the senior officer airborne.

Carriers may have hundreds of crewmembers and officers employed in the hangar deck. During battle, they refuel, rearm, or repair craft as necessary, ensuring that the carrier's small craft are out where they can do the most good instead of bottled up inside the ship.

Internal Security and Boarding Parties

The ship's troops or marines are normally responsible for providing internal security and defending the ship from enemy boarders. Security teams or troop detachments typically guard the most important areas of the ship against potential boarding parties, while reserving several fast-reaction teams to seal off trouble spots fast.

If the captain anticipates the opportunity to get boarders onto an enemy vessel, the boarding party musters near the ship's airlocks or boarding pods.

Hero Tasks

If you think of a typical round of space combat as dozens of tasks that various members of the ship's crew must accomplish, then you'll see that a group of player-controlled heroes have to pick and choose which tasks demand their personal attention. A team of highly skilled heroes can fight a ship much better than even a crack crew by taking control of the most important jobs on the ship.

The Leadership Skill

Instead of taking a hands-on roll by making skill checks based on his own System Operation or Vehicle Operation skills, a hero might instead use the Leadership skill to coordinate the efforts of supporting characters who are actually firing the guns or maneuvering the ship. The hero in question makes a Leadership skill check; on an Ordinary, Good, or Amazing success he confers a –1, -2, or –3 step bonus to his team's crew check for that round.

A hero can affect only the crewmembers assigned to one particular task or station. For game purposes, you can define this as one die roll per round–an attack roll, sensor check, repair check, maneuver check, or any similar roll.

For example, the captain of a ship might use his Leadership skill to help the bridge team through evasive maneuvers, direct the fire of one battery, or supervise one repair check, but he couldn't do all three at the same time.

Edge

If you are playing with ALTERNITY characters, have the character in command of the fleet make a Tactics–*space combat* skill check instead of a crew check.

Power Distribution

A hero manning the engineering console on the bridge or in main engineering can attempt to increase the amount of power available to the ship in the current pwer phase. He's coaxing the power plant to the limits of its performance, selectively cutting off nonvital systems, and using his knowledge of the ship's engineering plant to squeeze out every bit of power.

The hero may attempt a System Operation–*engineering* skill check. (Don't forget the penalties for shaken, disabled, or crippled ships.) He increases the ship's total power points by 10, 20, or 30 percent for an Ordinary, Good, or Amazing success.

Sensors

Obviously, a hero manning one of the ship's sensors (or the main sensor control console) may substitute his System Operation–*sensors* skill check for the ship's crew check when performing a sensor check with that system.

Movement

A hero manning the ship's nav console or helm may substitute a Vehicle Operations–*spacecraft* skill check for a maneuver check. If the character is flying a single-seat fighter, he can use this skill for attack rolls, sensor checks, and other crew checks.

Attacks

A hero manning the ship's weapons console may use his own System Operation–*weapons* skill in place of the crew check number for all fire from that weapon. Normally, a weapon operator or mount captain may gain this bonus–a hero working as the ship's tactical officer is too busy to fire weapons himself.

On the receiving end, characters manning ships in battle stand a good chance of being injured or killed by enemy

fire. When the heroes' ship is blasted into atoms by a well-placed matter bomb or a zero bore hit, someone's likely to be hurt. See "Injury and Death," later in this chapter.

Repairs

Heroes manning the engineering console on the bridge or command deck may repair stun damage or get a knocked-out system back on line in the repair phase with a successful System Operation–*engineering* skill check. An Ordinary, Good, or Amazing success repairs 1, 2, or 3 points of stun damage.

Heroes stationed in main engineering, the ship's damage control center, or the ship's repair parties may repair stun damage, wound damage, or bring knocked-out systems back on line with a successful Technical Science–*repair* or *juryrig* skill check. An Ordinary, Good, or Amazing success repairs 1, 2, or 3 points of damage.

Special Orders

Boarding actions, while rare, are made for heroes. By leading a boarding party or repelling boarders, a hero's personal combat skills become the most important assets at his command.

A hero in charge of a boarding party or security detail may use his Tactics–*infantry combat* or Leadership–*command* skill to add a –1, –2, or –3 step bonus to his side's boarding combat crew check for an Ordinary, Good, or Amazing success. At the hero's option, he can instead apply a +1, +2, or +3 step penalty to the enemy's boarding combat crew check. This increases the enemy losses inflicted by the troops under his command, or reduces the casualties of friendly troops.

If the hero is not in a position of command, you can assume that he's worth twice as many boarding points as a similarly armed and armored trooper. You may prefer to actually sketch out a short scenario for the heroes to play through, and base the success or failure of the boarding action on the success or failure of the heroes' encounter.

Injury and Death

What happens when six player characters are among the thousand crewmembers of a battleship that sustains heavy damage? Presumably, dozens or hundreds of the ship's crew might have been injured or killed during the battle. How do you determine if the heroes happened to be among those unfortunate casualties?

Crew Losses

In general, tracking exact crew losses isn't necessary. It's reasonable to assume that a ship reduced to about half its mortal points has suffered a number of casualties, some of whom are wounded and some of whom are dead. However, if it's important to guess at just how many crewmembers are being killed or wounded by enemy fire, use the following guidelines.

First, divide the crew into four groups: 10 percent, 20 percent, 30 percent, and 40 percent. Next, assign these numbers to the ship's four damage tracks: stun, wound, mortal, and critical, respectively. For example, a light cruiser has a total crew of 240 hands. Of these, 24 are on the stun track; 48 on the wound track; 72 on the mortal track; and 96 on the critical track.

Boxes marked off on the damage track cause a proportionate number of crew losses. A light cruiser has 40 stun, 40 wound, 20 mortal, and 10 critical points. This means that each stun box is "worth" 0.6 crew casualties, each wound box is worth 1.2 casualties, each mortal box 3.6 casualties, and each critical box 9.6 casualties for a light cruiser with a crew of 240 hands. If the ship loses 10 wound points and 5 stun points, you can assume that about 15 (12+3) crewmembers have become casualties.

Finally, you can assume that about half of all casualties are killed outright, one-quarter are severely wounded and require immediate care, and one-quarter are lightly wounded and can wait on medical attention for a short time. To continue our example, you could assume 7 dead, 4 badly wounded, and 4 with slight wounds. The death rate is high because the effects of antiship weapons on crewmembers who happen to be near the impact site are often quite gruesome.

Losses to the crew don't have any game effect unless called for by specific results on the hit location table. In general, the step penalties for shaken, disabled, and crippled ships reflect increasing crew losses among other effects. These guidelines are provided just as a point of information.

Heroes at Hazard

If you don't want to keep track of the exact location of each player character on board or the exact location of all incoming enemy fire, you can simply use this rule. Any time the ship marks off damage on its damage track, there is a chance that a hero on board suffers damage. Each player rolls a d20 to determine if her hero is endangered by the hit. On larger ships, the odds of any particular hit jeopardizing the hero are very small.

Table 3–1: Random Hazards (d20)

Ship	Endangered on…			
Class	Stun	Wnd	Mor	Crit
Small	1–4	1–6	1–8	1–12
Light	1–3	1–4	1–6	1–8
Medium	1–2	1–3	1–4	1–6
Heavy	1	1–2	1–3	1–4
S-Heavy	1	1	1–2	1–3

For example, if a hero is on board a destroyer (a light ship) that suffers mortal damage, she is endangered by the damage on a roll of 1–6 on a d20. On a battleship (a

heavy ship) she's endangered only by mortal damage on a roll of 1–3 on a d20.

Heroes endangered by damage roll Personality feats and compare the results to the following table. Why a Personality feat? At this level, the question of whether the hero happens to be standing in the path of the incoming plasma beam is a matter of sheer luck, and Personality measures luck about as well as any heroic attribute.

Table 3–2: Character Injury

PER Feat	Secure	Vulnerable
Amazing	None	None
Good	None	1d4s
Ordinary	1d6s	1d8s
Failure	1d8w	1d12w
Crit. Failure	1d6m	1d8m

Consider this damage to be low impact, high impact, or energy depending on the weapon that caused the hit. The firepower of the attack is Good. Secured characters are strapped into their seats and protected by armored acceleration couches. Vulnerable heroes are any heroes who are trying to move around the ship during the fight.

This doesn't mean that people routinely survive direct hits from heavy plasma beams. They don't. But the heavy plasma beam wasn't targeting the hero who is endangered by the strike, it was targeting her ship. People in the general vicinity are at hazard from explosive decompression, flying shrapnel, explosions, catastrophic system failures, and other such dangers. Direct hits would be handled by means of the normal damage upgrading rules described in *Chapter 1: Basic Combat*.

Heroes on Station

If you would prefer to be more precise about when and where a hero might be injured during battle, refer to the system damage rules in *Chapter 2: Advanced Rules*. Determine which station or system each hero is manning and which section or zone of the ship that system is located in. When that system or location is hit, the heroes are endangered, just as described in the preceding section.

For example, the heroes might all be manning a cruiser's command deck, which happens to be located in the forward center section of the ship. When the FC section is hit and the command deck is exposed to a potential System damage check, the heroes are endangered by the damage and must make Personality feat checks as described in the previous section.

Bailing Out

It's usually advisable to bail out of crippled or destroyed craft before more damage makes bailing out impossible. Bailing out or abandoning ship is a special order. It takes a little time to reach the ship's escape system (if any) and get clear of the wreck:

Table 3–3: Bail-Out Times

Class	Bail-out Time
Small	Same round
Light	1d4 rounds
Medium	1d6+1 rounds
Heavy	2d6 rounds
Super-heavy	3d6 rounds

The figures on TABLE 3–3 represent an evacuation of most surviving crewmembers. Generally, 10 to 20 percent of the surviving crewmembers won't be able to evacuate due to blocked exits, damaged escape craft, severe injuries, and other factors.

Even though it might take 8 or 10 rounds to completely abandon a large ship, some number of crewmembers will get clear of the wreck every round during the evacuation. Assume that 20 percent of the survivors get clear each round for a light or medium ship, and 10 percent of the survivors get clear each round for a heavy or super-heavy ship. Player characters can leave as soon as they reach an escape pod or airlock.

COMBAT WITHOUT MINIATURES

Many Gamemasters prefer to run their games without using any maps or miniatures at all. Obviously, the combat rules in the preceding chapters assume the use of some kind of map sheet, but you don't have to do this if you prefer not to.

In the ALTERNITY *Player's Handbook*, vehicle or spacecraft combat without some kind of physical representation in front of the players is referred to narrative combat resolution.

Position

The only things that matter for positioning in narrative combat are the range category and each ship's heading. In narrative combat, assume that every ship in both fleets is maneuvering in the exact same manner and shares the exact range category, heading, and speed of all friendly vessels in relation to the enemy fleet.

Range Categories

Instead of keeping track of the exact distance between the enemy fleets, distance is described as one of the following range categories:

- Disengaged
- Contact
- Extreme
- Long
- Moderate
- Close
- Very Close

Disengaged: The battle is over, as both ships lose sensor contact with each other.

Contact: Missile fire is possible, but no other weapons can reach the enemy ship or ships.

Extreme: This is long range for beam or projectile weapons of super-heavy or heavy firepower; no other weapons can fire.

Long: This is long range for beam or projectile weapons of medium or light firepower; normal range for heavy and super-heavy beam and projectile weapons.

Moderate: This is long range for torpedoes and special weapons, as well as beam or projectile weapons of small craft firepower. Normal range for all other weapons.

Close: All weapons are at normal range.

Very Close: Bomb attacks and missile attacks may be executed. Beam or projectile weapons of Heavy or Super-heavy firepower, torpedoes, and special weapons may *not* fire, since they're simply too close.

Attacks at normal range are conducted normally; attacks in a weapon's long range category suffer a +3 step penalty.

Heading

Basically, there are three ways a ship can be facing relative to the enemy: closing, holding, or opening.

Closing: The ship or ships are generally pointed at the enemy and trying to get closer. Weapons that bear forward (the front firing arc) may be fired at the enemy.

Holding: The ship or ships are maintaining their position. They may be drifting in space, or driving in some direction that doesn't really close or open the distance, instead maneuvering around the enemy. The commander may choose which of the four firing arcs faces the enemy.

Opening: The ship or ships are heading away from the enemy. Weapons that bear aft may be fired at the enemy fleet.

All friendly ships share the same heading in the narrative system. It's assumed that they are maneuvering in formation to provide mutual support to each other.

Movement

In the narrative combat system, the movement phase is simply a set of declarations: Do you want to get closer to the enemy, and which way do you want to be facing?

The opposing player must declare his heading first. As previously noted, all ships in the opposing player's fleet share the same heading in the narrative combat rules. After the opposing player declares his intentions, the edge player declares his intention. Again, all edge ships share the same heading.

After both sides have declared their heading, adjust the current range category accordingly:

Table 3–4: Narrative Movement

Edge Player	Opposing Player: Close	Hold	Open
Close	–2 C	–1 C	??
Hold	–1 C	NE	+1 C
Open	??	+1 C	+2 C

–2 C: Decrease current range by two categories, to a minimum range of very close.

–1 C: Decrease current range by one category (min. very close).

NE: No change, keep current range category this round.

+1 C: Increase range by one category (max. disengaged).

+2 C: Increase range by two categories (max. disengaged).

??: If both fleets have the same acceleration, the range category remains the same; otherwise, the faster fleet closes or opens the range accordingly.

Example: The *Audacious* is a Concord destroyer attacking an External frigate. The range category for the first round is contact; this is an open-space encounter. The Concord commander decides to pursue the External ship and bring her to battle at a much closer range, so he declares an intent to close. The External commander wants no part of the *Audacious*, and chooses to open the range, hoping to escape altogether by increasing the range from contact to disengaged.

Since the Concord commander wants to close and the External commander wants to open, the next range category depends on which ship is faster. The *Audacious* has an acceleration of 4, while the External frigate only has an acceleration of 3. Since the *Audacious* is faster, the range will decrease by one category, from Contact to Extreme. It will take the *Audacious* a couple of more rounds, but she'll eventually run down the External frigate and force her to fight whether she wants to or not.

Sequence of Play

While the narrative combat round runs much like the visual combat round, there are some important differences.

Edge Phase
Power Phase
Sensor Phase
Movement Phase
- a. Opposing Player Declaration
- b. Edge Player Declaration
- c. Position Updates

Attack Phase
- a. Beam and Projectile Weapons
- b. Torpedoes and Special Weapons
- c. Missile Attacks
- d. Bomb Attacks

Launch Phase
Repair Phase
Special Orders

Crew Requirements

Basic Crew

Deck
Deckhands: 1 deckhand per 40 hull points
Cargo Handlers: 1 cargo handler per autocargo system, or 1 cargo handler per bay and 2 per hold
Bosun's Mates:1 boatswain mate per 5 deckhands or cargo handlers
Ship's Bosun
Deck Officers: 1 per 3 bosun's mates
First Lieutenant

Engineering
Drive Techs: 1 drive tech per 5 hull points for FTL drives.
Engine Tech: 1 engine tech per 10 hull points devoted to engines, plus 1 engine tech per engine.
Power Tech: 1 power tech per 10 hull points devoted to power plants, plus 1 power tech per power plant.
Support Tech: 1 support tech per life support system
Cold Tech: 1 cold tech per 2 life suspection units
Eco Tech: 1 eco tech per recycler unit or hydroponics bay
Petty Officers: 1 engine mate per 5 drive techs, power techs, engine techs, support techs, eco techs, or cold techs
Fuel King (if ship carries fuel)
Engineering Officers: 1 per 3 petty officers
Chief Engineer

Navigation
Quartermasters: 2 quartermasters, plus 1 per class (2 for light, 3 for medium, etc.)
Helm operators: 1 helm operator plus 1 per class (2 for light, 3 for medium, etc.)
Petty Officers: 1 per 4 quartermasters or helm operators.
Navigator

Operations
Electronics Techs: 1 per sensor or comm system
Comp Techs: 1 plus 1 per class (computer core); 1 per system assigned a dedicated computer.
Op Specialists: 1 per sensor system; 1 per weapon system; 1 per defensive system.
Intelligence Specialists: 2 on medium ships, 4 on heavy, or 10 on super-heavy ships
Petty Officers: 1 per 3 techs
Officers: 1 per 3 petty officers
Operations Officer

Psi—Psi Officers as needed

Auxiliary Engineering
Repair Techs: 1 per 40 hull points
Machinists: 4 per workshop, fabrication facility, or nanomanufacture bay.
Petty Officers: 1 per 4 repair techs or machinists.
Damage Control Officer

Weapons
Gunners: 2 per beam or projectile weapon mount, plus 1 per 5 hull points devoted to beam or projectile weapons.
Missile Techs: 2 per missile rack, 4 per missile tube, or 4 per cell array.
Torpedomen: 4 per torpedo system, plus 1 per 5 hull points devoted to torpedo systems.
Petty Officers: 1 per 4 gunners, missile techs, or torpedomen.
Weapon Officers: 1 per 3 petty officers
Chief Weapons Officer

Flight
Flight Crews: As needed
Aviation Techs: 3 per embarked craft
Aviation Storekeepers: 1 per embarked craft
Flight Deckhands: 1 per 2 embarked craft
Flight Ops Specialists: 1 per 4 embarked craft
Aviation Weaponeers: 1 per embarked craft
Petty Officers: 1 per 4 aviation techs, aviation storekeepers, flight deckhands, flight ops specialists, and aviation weaponeers
Officers: 1 per 4 petty officers
Flight Officer:
Strike Officer:
Wing Commander:

Science
Technicians: 4 per lab section
Science Officers: 1 per lab section
Chief Science Officer

Ship's Troops
Marines: As needed
Sergeants: 1 per 4 marines
Officers: 1 per 4 sergeants
Commander:

Support Crew

Medical
Med Techs: 1 per 50 basic crewmembers or 1 per 2 beds in sick bay, whichever is greater
Petty Officers: 1 per 3 med techs
Surgeons: 1 per sick bay (troop ships only)
Ship's Doctor

Service
Mess Hands: 1 per 20 basic crewmembers
Mess Stewards: 1 per 3 basic officers plus 1 per passenger
Petty Officers: 1 per 5 mess hands or mess stewards
Mess Chief

Supply
Storeskeepers: 1 per 20 basic crewmembers
Petty Officers: 1 per 5 storeskeepers
Supply Officer

Administration
Yeomen: 1 per 40 basic crewmembers
Security Specialists: 1 per 40 basic crewmembers
Petty Officers: 1 per 4 yeomen or security specialists
Officers: 1 per 3 petty officers
Chief Master-at-Arms
Admin Officer

Embarked Flag
Petty Officers: 20
Officers: 10
Chaplain
Flag Lieutenant
Intelligence Officer
Admiral

Command
Master Chief Petty Officer
Executive Officer
Political Officer (if needed)
Captain

Edge (Narrative)

In the narrative combat style, edge is even more important than it is in map-based combat. The commander with the edge has the privilege of deciding his heading (described below) after the opposing commander declares his heading.

Edge is determined as described in *Chapter 1: Basic Combat*, with a crew check or a Tactics—*space tactics* skill check. However, the first tiebreaker for narrative combat is ship size; the fleet with the largest or heaviest ship loses ties. The second tiebreaker is number of ships on a side; the side with the fewest ships wins ties.

Sensors (Narrative)

Assume that all sensor systems have normal capability out to Extreme range, and long-range capability (checks with a +3 step penalty) in the Disengaged range category.

Movement (Narrative)

As described under "Position" and "Movement" on the preceding page, the narrative combat style does not require any kind of map. Range is one of seven general categories from disengaged to very close. Heading is relative to the enemy ship—is the hero's ship closing, holding, or opening the distance between it and its opponent?

The first step of the movement phase is the opposing commander declaration. The opposing player is the side that currently does not have the edge; they have to declare their intentions first (close, hold, or open). Then, the edge commander declares his intent for the round. Based on the intentions of both sides, the range between the two ships or fleets may be updated as shown on TABLE 3–4.

Attack (Narrative)

If you're not playing out the battle on a map of some kind, exact weapon ranges don't matter. Instead, weapons are assigned range categories based on their type and size.

Range Category	Normal Fire	Long Fire
Disengaged	none	none
Contact	A	none
Extreme	A	B
Long	A, B	C
Moderate	A, B, C	D, E
Close	A, B, C, D, E	none
Very Close	C, D, F	none

A: Missile launches.

B: Beam and projectile weapons of heavy or superheavy firepower.

C: Beam and projectile weapons of light or medium firepower.

D: Beam and projectile weapons of small craft firepower.

E: Torpedoes and special weapons.

F: Bombs and missile impacts.

Normal fire allows an attack roll at no penalty for range. Long-range fire adds a +3 step penalty to the shot.

Special Orders (Narrative)

Chapter 2: Advanced Combat covers three special maneuvers or actions: ramming, boarding, and self-destruction. It's possible to perform these actions in narrative combat, with some modification to the rules.

Ramming: To conduct a ramming attack, a captain must have the edge and must be in the very close range category. The ramming ship must have an acceleration rating equal to or greater than the target's. The ramming ship must pass a crew check (or a Vehicle Ops—*spacecraft* skill check on the part of the pilot). If the ramming ship succeeds in its attack roll, the target is entitled to a crew check (or Tactics—*space combat* skill check by the captain) to avoid the collision. Add the target vessel's target size modifier to the avoidance check.

The damage of the ramming attack is listed under "Ramming" in *Chapter 2: Advanced Combat*. After the ram, the ships involved are at very close range.

Boarding: The entry and assault stages of a boarding action work as described in *Chapter 2: Advanced Combat*. The approach stage is a little different, though. Boarding transporters can be employed at moderate range, provided no energy screen interferes with the transport. For conventional approaches, the boarding ship must be at very close range, and the target vessel must be unable to maneuver in its own defense.

Self-Destruct: Initiating self-destruction takes place just as described in *Chapter 2*. When a ship self-destructs, it creates an explosion equal to that caused by the loss of more than twice its critical point score. See explosion damage, on TABLE 2–3. Ships that are very close to the detonating vessel are treated as if they were 1 hex away on TABLE 2–3; ships that are close to the detonating vessel are treated as if they were 2 hexes away.

CHAPTER 4: THE COLD HARD FACTS

Space travel isn't as easy as many science fiction books and movies make it appear. In the classic space opera, ships perform maneuvers that are frankly impossible in any kind of realistic sense. Diving fighters somehow create screaming shrieks in vacuum. Massive cruisers roll and bank like stunt planes at a county fair. And no one worries about things like how much acceleration a human body can tolerate, relativistic effects, and other intrusions of real science into the fiction at hand.

In this chapter we'll take a look at a few "real-world" issues that affect spacegoing craft and warfare in the future. You don't have to pay attention to any of this; there's a lot of outstanding science fiction that chooses not to pay attention to the cold hard grasp of reality. But if you prefer a game where the impossible is simply ruled out, read on.

FIGHT OR FLIGHT

Speed may be a ship's best defense. A spaceship traveling at extremely high speed is almost impossible to engage in combat. The faster a ship goes, the more difficult it is for enemy vessels to interfere with its passage–and the harder it is for the fast-moving ship to successfully employ its own weapons against targets at much slower speeds. The difference in velocity (or delta-v, as it's sometimes called) becomes a gulf or barrier nearly impossible to cross from either direction.

Imagine a patrol ship traveling at a speed of 10. It covers ten 1,000-kilometer hexes in 30 seconds, or 1.2 million kilometers per hour. It can travel from the Earth to the Moon in about ten minutes, from the Earth to the Sun in about 150 minutes, and from the Sun to Pluto in about 100 hours. That's pretty fast.

Now imagine that the patrol ship has orders to intercept an enemy raider entering the inner system at a speed of 100. In terms of the round sequence, the best the patrol ship can hope for is one shot at the raider as it passes. Assuming the patrol craft has an acceleration of 3, it will take *30 rounds* of maximum acceleration just to reach the same speed as the raider–and then the patrol craft will have to add even more speed to have a chance of overhauling the raider in a tail chase.

The raider isn't in a great position if it's imperative that it destroys the patrol craft. At a speed of 100, the raider is suffering a penalty of –24 to its maneuvering class (remember, each four points of speed is a –1 penalty). Assuming that the raider was MC 3 to begin with, its current MC is –21 . . . which means that it can perform a maneuver once every 22 rounds. If the raider spots the patrol craft at a range of 1,000 hexes (that's one *million* kilometers), it couldn't perform a maneuver to adjust its course accordingly until it was ten full rounds (1,000 hexes) past the patrol ship!

Table 4–1: Speeds

Speed*	KPH	Au/Hr	%c
1	120,000	0.0008	0.01%
2	240,000	0.0016	0.02%
3	360,000	0.0024	0.03%
4	480,000	0.0032	0.04%
5	600,000	0.004	0.05%
10	1.2 million	0.008	0.1%
20	2.4 million	0.016	0.2%
50	6 million	0.04	0.5%
12	million	0.08	1.1%
416	50 million	0.33	5%
833	100 million	0.67	9%
1250	150 million	1.0	14%
2500	300 million	2.0	28%
3750	450 million	3.0	42%
5000	600 million	4.0	56%
6250	750 million	5.0	70%
7500	900 million	6.0	83%
9000	1.08 billion	7.2	100%

* At PL 7+ scale; for PL 6 scale, multiply by 200. For example, a speed of 4 at PL 7 is the same as 800 on the PL 6 scale.

Take a look at TABLE 4–1. If a ship has an acceleration of 4, it's pretty fast for the Gravity Age. But it needs to increase its speed to 1,250 to reach a cruising speed of 1 AU per hour. That's three hundred game rounds of acceleration, or about two and a half hours.

High Speed Combat

Clearly, there are logistical difficulties in playing out a battle between ships with a delta-v of 50 or 100 points of speed, let alone 500. Most shipboard weapons have a maximum range of ten to twenty thousand kilometers; most shipboard sensors, forty to sixty thousand kilometers. A ship moving at a speed of 50 may begin the round outside of weapon range, move right past an enemy vessel, and wind up outside of weapon range again. For this reason, delta-v acts as a barrier to combat. If one ship's traveling at speed 100 and the other one's going at speed 10, there's nothing they can do to each other until one slows down or the other speeds up. By the time that happens, the fast-moving ship will be many millions of kilometers away from the point of initial contact.

For this reason, most space combat actually takes place in the vicinity of planets or stations where a commander can expect to find his enemy traveling at a few thousand KPH. It's simply impossible to intercept a fast-moving target in open space.

For every 10 points of delta-v between the attacker and the target, the Gamemaster may assign a 1-step penalty to attack rolls. A ship at speed 0 suffers a +5 step penalty to

hit a ship traveling at speed 50, and vice versa. That assumes, of course, that the ships somehow get within weapons range of each other in the first place.

Achieving Orbit

Sitting at the bottom of Earth's gravity well, we spend a lot of time thinking about ways to gain enough velocity to achieve orbit or escape Earth's gravitational influence altogether. It's just as tricky and takes just as much energy to *lose* enough velocity to fall into orbit for a spaceship approaching a planet from interplanetary space.

Table 4–2: Orbital Windows

Outbound	PL 7	PL 6
Achieve Orbit	1.5	30
Escape Orbit	3	60
Inbound	PL 7	PL 6
Enter Orbit	1–3	30–60
De-orbit	0–1	0–30

This means that a ship must slow down to a reasonable speed before entering orbit or attempting a landing. Reaching the vicinity of the planet you're heading toward with a speed of 300 or 400 is useless; the ship will simply sail past without a chance of making orbit, or impact the planet like a big steel meteor. Therefore, a ship has to start decelerating a long way out so that it's traveling at a manageable speed when it reaches its destination.

For example, a ship traveling at 2 AU per hour is moving at a speed of 2500. If it has an acceleration of 2, it will take that ship 1,249 rounds (about ten hours) to slow down to a speed of 2, which is pretty good for entering orbit. The end result: any ship trying to reach a particular planet is traveling at a speed of 10 to 20 when it's within 50 to 100 hexes of its destination, and it's still slowing down.

Table 4–3: Stopping Distance (Spd 10)

Acc	Hexes	Rounds
1	45 hexes	9
2	21 hexes	5
3	12 hexes	3
4	9 hexes	3
5	6 hexes	2
6	5 hexes	2

TABLE 4–3 shows how many hexes a ship traveling at a speed of 10 needs to perform a straight deceleration to a speed of 1, and how many rounds it takes. In other words, a ship with an acceleration of 2 slowing down from interplanetary travel must be at least 21 hexes from its destination when it slows to speed 10, and it will take three more rounds of deceleration to reach a speed of 1. For most battle or encounter scenarios, you can say that the arriving ship begins at speed 10 at the appropriate distance from the planet (although more cautious approaches are certainly possible).

ACCELERATION

The force of gravity at the surface of the Earth is a continuous acceleration of about 10 meters per second per second straight down. This equates to an increase of roughly 100 KPH per phase, in the standard ALTERNITY round structure. In 30-second *Warships* rounds, 1 G represents an increase in speed of roughly 1,000 kilometers per hour over 30 seconds of continuous acceleration. In other words, if you started the round flying at a speed of 120,000 kilometers per hour and accelerated at 1 G for the whole round, you're traveling at 121,000 kilometers per hour at the end of the round.

Humans can tolerate 1 G forever; we spend our entire lives pinned to the surface of the planet by this force. Unfortunately, 1G of acceleration won't get you very far in space travel unless you accelerate for a long, long time. Most spaceship engines at PL 6, 7, and 8 are capable of accelerations of dozens, hundreds, or thousands of Gs. It's remotely conceivable that fluid tanks, anticoagulants, and artificial respiration might allow a human to endure 30 or 40 Gs for a short time, but an unprotected human would die pretty quickly under such forces.

Higher accelerations would leave nothing but raspberry jam on the bulkheads–if there were bulkheads left. Most ships would tear themselves to pieces under acceleration strong enough to instantly kill a human.

Fusion Age Travel

Engine systems of Progress Level 6 create accelerations of up to 60 or 70 G, give or take. For routine travel, a Fusion Age ship does not use all of its acceleration capacity–it's much more comfortable and convenient to use a steady acceleration of 1 G or a little less, which also provides the accelerating ship with a reasonable simulation of gravity for most of the trip. In combat, however, a ship must employ accelerations that strain human and machine to their limits.

Protection from Acceleration

Accelerations of more than 2 G or so require special protective measures for a ship's passengers and crew.

Characters in normal seats or positions are *unprotected.* They may be injured or killed by extreme acceleration, but aren't at risk for damage from routine maneuvers.

Characters sealed into acceleration tanks and prepared with various drugs and mechanical devices are *protected* against acceleration. All crew stations and passenger quarters are fitted to protect their occupants; donning G-suits and preparing for extreme acceleration takes about 10 minutes (or 2 game rounds for PL 6 combat).

Effects of Acceleration

The exact effects of acceleration naturally depend on just how much acceleration you're talking about.

3 G or less (Acc 0 to 0.2): No ill effects.

3 to 9 G (Acc 0.2 to 0.5): Protected characters suffer no penalties; unprotected characters suffer a +2 step penalty to all actions.

Any character attempting to move around the ship at an acceleration of 3 G or more must attempt a Strength check. On a failure, the character suffers a short fall and sustains damage accordingly (see TABLE P15 in the ALTERNITY *Player's Handbook*).

10 to 25 G (Acc 1): Protected characters suffer no penalties. Unprotected characters can take no actions at all and must attempt an Stamina–*endurance* check each round, suffering 0, 1, 2, 3, or 4 points of stun damage for an Amazing, Good, Ordinary, or Marginal success.

26 to 40 G (Acc 2): Protected characters suffer a +2 step penalty to all actions (including all crew checks). Unprotected characters can take no actions at all and must attempt an Stamina–*endurance* check as described above at a +3 step penalty.

41 to 60 G (Acc 3): Protected characters can take no actions at all and must attempt an Stamina–*endurance* check as previously described. crew checks are still possible at a +3 step penalty (the ship's computers take over). Unprotected characters die.

61 to 90 G (Acc 4 or 5): Protected characters can take no actions at all and must attempt Stamina–*endurance* check at a +3 step penalty. crew checks are still possible at a +5 step penalty. Unprotected characters die.

91 G or more: No character survives, regardless of protection.

Starting and Stopping

Not all acceleration injuries are slow, crushing deaths. Crewmembers walking about the ship when the captain suddenly decides to begin an unannounced 20-G deceleration are liable to break arms, legs, spines, and bulkheads as they're dashed against the nearest hard surface.

Characters with no warning of the impeding change are subject to falling damage for a short fall (3 to 9 G), medium fall (10 to 25 G), long fall (26 to 40 G), or terminal fall (41 G or more). For this reason, most captains make a point of announcing maneuvers before they cut in the rockets.

Gravity Age Travel

In the Gravity, Energy, and Matter Ages, most engine systems provide compensation for acceleration or ignore acceleration altogether. These engines are hundreds of times more powerful than the fusion torches and ion engines of the Fusion Age, and there is simply no way that ordinary hulls–let alone unprotected humans–could stand up to this kind of punishment without changing the rules altogether.

At PL 7, acceleration compensators are part of basic engine design; the particle impulse and gravity induction drives are capable of thousands of gravities, but as long as the engine generates thrust, it also generates a protective field that counteracts the tremendous acceleration of the engine. The gravitic redirector of PL 8 works in much the same way.

At PL 8, the inertial flux engine functions by instantaneously altering the inertial state of all matter on board the ship at the same instant. Relative to the rest of the ship, the passengers experience no acceleration at all.

At PL 9, the spatial compressor simply annihilates distance around the ship, so that very modest accelerations produce enormous results. An outside observer might record an acceleration of ten thousand G, but inside the ship the same motion is experienced as a mild tug.

RELATIVITY

Ships moving at extremely high speeds begin to experience significant relativistic effects–time dilation, elongation, increase in mass, and other phenomena that become apparent as a ship nears the speed of light.

Most of the time, these effects are simply immeasurably small. (Heck, if you go for a walk and come back to your house, there would be some infinitesimal difference between your perfectly accurate wristwatch and your perfectly accurate wall clock.) However, spaceships are capable of traveling at speeds so high that relativistic effects can really matter.

Dilation

The amount of time dilation, increase in apparent mass, or elongation observed aboard a ship traveling near light speed is proportional to just how close it is to light speed. While a tiny but measurable amount of dilation occurs at any velocity, we'll sum up the notable breakpoints. Dilation is expressed as a ratio or multiplier, known as gamma.

Table 4–4: Gamma

Speed	AU/hour	%C	g
100	0.18	1.1%	1.0003
1250	1.0	14%	1.01
2500	2.0	28%	1.04
3750	3.0	42%	1.1
5000	4.0	56%	1.2
6250	5.0	70%	1.4
7500	6.0	83%	1.8
8100	6.5	90%	2.3
8730	7.0	97%	3.9
8829	7.1	98.1%	5.1
8999	7.239	99.99%	60.2
9000	7.24	100%	inf

For example, gamma is 1.4 for a ship moving at 70 per-

cent lightspeed (or 5 AU per hour). If the ship travels for 10 hours at that rate, only 7.1 hours pass on board the ship (10 divided by 1.4 is 7.1). At 97 percent lightspeed (7 AU per hour) passengers on board the ship experience only 2.6 hours compared to the 10 hours that pass outside. It's theoretically possible for a ship to approach the speed of light so closely that millions of years would pass outside, while only hours passed inside.

Gamma also affects a ship's acceleration value. Since acceleration represents how much thrust the engines produce compared to the mass of the ship, you could reduce the ship's acceleration by the ratio. For example, a ship with an acceleration of 3 is traveling at a speed of 8,100 megameters per round (90 percent lightspeed). Normally the ship could increase its speed by 3 per round, but its current velocity reduces its acceleration to 1.3 (3 divided by 2.3 is 1.3). If the ship hits 97 percent lightspeed (gamma 3.9), its acceleration of 3 would be reduced to 0.76. Eventually, its acceleration becomes infinitesimal.

Time and Space

The dilation effect of extreme velocity poses some interesting questions for space travelers, especially in a game universe where true faster-than-light travel is not possible but high-gamma relativistic travel is possible. Imagine a ship whose power plant and engines are powerful enough to accelerate to 99.99 percent lightspeed within a few hours of launch. It doesn't have an FTL drive and can't break the lightspeed barrier—but travelers on board that ship will feel like they did!

Let's say that the spaceship is traveling from Earth to Tau Ceti, a Sol-like star about twenty light years from Earth. If the ship traveled exactly at the speed of light, it would take twenty years to make the trip. But the ship can't reach light speed; nothing in the universe can. Instead, the ship reaches a speed of 99.99 percent lightspeed. At a dilation ratio of 60.2, the twenty-year voyage would take about 120 days. At a gamma of 600 (call it 99.999 percent lightspeed), the trip would take about 12 days of shipboard time. Twenty years pass in the universal frame of reference for only 12 days inside the ship.

What would this mean? If you're talking about alien worlds with little or no contact with each other, surprisingly little. Each time the heroes visit a new system, the rest of the universe gets a little older, but they're only passing a few short weeks. Back home, friends and family live decades that their spacefaring loved ones don't experience. Bank accounts and mutual fund accumulate years and years of interest. Society changes, grows, perhaps becomes unrecognizable to the traveler who returns after a trip of four or five decades that she experienced as less than a year. But as long as each new planet she visits isn't home (or someplace that can affect or be affected by her homeworld) the time dilation means little to her.

Even if the traveler journeys between worlds in close contact with each other, relativistic travel wouldn't mean much in a large but static galactic society. If nothing really changes over time other than the fact that your acquaintances get older and you get richer, you might not mind missing centuries of history as you journey from world to world. It's possible that spacefarers might form a distinctive sub-culture or segment of society, rootless vagabonds admired, pitied, or even reviled by the people they serve.

The most difficult scenario is the middle case—worlds in close contact that are *not* static, where society advances and technology increases immeasurably each time the heroes get off the boat in a new place. They grow more and more antiquated as centuries and millennia spin by them, one day finding that their world is nothing like the world they knew only a few weeks or months ago in their own time.

What Is the Speed of Light?

In case you were wondering, the speed of light is about 300,000 kilometers per second...roughly one billion kilometers per hour. If you're maneuvering a ship on the megameter scale, a ship moving at the speed of light would travel 9 million kilometers—or 9,000 megameters—per round.

Most of the PL 7 or better engine systems described in this book have enough power to quickly reach this speed through constant acceleration. A ship with an acceleration of 3 could reach lightspeed in 3,000 rounds, or about 25 hours. But it doesn't work this way. Relativity rears its ugly head.

As a ship accelerates toward lightspeed, its extreme velocity begins to cause dilation effects. In effect, as its velocity approaches the speed of light, its mass approaches infinity. This means that it's impossible to reach the speed of light through simple acceleration, no matter how good an engine you have at your disposal.

You can't accelerate to the speed of light, but you might go faster than light by means of a drive or device that takes you from one star to another star faster than light could actually travel the same distance.

3D Combat

The ship combat rules presented in the first two chapters depict combat as a two-dimensional confrontation. Frankly, this is a gross simplification made for the purpose of keeping game play fast-moving and fun. If this strikes you as *too* simple, read on.

Adding the z-axis to your game doesn't materially affect most of the steps in the sequence of play. The two places where three-dimensional positioning and movement matter are in the movement phase and the fire phase.

3D Position

Since each hexagon on the mapsheet represents a megameter (1,000 kilometers), we'll arbitrarily divide a ship's altitude above or below the plane represented by the mapsheet into 1,000-kilometer increments too. Think of the bat-

tlefield as a stack of identical mapsheets set 1 hex width apart, with one mapsheet in the middle of the stack actually functioning as the reference level for all the others. The reference level or zero-level is the mapsheet you have spread out on your table to play out a ship combat, and a ship is either above or below this reference level by some number of megameters.

Indicating Elevation

You might try small poker chips or tokens placed under the ship miniature or counter as a method for indicating altitude. Use white chips to indicate elevation above the reference map–a miniature with six white chips under it is actually 6 MM above the reference level. Red chips indicate a position "under" the map in the exact same way.

You could also construct a clip stand scaled to your own map and miniatures. Clip stands are used for some dogfighting games–it's a heavy hexagonal base that marks where the plane is on the map, while the plane itself is moved up or down a rod or dowel standing up from the base and marked in altitude increments.

Counting Range

To determine the range between two ships at different levels, you'll need to do a little math. First count the horizontal distance, as indicated by the hexes separating the two markers. Then, count the vertical distance indicated by their chips. For example, a ship at elevation +6 MM and a ship at +2 MM are separated by a vertical distance of 4 megameters.

Now, square the horizontal distance, square the vertical distance, and add them together. The actual distance between them is the square root of the sum. You're solving for the length of a right angle's hypotenuse. Pythagoras put it a little better: $x^2 + y^2 = z^2$, where x is the horizontal distance, y is the vertical distance, and z is the "slant range" directly between the two points.

Slant range = Square root of $(x^2 + y^2)$

Let's say that the two ships above happen to be 7 hexes away from each other horizontally, and 4 hexes away from each other vertically:

Range = Square root of $7^2 + 4^2$
Range = Square root of 49 + 16
Range = Square root of 65
Range = 8.06 (round down to 8)

If the first ship fired on the second ship with no vertical separation at all, the range would be 7 hexes. But the 4-hex vertical difference increases the actual range of the attack to 8 hexes.

3D Movement

Obviously, moving in a three-dimensional battlefield requires rules for gaining or losing elevation. We'll handle this in the simplest manner possible, by expanding the maneuvers available to a commander. (See "Maneuvers" in *Chapter 1: Basic Combat*.)

Climb or Dive

When a ship performs a climb or dive maneuver, it allocates some of its horizontal speed into vertical movement. Although it's not perfectly accurate, we'll simply say that this allows the commander to split his ship's movement into a horizontal and a vertical component. For example, a ship with a speed of 4 dives; the captain could move 3 hexes forward and 1 hex down, 2 hexes forward and 2 hexes down, or 1 hex forward and 3 hexes down. The climb or dive ends at the end of the ship's current movement, although it could certainly climb or dive again in following rounds.

Realistically, the ship could actually designate a new climb rate or dive rate as a default part of its "straight" movement. However, for the sake of ease of play, we'll say that a ship completes its climb or dive in one round of movement, and climbs or dives again if it wants to keep gaining or losing elevation.

Roll

The roll maneuver allows a ship to "sideslip" one hex as it moves forward. In the 3D movement system, a ship may use a roll to either gain or lose 1 megameter of elevation. It's really the same thing as a 1-hex climb or dive, but the cinematics are a little different.

Turn and Loop

When a ship performs this maneuver, it *must* gain or lose one megameter of elevation.

3D Fire

The major consideration for weapons fire in a 3D combat system is how elevation affects arcs of fire. The principal arcs of fire defined in *Chapter 1: Basic Combat* gain a new component in 3D combat–*target aspect.* (The zero arc ignores attitude rules.)

Target Aspect

A potential target may be in one of three possible aspects toward the attacking ship: *high, flat,* or *low.*

Flat: The horizontal separation between the firing ship and the target is greater than or equal to the vertical separation. For example, a ship 5 hexes away on the mapsheet and only 3 hexes lower than the firing ship is a flat shot. A ship may fire normally on a target with a flat aspect.

High: The vertical separation exceeds the horizontal separation, and the target has a higher elevation than the firing ship. The firing ship can't attack the target unless it has weapons that can fire into the high arc or it maneuvers to change its own attitude.

Low: The vertical separation exceeds the horizontal separation, and the target ship has a lower elevation than the firing ship. The firing ship can't attack unless it has weapons that can fire into the low arc or it maneuvers to change its own attitude.

Attitude

This term describes the general orientation of the firing ship to its target. Is it level, climbing, or diving? A climbing ship can shoot flat and still hit an enemy target that would otherwise be in the high arc; the target isn't really *over* the firing ship if the firing ship is heading toward it straight-on.

It should be difficult but possible for a ship to perform minor attitude adjustments or spins to freely face in any orientation for a shot. However, for the purposes of game play we'll say that a ship must spend most of the game round pointing in the right direction to shoot. In other words, a ship can't ignore firing arcs by simply spinning left, right, up, and down as it moves.

Level: The firing ship did not make a maneuver that changed its elevation during the most recent movement phase. Weapons firing into all standard arcs may only fire on targets with a flat aspect.

Climbing: The firing ship gained elevation in the last movement phase. In its forward arc of fire, a climbing ship may fire on targets with a flat or high aspect, and in its aft arc of fire, the ship may fire on ships with a flat or low aspect. Weapons firing into other arcs can only fire on flat-aspect targets.

Diving: The firing ship lost elevation in the last movement phase. In its forward arc of fire, a diving ship may fire on targets with a flat or low aspect. In its aft arc of fire, the ship may fire on targets with a flat or high aspect. Weapons firing into other arcs may only fire on flat-aspect targets.

High and Low Arcs

In 3D combat, two new firing arcs are added to the six standard arcs (forward, aft, starboard, port, zero-starboard, and zero-port): the high and low arcs.

The high arc is defined as any hex whose vertical separation is at least one hex more than its horizontal separation. For example, an External cruiser that is exactly one hex higher than a Concord battleship but occupies the same horizontal hex would be in the battleship's high firing arc. Similarly, if the enemy ship was located in a hex five megameters higher and only two hexes distant horizontally, it would also be in the high arc.

The low arc is exactly like the high arc, but in reverse. In the example above, the Concord battleship would be located in the External cruiser's low arc.

Weapon Firing Arcs: The high and low firing arcs are treated exactly like the other standard arcs for purposes of ship construction and designating arcs of fire for weapons. For example, a turret normally permits three firing arcs, so a ship designer could designate those as the forward, port, and high arcs (a wing turret portside), or maybe the port, starboard, and low arcs (a belly turret midships).

Universal Turrets: A weapon turret can fire into *four* arcs if it's designated as a universal turret. One of the arcs must be high or low; the costs is an additional 25% cost and space above and beyond a standard turret. In other words, a standard turret requires an additional 25% cost and space, and a universal turret requires an additional 50% cost and space beyond that of a standard mount for the same weapon. See *Chapter 5: Ship Construction*.

CHAPTER 5: SHIP CONSTRUCTION

Designing a large spaceship is one of the most technically challenging feats a civilization, nation, or private enterprise ever faces. Dozens of vital engineering systems from the ship's drives to its life support systems require extensive, thorough, and complete planning. Navigation, communication, and sensor systems made up of thousands of distinct components and incredibly complex software must be installed, tested, and calibrated. Systems particular to the ship's mission and role—weapons, hangars, cargo transfer systems, scientific instrumentation, and so on—require the same degree of care and attention. Finally, a crew must be assembled and trained in the operation of the tremendously complex piece of machinery with which they are entrusted. The entire process takes many months, and sometimes years.

Fortunately, we don't have to concern ourselves with the exacting minutiae of spaceship design. For the purposes of this book, ship design basically boils down to a process of resource allocation. Given the constraints imposed by the selection of a particular hull, what is the best combination of firepower, sensor capability, maneuverability, and defense for that ship and its mission? There's no such thing as the perfect ship; a cruiser that has the armament, armor, and speed you think you need is probably going to end up being much bigger than you thought it was going to when you decided to design a light cruiser.

SHIP DESIGN CHECKLIST

Here's a quick checklist of how you go about designing a large ship with the rules in this chapter. The steps titled in italics are mandatory for any ship, regardless of its mission or armament; other steps may be skipped, depending on what kind of ship you're building and the technology level of your setting.

1. *Class and Hull Selection*
2. Armor
3. *Power Plant and Fuel*
4. *Engines*
5. FTL Drive
6. *Support Systems*
7. Weapons
8. Defensive Systems
9. *Command and Computers*
10. *Sensors and Fire Control*
11. Hangars and Small Craft
12. Miscellaneous Installations
13. *Adding it up*

Preparation

It goes without saying, but the first thing you need to do is decide why you're building this ship and what parameters you're going to observe in the construction process. You should also decide what Progress Level and tech track you're building this ship for; obviously, high-PL ships will have access to more compact and powerful equipment than low-PL ships.

Class and Hull

The second step in designing a ship is to decide, in general terms, what hull size and type is going to best serve your purposes and budget. The hull is the single most expensive component of the ship construction process, but it serves as a framework into which you can plug all the weapons and systems you'll need for your ship to perform its basic mission.

Choosing a hull provides one of the first resources you'll need for ship construction: Hull Points.

Armor

The ship's primary defenses against enemy damage are its size and compartmentation. This is reflected by the ship's damage track and by its toughness, or resistance to enemy fire. The next line of defense is armor. Armor negates some of the damage from each weapon that strikes the ship. It's a good idea to decide on the type and weight of your ship's armor at this point, since armor takes up some percentage of your ship's total hull points.

Power Plant

With a few exceptions, any spaceship must have the ability to generate power for its engines, weapons, sensors, and other critical components. Depending on the exact technology available to the shipbuilder, the power plant may require some kind of bulky and expendable fuel supply.

Helpful Hint

We've organized this chapter so you can build a ship by simply proceeding in order with the ship construction process. In other words, first you'll pick a hull, then you'll decide on your armor, pick a power system, and so on. You may find it useful to work on a piece of scrap paper or spreadsheet before you fill in a ship record sheet for your newly designed spaceship.

Make sure you don't forget:

- A hull (Table 5–1);
- A power plant, with fuel if necessary (Table 5–3);
- An engine, with fuel if necessary (Table 5–4);
- Accommodations for the crew (Table 5–6);
- A life support system for all critical spaces (Table 5–6);
- A command deck or cockpit (Table 5–13);
- A communication system of some kind (Table 5–13);
- A sensor system of some kind (Table 5–14).

Everything else is optional, but these systems are the bare minimum necessary to build a spacegoing vessel. .

Engines

Engines translate a ship's power into movement in normal space. Some engines, such as chemical rockets or photon sails, operate with little or no relation to the ship's power plant. Most high-tech engines rely on a ship's ability to generate massive amounts of energy.

FTL Drive

The acronym 'FTL' stands for faster-than-light. If you want your spaceship to be a *starship,* you'll want to select an FTL drive and install it in your hull. Generally, only one or two FTL techniques work in any given set of sci-fi assumptions, so make sure you check with your Gamemaster or fellow players before deciding on a FTL system that may be available in your game.

Support Systems

The support systems "finish off" the engineering part of ship design with life support, recycling, and other critical systems. It's a very good idea to purchase some life support for your ship. Crew and troop accommodations are included in this step. Highly automated ships at high Progress Levels (and many civilian ships at any PL) require minimal crews. Assault ships, with their extensive troop lift capacity, must reserve a great deal of space for troop berthing.

Weapons

Choose the weapon systems you wish to install in the ship. There are five categories of weapons: beams, projectiles, missiles, and torpedoes, and special weapons. As with FTL travel, some types of weapon border on the fantastic and may not be appropriate for your game.

Defensive Systems

Unlike armor, which is based on a percentage of the hull, defensive systems require power and some specific number of hull points. Defensive systems include shields, countermeasures, damage control installations, and special defenses.

Command and Control

This is the brain of the spaceship. How well can it gather, process, and utilize information? These systems include communications, command facilities, and—most importantly—the ship's main computer.

Sensors

In this step, you should build the ship's sensor suite and fire control systems. Detecting targets hundreds of thousands of kilometers away and effectively bringing the ship's weaponry to bear require extensive sensor systems.

Hangars and Small Craft

Carriers and assault ships rely completely on their complement of small craft. In this step, you'll decide how much of your spaceship is devoted to the storage, maintenance, and deployment of smaller craft.

Miscellaneous

A number of special capabilities are included in this catch-all category. The most common miscellaneous system is a ship's cargo capacity. Not all cargo ships are civilian vessels; assault ships need to carry vast amounts of military equipment to support their troops planetside.

Adding It Up

There are three main commodities you'll need to keep track of throughout the ship design process: hull points, money, and power points. Hull points represent the sheer size of the hull and the systems you want to install therein. If the systems you install total too many hull points for your hull, you'll have to reevaluate your design choices. Money may or may not be a consideration for your campaign, but it's a good gauge of how much ship you're trying to build and what kind of resources are necessary to manufacture it. Finally, many of your ship's most important systems demand a source of power; you need to ensure that the ship's power plant is sufficient to power the installed systems.

Assign Systems and Create Record Sheet

Assuming that everything adds up, the last step of creating a ship is to create its damage diagram and fill in a permanent record form so that you don't lose all your hard work.

TECHNOLOGY

Before you begin building your ship, you should decide what Progress Level and technology types are appropriate for your campaign. It's entirely possible for a campaign to feature a variety of Progress Levels; some navies might be constructed using the latest PL 9 technology, while others might be barely spaceworthy PL 6 fleets, limited to the defense of their own home systems. It's not fair, but sometimes PL 6 societies wind up fighting against more advanced societies.

In addition to the question of the overall technological level of a society, some cultures or races may specialize in certain types of related technologies. For example, control of gravity not only provides some outstanding engine systems, but it also leads to some sophisticated weaponry and defenses too. These related technologies are described by the "tech track" system, which codes each starship system based on its parent technology.

Progress Level

Progress Level is an abstract measurement of the technological capability of a planet or civilization. It's a pretty good indication of how effective ship systems are likely to be; in general, a PL 7 engine is significantly better than a comparable PL 6 engine, a PL 7 weapon is better than a PL 6 weapon, and so on. The Progress Levels available for ship construction are:

PL 5 (Information Age): The first space vessels become possible. This is the "real-world" technology level. Spacegoing warships and viable interplanetary travel are still decades away, so PL 5 is not supported by these ship construction rules.

PL 6 (Fusion Age): Fusion power offers cheap, clean, and plentiful energy, making interplanetary travel practical and affordable. Fusion Age ships can be effective warships, but most of the designer's time and effort goes toward creating a ship that can survive and maneuver in space; weaponry is almost an afterthought.

PL 7 (Gravity Age): Control of gravity and mastery of faster-than-light (FTL) travel make interplanetary flight a routine matter, and interstellar travel cheap and easy. This is the beginning of the classic space opera technology. The Basic Rules assume PL 7 as the default for most games.

PL 8 (Energy Age): Technologies capable of harnessing the most fundamental structures of the universe come into existence. Warships are capable of spanning dozens or hundreds of light-years in a matter of days. The advent of shield technologies make power, not weaponry, the key to a successful warship design.

PL 9 (Matter Age): Extensive control over the very nature of the universe makes impossible feats routine. Some PL 9 technologies are included in case you want to design ships for a race or society with a special edge, but this level of technology generally exceeds the limits of classic space opera.

Tech Tracks in Star*Drive

If you're playing a game based on the STAR*DRIVE Campaign Setting, here's how the technology tracks break down by the major races. All listed technologies are PL 7 unless otherwise noted.

Human: Gravity Manipulation, Dark Matter Tech, Fusion Tech, Quantum Manipulation, Super-materials, Computer Tech
Fraal: Gravity Manipulation (at PL 8), Dark Matter Tech (at PL 6), Fusion Tech, Quantum Manipulation, Psi-Tech (except psychoportive drive), Computer Tech
Mechalus: Antimatter Tech, Fusion Tech, Super-materials (at PL 8), Computer Tech (at PL 8)
T'sa: Fusion Tech, Quantum Manipulation (at PL 6), Super-materials, Computer Tech
Kroath: Gravity Manipulation (at PL 6), Dark Matter Tech (at PL 8), Fusion Tech, Super-materials, Computer Tech, and symbiotic hulls
N'sss: Gravity Manipulation, Dark Matter Tech (at PL 8), Fusion Tech (at PL 8), Super-materials (at PL 8)
Klicks: Gravity Manipulation (at PL 6), Dark Matter Tech (at PL 8), Fusion Tech, and symbiotic hulls
Medurr: Gravity Manipulation, Fusion Tech, Quantum Manipulation (at PL 8), Matter Transmission, Super-materials, Computer Tech (at PL 6)

Tech Track

Not every society will develop every technology available in the following system descriptions. While a hull of almost any size can be handled by any spacefaring race, not every culture is going to master artificial gravity, or energy fields, or antimatter-based power generation. The tech track describes certain suites of technology that fit together; for example, gravity tech makes possible artificial gravity, gravity-based weaponry such as the mass cannon, gravity induction engines, and the stardrive.

Each ship system described in the rest of this chapter may include a tech track code, indicating the type of technology that must be available to make use of that system. If no code appears, the technology is so basic that *any* spacefaring race, regardless of technological expertise, can build ships incorporating that system. Note that it's quite possible for a particular race or culture to possess more than one of these technology tracks, possibly at different Progress Levels. For instance, an alien empire might have Gravity Manipulation at PL 7, Dark Matter Tech at PL 8, and Matter Coding at PL 6. (Unless otherwise stated, assume that most cultures have all technologies at the same PL.)

The technology tracks are:

Gravity Manipulation (G): The ability to create, project, and control fields of artificial gravity or negate the effects of naturally occurring gravity.

Dark Matter Tech (D): We know of four fundamental forces in the universe: gravity, electromagnetics, the weak nuclear force, and the strong nuclear force. For purposes of the ALTERNITY game, we're assuming some tiny portion of the unseen mass that comprises 90 percent of the universe is comprised of a different kind of matter through which a fifth fundamental force can be harnessed. The decay of dark matter into "normal" matter releases immense amounts of energy, and a civilization with this technology can harness it to create mass reactors and weapons of tremendous power.

Antimatter Tech (A): The efficient manufacture and storage of antimatter makes a number of high-energy power and weapon systems practical.

Matter Coding (M): How does a particle "know" how to be a particle? How does it "know" how to interact with other particles? This technology is based on the principle that subatomic matter may operate under a kind of universal coding system that can be unraveled and manipulated to make matter behave as desired.

Fusion Tech (F): It's possible to create fusion reactions with our current technology–the H-bomb is a great example. Harnessing the power of fusion in safe, economical, and self-sustaining power plants is the next big step in the energy revolution.

Quantum Manipulation (Q): Quantum Manipulation technology is based on the understanding of the forces that control the interactions of the various subatomic particles. The tantalizing quantum-fluctuation (or zero-point) energy source represents the ultimate goal of this line of inquiry.

Matter Transmission (T): A civilization with this technology has mastered the teleportation of matter from one point to another. Naturally, this has a number of military and commercial applications.

Super-Materials (S): Materials technology is crucial to the design of hull and armor systems in the future. Ranging from tough composites to monofilaments and artificial materials in which every atom has been nanoengineered for maximum strength, advanced materials make incredibly strong hulls possible.

Psi-tech (P): Technology that harnesses the power of thought, psi-tech allows a civilization to change reality with willpower and superior mental skill.

Energy Transformation (X): Energy Transformation is nothing less than the ability to control the manifestation of matter and energy. A tiny amount of matter can be transformed into an incredible amount of energy. At the higher progress levels, this technology provides the ability to actually change the type of energy.

Computer Tech (C): While any spacefaring civilization will possess some amount of computing technology, extremely sophisticated nanotechnologies, sensors, and control systems fall under this category.

Step 1: Class and Hull

The first step in building a starship is selecting a ship class and an appropriate hull type. For our purposes, a class is simply a very broad measurement of the ship's general size, toughness, and firepower, while a hull is a fairly specific beginning point for the shipbuilding process.

Class

Ship classes include small craft, light, medium, heavy, and super-heavy. Each of these broad classes includes a number of specific hull types that you may choose from. For example, medium ships include the light cruiser, heavy cruiser, and the armored cruiser.

Small Craft

The smallest warships are, of course, fighters and other small craft. Typically, these ships are small enough to be carried aboard medium or heavy vessels; a battleship will frequently carry several launches or scouts, while a true carrier may embark hundreds of fighters and strike ships. Note that *formation combat* rules may be used in place of individual controlling the movement and attacks of each fighter involved in a squadron-sized battle; see *Chapter 1: Basic Combat* for details.

What's a Class, Really?

A class of ships consists of all the ships built to a common plan. Although some of the ships may be modified from this baseline later, they're essentially identical in all important details. For example, the U.S. Navy currently operates two major classes of destroyers: the Spruance-class ASW destroyers, and the *Arleigh Burke*-class Aegis destroyers. There are several advantages to finding a plan that works and then sticking to it; the cost per unit drops dramatically when you don't have to come up with new plans, systems, and manufacturing processes for each new ship you build. In addition, crew training and tactical doctrines can be applied more easily to lots of different ships instead of one at a time.

Typically, an enemy observer can identify the class of a particular warship by its visual profile or its sensor and weapon suite, but unless he has access to some kind of intelligence information, the exact identity of the ship is rarely obvious. In other words, it's pretty easy to identify a *Spruance*-class destroyer, but much harder to figure out that the ship in question is the *Foster*, *Hayler*, or *O'Bannon*.

Light Ships

Ranging from light freighters and attack ships on up to destroyer leaders, light ships are usually too big to be carried aboard other vessels. Ships such as corvettes and destroyers are the most numerous true warships; a planetary fleet may include hundreds of these vessels.

Medium Ships

Cruisers, light carriers, and large merchantmen are common medium ships. They screen heavy and super-heavy vessels, and are capable of executing detached operations for extended periods of time.

Heavy Ships

A heavy ship such as a battleship or fleet carrier is a national investment. One or two serve as the centerpieces of most task forces and operational groups; more than a dozen in the same place at the same time represents an overwhelming amount of force—a sector fleet ready for a major engagement.

Super-Heavy Ships

Not every game will feature super-heavy ships; these titans are each a fleet in themselves, carrying dozens or hundreds of small craft and mounting weaponry that can destroy a heavy cruiser in one hit. Be warned: building a super-heavy ship can take a long time!

Hull Selection

Choose the hull type you want to use for your spaceship. While we've attached some very specific names to these hull types, there's no reason you couldn't design any kind

of ship using any kind of hull. For example, if you want to design a destroyer-sized ship that embarks a single flight of four strike fighters, you could choose a destroyer hull despite the fact that you're building a "mini-carrier". Similarly, a heavy cruiser hull might be used to build a survey cruiser, a fast freighter, a command ship, or an orbital assault ship. The name is simply a placeholder.

Launch

This is a boat, pinnace, or gig designed to simply move small amounts of people from one point to another. They're rarely armed or armored.

Courier

The courier is a more robust ship capable of extended operation away from its base. Few are drive-capable.

Trader

The smallest common commercial hull, the trader (or tradesman) generally carries a mix of small, high-value loads, personnel, and information or mail.

Fighter

Designed for action against other small craft, fighters lack the punch to be very effective against large targets unless they've been designed to carry bombs or torpedoes.

Strike Fighter

Also known as the heavy fighter, the strike fighter is usually armed with a bomb or torpedo capable of seriously damaging a large warship or tough ground target. It may or may not be equipped with weapons suitable for defending itself against enemy fighters.

Cutter

Many system patrol craft or police vessels fall into this category. The cutter is rarely drive-capable. Note that a military ground assault ship might fall into this hull size.

Scout

The largest small craft, a scout is designed to cover space and locate enemies without engaging in serious combat. A scoutship is 40 to 50 meters long and masses 100 to 200 tons.

Fast Freighter

Fast freighters are a commercial hull generally employed in small, frequent runs, such as carrying supplies to small outposts and bases. The fast freighter usually carries some minor defensive armament.

Fast Transport

Designed to carry small amounts of high-bulk cargo such as heavy machinery or vehicles, the fast transport sees service in the same kind of work as the fast freighter.

Hauler

The hauler is a spacegoing tug that drags heavy, nonpowered loads and modules. Most haulers are fitted with big power plants and huge engines, at the expense of cargo capacity and crew quarters.

Industrial

Industrial ships include a mining ship, mobile outpost, or similar vessel intended to carry very specialized machinery for a specific mission. Industrial hulls are rarely armed.

Escort

Escorts are a long-endurance patrol craft employed for a variety of duties, including the protection of merchant shipping and remote bases. A typical escort ship is about 50 to 70 meters long and weighs 1,000 tons. A crew of 30 to 40 is normal, although a handful could operate the ship for a short time. Gunboats or missile boats could fall into this category.

Corvette

Basically a larger version of the escort ship, the corvette serves as both a gunboat and fleet escort. These are the smallest military vessels expected to operate independently in wartime.

Frigate

A military vessel used for scouting and escort duties, the frigate is primarily intended to screen larger vessels against small craft attack. A frigate is roughly 100 to 120 meters long and weighs about 2,000 to 3,000 tons, carrying a crew of about 100 men and women.

Destroyer

Destroyers take their name from the torpedo-boat destroyers of the late 19th century. They're integral to the defense of a task force, screening it against small craft and attack ships. Destroyers are often armed with a one- or two-shot weapons useful against much larger ships. A destroyer is usually about 150 to 200 meters long and masses about 8,000 metric tons. It carries a crew of 150 to 200.

Table 5-1a: Military Hulls

Hull Type	Hull Pts.	5%	10%	Tough	Target	Mvr	s	w	m	c	Crew	Cost
Small Craft												
Fighter	10	0.5	1	Sm	+3 steps	4	5	5	3	2	1	$350 K
Strike fighter	15	1	1.5	Sm	+3 steps	4	8	8	4	2	2	$500 K
Cutter	20	1	2	Sm	+2 steps	4	10	10	5	3	4	$600 K
Scout	30	1.5	3	Sm	+2 steps	4	15	15	8	4	6	$800 K
Escort	40	2	4	Sm	+2 steps	4	20	20	10	5	10	$1 M
Light Ships												
Corvette	80 (+8)	4	8	Lt	+1 step	3	20	20	10	5	20	$5 M
Frigate	120 (+12)	6	12	Lt	+1 step	3	30	30	15	8	60	$15 M
Destroyer	160 (+16)	8	16	Lt	+1 step	3	40	40	20	10	80	$30 M
Medium Ships												
Light cruiser	320 (+64)	16	32	Md	0	2	40	40	20	10	240	$50 M
Heavy cruiser	400 (+80)	20	40	Md	0	2	45	45	23	12	300	$100 M
Armored cruiser	480 (+96)	24	48	Md	-1 step	2	60	60	30	15	360	$200 M
Heavy Ships												
Battlecruiser	960 (+288)	48	96	Hv	-2 steps	1	60	60	30	15	960	$500 M
Battleship	1200 (+360)	60	120	Hv	-2 steps	1	75	75	38	19	1200	$1000 M
Fleet carrier	1600 (+480)	80	160	Hv	-3 steps	1	100	100	50	25	1600	$1500 M
Super-heavy Ships												
Dreadnought	3200 (+1600)	160	320	SHv	-3 steps	1	100	100	50	25	3200	$2000 M
Super-carrier	4000 (+2000)	200	400	SHv	-4 steps	1	125	125	63	32	4000	$4000 M
Super-dread.	6400 (+3200)	320	640	SHv	-5 steps	1	200	200	100	50	6400	$10000 M
Fortress ship	12000 (+6000)	600	1200	SHv	-5 steps	1	375	375	188	94	12000	$50000 M

Table 5-1b: Civilian Hulls

Hull Type	Hull Pts.	5%	10%	Tough	Target	Mvr	s	w	m	c	Crew	Cost
Small Craft												
Launch	8	0.5	1	(Gd)	+3 steps	4	4	4	2	1	2	$300 K
Courier	16	1	1.5	(Gd)	+2 steps	4	8	8	4	2	4	$400 K
Trader	24	1	2	(Gd)	+2 steps	4	12	12	6	3	6	$500 K
Fast freighter	32	1.5	3	Sm	+2 steps	4	16	16	8	4	8	$600 K
Fast transport	40	2	4	Sm	+2 steps	4	20	20	10	5	10	$800 K
Light Ships												
Hauler	72 (+7)	3	7	Sm	+1 step	3	18	18	9	5	18	$1 M
Industrial	96 (+10)	5	10	Sm	+1 step	3	24	24	12	6	24	$2 M
Medium Ships												
Medium freighter	240 (+48)	12	24	Lt	0	2	30	30	15	8	30	$20 M
Clipper	360 (+72)	18	36	Lt	0	2	45	45	23	12	360	$40 M
Medium transport	480 (+96)	24	48	Lt	-1 step	2	60	60	30	15	60	$60 M
Heavy Ships												
Tanker	720 (+216)	36	72	Md	-1 step	1	45	45	23	12	90	$100 M
Liner	840 (+252)	42	84	Md	-1 step	1	53	53	27	14	840	$150 M
Heavy transport	1280 (+384)	64	128	Md	-2 steps	1	80	80	40	20	160	$200 M
Super-heavy Ships												
Super-freighter	2400 (+1200)	120	240	Hv	-3 steps	0	75	75	38	19	300	$400 M
Colony transport	3600 (+1800)	180	360	Hv	-4 steps	0	113	113	57	29	3600	$1000 M

Hull Points: The number of hull points available in this type, representing its capacity for installing systems. The first number is the basic hull point total, the number in parenthesis is the bonus hull point total.

Tough: The ship's toughness rating. Note that some ships have Good toughness, one step less than Small Craft.

Target: The ship's basic resistance modifier to enemy fire, based on its size and maneuverability.

Maneuver: The ship's maneuverability class.

5% and 10%: This is the number of hull points a system requiring 5 or 10 percent of the hull requires. This information is simply a shortcut to save you time and effort.

S, W, M, C: The ship's Stun, Wound, Mortal, and Critical damage tracks.

Crew: For information purposes only, a general estimate of how many crewmen a typical ship of this type carries.

Cost: The cost of the hull, in credits, Concord dollars, or the appropriate currency for your campaign.

Medium Freighter

The medium freighter usually carries containerized cargo. Most operate in regular runs between densely populated systems.

Clipper

This is a small liner or personnel transport intended for passenger use, not heavy cargo. Many clippers are fitted with top-notch engines for the best possible speed.

Medium Transport

Medium transports are similar to medium freighters, but they are fitted for specialized cargoes such as vehicle decks, liquid or gas tanks, or bulk holds.

Light Cruiser

The light cruiser is a warship that serves several roles. It may be part of a task force, escorting capital ships; it may operate independently as a scout and raider; and finally, it may serve in diplomatic and scientific tasks. Light cruisers frequently have an outstanding endurance and can operate with little or no base support for months on end. An escort carrier or assault transport could be built on a light cruiser hull.

Heavy Cruiser

Generally considered the smallest capital ship, a heavy cruiser is a serious warship. It can outfight anything it can catch, and outrun anything it can't outfight. A typical heavy cruiser is about 250 to 300 meters in length and masses about 50,000 metric tons. It carries a crew of 500 to 1,000.

Armored Cruiser

These vessels often serve as the centerpiece of a raiding or patrolling task force, especially if heavier warships are in short supply. Many armored cruisers are configured for task force command functions; the command cruiser is a fairly common variant of this hull type. A light carrier or assault carrier could easily fit into a ship of this hull type.

Tanker

A large civilian hull intended for the transport of large quantities of gases or liquids. While other forms of cargo storage may be installed, most ships of this size carry water, hydrogen, petrochemicals, or oxygen.

Liner

This is a full-sized passenger ship. While any vessel this size must carry some cargo, the liner specializes in moving a large number of passengers, usually in some degree of luxury. A liner is about 400 meters in length and weighs in at 60,000 to 90,000 tons. The crew numbers about 200, not counting the hotel and restaurant staff, which might be as many as 1,000 more.

Heavy Transport

The heavy transport is designed to move a huge amount of specialized cargo such as bulk freight, containerized freight, or roll-on/roll-off vehicle storage.

Battlecruiser

The battlecruiser is a formidable warship that sacrifices weight of armor in exchange for speed. Its heavy weapons can make short work of any smaller vessel, and it can usually outrun anything big enough to stand up to it in a fair fight.

Battleship

The mainstay of many stellar navies, the battleship is heavily armed and armored, although not very maneuverable. Battleships serve as the backbone of any battle fleet. The average battleship is roughly 400 to 500 meters in length and masses about 150,000 tons, with a crew of about 2,000 men and women.

Fleet Carrier

Designed to carry large numbers of strike craft and interceptors, the fleet carrier has the ability to launch devastating attacks from millions of kilometers away. Most are very lightly armed, relying on their escorting vessels to defend them against attack.

Super-Freighter

The largest ships built for routine commercial purposes, the super-freighter can be fitted with tanks or other specialized cargo facilities to make it into a super-tanker or super-transport.

Colony Transport

This colossal ship is designed to haul everything a new colony needs to a new star system. Thousands upon thousands of colonists with heavy machinery, prefabricated buildings, equipment, and supplies can fit within its cavernous storage decks.

Dreadnought

The mightiest ships found in the battle lines of a stellar navy, dreadnoughts are titans armed with awesome firepower and impregnable defenses. A dreadnought is around

800 to 1,200 meters long and weighs about 600,000 to 1,000,000 tons. Typically, a crew of 4,000 to 5,000 is required.

Super-Carrier

Like the fleet carrier, the super-carrier is designed specifically to operate large numbers of small craft. A super-carrier might have an air wing of 200 to 300 interceptors and strike craft.

Super-Dreadnought

Sometimes found serving as fleet command ships or flagships, the super-dreadnought is roughly twice the size of its smaller namesake.

Fortress Ship

The fortress ship combines the best features of the dreadnought and the super-carrier. It is armed with an impressive main battery, and it embarks hundreds (or maybe even thousands) of small craft, too. A fortress ship might be 2,500 to 4,000 meters in length and weigh as much as 3–5 million metric tons. Crew and passengers could easily approach 100,000 men and women. Like any super-heavy military ships, fortress ships are national assets that serve as the centerpieces of sector defense fleets; they're almost always accompanied by an escort of dozens of cruisers and destroyers.

Firepower and Toughness

The first thing determined by the ship's class is its toughness. Weapons increase or decrease in effect based on the kind of target they're used against. This is an extension of the rules for weapon firepower and target toughness presented in the ALTERNITY core rulebooks; consider the firepower and toughness scale to extend as described here:

Ordinary	
Good	
Amazing =	Small Craft
	Light
	Medium
	Heavy
	Super-heavy

This means that a weapon of heavy firepower is one firepower grade above a target of medium toughness, two firepower grades above a target of Light toughness, and five grades above a target of Ordinary toughness. This has drastic effects on a weapon's effectiveness against targets of different toughness, as described in *Chapter 1: Basic Combat*.

Hull Points

Your choice of hull type provides you with the first critical pieces of information about your ship. First and foremost is the ship's hull point score. This measures how much room the hull contains for all the critical systems it must contain, from weapons to crew quarters. Hull points are also crucial for building the ship's damage track when you're done with your ship design.

Economy of Scale

Larger ship hulls can be fitted with more systems than their size would otherwise indicate. There are several reasons for this: First, the square-cube law dictates that squaring an exterior dimension will cube the volume, so that as a hull gets a little longer and a little wider, the volume of space enclosed in the hull increases at a much faster rate. Second, many systems take up more space as they are designed for a higher capacity, but they don't take up a *proportional* amount of extra space. For example, crew quarters for 400 hands aren't twice as big as crew quarters for 200 hands. This is because things like washrooms, passageways, mess decks, and lounges don't need to be doubled to handle twice as many people. Even things like power plants and engine systems become more efficient in size.

To reflect this, light ships have 10% more hull points than they "should" have, medium ships have 20% more, heavy ships have 30% more, and super-heavy ships have 50% more. These bonus hull points are represented on TABLE 5–1 in parenthesis. These bonus hull points don't add to the ship's damage track, and they don't count for calculations based on percentages of the ship. They're just free hull points.

For example, a battle cruiser has 1,000 hull points, plus an additional 300 hull points for economy of scale. If a system requires 1 hull point per 20 hull points of ship, or 5 percent of the ship's hull, only the base 1,000 hull points are used for this calculation. In this case, the system takes 50 hull points—even though 5 percent of a 1,300 hull point ship would require 65 hull points, not 50. The cost of the system and its power demands would be based on the size of the system actually installed (50 hull points).

The rule for economy of scale means that large ships can afford proportionally more space for "options" such as weapons, defensive devices, or additional crew quarters than a smaller ship. Of course, large ships are also extremely expensive, so it's not really more efficient to build one big ship than it is to build a number of smaller ones. But you can definitely use the same space more efficiently in one hull than you can in ten smaller ones with the same total of hull points.

Damage Track

Finally, the choice of hull also provides the ship's damage track—the number of stun, wound, mortal, and critical

points. For small craft, the stun point score is equal to half the ship's hull points; for light ships, one-quarter; for medium ships, one-eighth; for heavy ships, one-sixteenth; and for super-heavy ships, one-thirty-second.

Ships gain proportionally fewer damage points as they increase in size because large ships are, in some ways, just as fragile as small ships. A typical ship hull includes thousands of kilometers of duct work, piping, and conduits, plus hundreds of thousands of kilometers of wiring. Damage in one area frequently causes secondary damage somewhere else, through cascading system failures and decompression.

A ship's wound point score is equal to its stun point score; its mortal score is equal to half its stun score; and its critical score is equal to half its mortal score.

Step 2: Armor

The level of armor you decide to install in your new ship design will affect the durability you have available for all other installed systems. Like all other installed systems, a ship's armor takes up hull points.

Light armor takes up no hull points.

Medium armor requires hull points equal to 5 percent of the ship's total hull point score.

Heavy armor requires 10 percent of the ship's hull points.

Super-heavy armor requires 20 percent of the ship's hull points.

Armor protects a ship against the effects of enemy fire, reducing the damage of hits sustained by the ship.

Alloy

Composed of carefully fitted belts or plates of very tough alloys such as vanadium steel, alloy armor is reasonably cheap and effective.

Polymeric

Polymeric armor is made up of advanced polymers, like carbon fiber and high-grade fiberglass. It is relatively cheap and light, but doesn't offer tremendous protection.

Reflective

Consisting of dense, highly polished plates of metal, reflective armor is effective against simple energy weapons. It is quickly defeated by more advanced weaponry.

Design Tip: Armor

Your ship design should devote about 10 to 20 percent of its hull points to defenses–armor and shields. Of course, you can maximize protection, but you'll have to give up firepower or maneuverability. Similarly, going light on the armor leaves you more room for weapons and engines. It's your call.

Cerametal

Combining the heat-resistant qualities of tough ceramics with the ductile strength of metal, cerametal armor offers a good compromise between protection and economy.

Neutronite

Advanced materials technologies lead to the creation of artificially dense materials that can withstand enormous forces. Neutronite is a tough steel alloy into which a "weave" of free neutrons has been pressed. It is incredibly massive, weighing about five times more than a similar volume of lead.

Reactive

A forerunner of the more advanced nanofluidic armor, reactive armor consists of layers of insulating gel or compressed gas between cerametal sheets. High-velocity impacts and energy beams may burn through the armor before it can dissipate the impact or heat of an intense blow.

Crystallis

This sophisticated armor consists of a crystalline lattice that absorbs phenomenal amounts of energy. While it is not particularly effective against projectiles and other massive weapons, it is the finest energy protection available.

Nanofluidic

Consisting of a thick layer of gel-like fluid sandwiched in a neutronite structure, nanofluidic armor is "smart" armor–it concentrates at the point of impact to blunt physical blows, and circulates around heat sources to dissipate energy. It is the most effective armor available.

Step 3: Power Plant

The heart of any ship is its power plant. It takes vast amounts of power to drive a ship through space, energize its weaponry and defenses, and supply heat and gravity. An under-powered ship may have dozens of deadly weapons, but no capacity to get them to the fight or employ them all once it's there.

The ship's power plant supplies one of the three basic commodities you'll want to keep track of as you build your ship: Power. (The other two commodities are hull points and money, in case you forgot.) Many systems require a specified amount of power to function, so you'll want to make sure that you know whether or not your ship has enough power points to make everything you deem important work at the same time.

Power plants are rated by how many power points they produce per point of durability. For example, if you're building a 10-durability fighter, you might decide to install a mass reactor of 3 durability. This generates 7.5 power

Table 5-2: Armor

Armor Type	Tech	LI	HI	En	Hull	Cost/Hull Pt.
Progress Level 6: Fusion Age						
Polymeric, light	-	d4-1	d4-1	d4-2	2.5%	$50 K
Reflective, light	-	d4-3	d4-2	d6-1	2.5%	$50 K
Alloy, medium	-	d4+1	d4+1	d4	5%	$150 K
Polymeric, medium	-	d4	d4	d4-1	5%	$100 K
Reflective, medium	-	d4-2	d4-1	d6	5%	$100 K
Alloy, heavy*	-	d6+1	d6+1	d6	10%	$300 K
Reflective, heavy*	-	d4	d4	d8+1	10%	$200 K
Alloy, super-heavy!	-	d6+3	d6+3	d6+2	20%	$600 K
Progress Level 7: Gravity Age						
Cerametal, light	-	d6-1	d6-1	d6-1	2.5%	$100 K
Cerametal, medium	-	d4+1	d4+1	d4+1	5%	$200 K
Neutronite, medium	S	d6+1	d6+1	d6+1	5%	$500 K
Reactive, medium	-	d4+2	d6	d4	5%	$150 K
Cerametal, heavy*	-	d8	d8	d8	10%	$400 K
Neutronite, heavy*	S	d8+1	d8+1	d8+1	10%	$1 M
Reactive, heavy*	-	2d4+1	d8	d4+1	10%	$300 K
Neutronite, super-heavy!	S	d8+3	d8+3	d8+3	20%	$2 M
Reactive, super-heavy!	-	2d4+3	d8+2	d4+3	20%	$600 K
Progress Level 8: Energy Age						
Crystallis, light	P, X	d6-1	d6	d6+2	2.5%	$250 K
Nanofluidic, light	S, C	d8-1	d8-1	d8	2.5%	$500 K
Crystallis, medium	P, X	d6	d6+1	2d4+1	5%	$500 K
Nanofluidic, medium	S, C	2d4	2d4	2d4	5%	$1 M
Nanofluidic, heavy*	S, C	2d4+1	2d4+2	2d4+1	10%	$2 M
Nanofluidic, super-heavy!	S, C	2d4+3	2d4+4	2d4+3	20%	$4 M

* Heavy armors cannot be installed on small craft.
! Super-heavy armors cannot be installed on small craft or light ships.

Tech: The technology track required for this type of armor. If two technologies are listed, either will suffice.

LI, HI, En: The armor's protective value against Low Impact, Hi Impact, and Energy attacks, respectively.

Hull: The amount of the ship's hull points required by armor of this weight. Refer to the hull table for the number of hull points each percentage equals (2.5% is half of 5%, rounded normally).

Cost per Hull Point: Each hull point allocated to armor costs this much money. If the armor installation takes less than 1 hull point, use a minimum cost of 1 hull point worth of armor.

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points for the ship (round up to 8), and costs 600,000.

Some power plants can't be miniaturized past a certain point and are unavailable for minimal installations. This is expressed as a minimum size for the power plant. Some power plants may also have a maximum size, indicating that the technology just isn't suited for extremely large applications. However, you can get around the maximum size limitation by installing multiple small power plants–power from all sources counts for the ship's total.

Since you're the designer, you can decide whether multiple durability points spent on your power plant make up one big power plant, or several small power plants scattered around the ship. The advantage of several small plants is that your ship is somewhat more resistant to damage–it's hard to knock out all of your power at one shot. However, it's more expensive to build a ship this way.

For example, one large mass reactor capable of generating 10 points of power requires 4 durability points (each durability point provides 2.5 points of power). This installation costs 100,000 for the reactor, plus 100,000 for each of the four durability points associated with the reactor–a total of 500,000. If you bought this as four one-durability mass reactors, you'd pay the base cost times four, plus the durability cost again, for a total of 800,000. Note that some power systems are difficult to enlarge, and have a relatively high cost per durability point, while other systems can be easily scaled up and have a low cost per durability point.

Fuel Tanks and Refueling

At higher Progress Levels, most power plants require refueling only at infrequent intervals. Their fuel is either inex-

Table 5-3: Power Plants

Power Plant	Tech	Pow	Base. Cost	Cost/ Hull Pt.	Min Size	Fuel?	Fuel Cost	Fuel Efficiency
Progress Level 6: Fusion Age								
Solar Cell	S	1.5	$500 K	$200 K	4	No	-	-
Fission Generator	-	1.5	$1 M	$100 K	4	No	-	-
Fusion Generator	F	2.0	$1 M	$200 K	2	Yes	$1 K	200
Grav-fusion Cell	G	2.5	$2 M	$200 K	4	Yes	$1 K	300
Fuel Tank	-	-	$50 K	$10 K	-	-	-	-
Progress Level 7: Gravity Age								
Tachyonic Collider	Q	2.5	$1 M	$100 K	2	No	-	-
Antimatter Reactor	A	3.0	$4 M	$400 K	3	No	-	-
Mass Reactor	D	3.5	$2 M	$250 K	2	No	-	-
Progress Level 8: Energy Age								
Dynamic Mass Reactor	D	4.0	$3 M	$200 K	1	No	-	-
Matter Converter	M, X	4.5	$4 M	$200 K	2	No	-	-
Quantum Cell	Q	5.0	$5 M	$400 K	3	No	-	-
Progress Level 9: Matter Age								
Singularity Generator	G	6.0	$10 M	$500 K	20	No	-	-

Tech: The technology track necessary to produce this power system.
Pow: The amount of power produced by a power plant of 1 hull point. Fractions round normally, so a 2-hull point antimatter reactor (3.0 power produced per hull point) produces 6 power points.
Base Cost: The cost for each separate power plant installed.
Cost/Hull Point: The cost for each hull point of the power plant, cumulative with the cost for each new plant.
Min Size: The smallest power plant possible, in hull points.
Max Size: The largest power plant possible, in hull points.
Fuel: Whether or not the power system requires additional fuel tankage.
Fuel Cost: The cost per hull point of fuel purchased.
Efficiency: The number of power-days that can generated by 1 hull point of fuel. For example, one hull point of fuel provides 200 power-days for a fusion generator of 1 hull point size, or 20 power-days for a fusion generator of 10 hull points.

haustible or needs to be replaced only when the entire ship is overhauled. However, many PL 6 power plants require fuel tank in addition to the power systems proper.

The amount of fuel a ship carries is up to you, but the major consideration here is endurance. In other words, how long can the power plant operate on one tank of fuel? This is measured by the fuel tank's total power-days. If a fuel tank holds 100 power-days, it can operate a power plant that generates 1 point of power for 100 days, 2 points of power for 50 days, 20 points of power for 5 days, and so on. If your design calls for 10 power points to run its major systems, it's a very good idea to purchase multiple fuel tanks (or one big one) so that your ship will operate for at least a couple of weeks without refueling.

Power Systems

With the possible exception of the quantum cell, a power generation system doesn't *create* energy. Instead, it *trans - forms* energy from one type to another, more usable, type. A steamship's boiler transforms the energy stored in the chemical bonds of its fuel oil into heat energy, which is then transformed into kinetic energy through a turbine. Similarly, a fission or fusion generator converts the energy of atomic bonds into heat energy which is then transformed into electricity, or some other easily used energy form.

Most of these power systems actually carry fuel of one kind or another, even if no fuel tank is required. A fission generator doesn't need thousands of gallons of water, but it does need some amount of uranium or plutonium which is consumed over time. The duration of a typical plant and its refueling costs are addressed in each power system description.

Solar Cell (PL 6)

The solar cell converts light and heat energy from a nearby star into shipboard power through large banks of highly efficient photovoltaic cells and heat exchangers. Within 1 AU (150 million kilometers) of a Sol-type star, the solar cell's power generation capacity increases by 50 percent; similarly, at a distance of more than 5 AU from a Sol-type star, the solar cell's power generation capacity drops by 50 percent. For example, a cruiser equipped with 40 durability points of solar cells normally generates 40 points of power; this increases to 60 power points in the inner portion of a

star system, and drops to 20 power points in the outer portion of a star system. Note that particularly bright stars (class O, B, or A) extend the range of high-efficiency and power drop-off to 2 AU and 10 AU, while very small stars (class K and M) change these figures to 0.5 AU and 2 AU.

Fission Generator (PL 6)

Also known as an atomic or nuclear power plant, the fission generator extracts energy from a controlled chain reaction of uranium or plutonium. Fission generators require heavy shielding, so small installations are very difficult. However, the technology is easy to apply to large installations.

A fission generator's fuel rods last approximately two to four years, and then must be replaced at a cost of 50,000 per hull point of the power plant.

Fusion Generator (PL 6)

A fusion generator harnesses the power of nuclear fusion to create shipboard power. A containment device "bottles" the reaction in magnetic fields, since the generator's core burns at temperatures as hot as the surface of a star. Fortunately, most fusion generators are designed to fail-safe in the event of damage.

The fusion generator uses hydrogen for fuel, but like the cold fusion reactor, this is often stored as water.

Grav-Fusion Cell (PL 6)

Based on a fraal device, the grav-fusion cell employs artificial gravity fields to contain and enhance the performance of a fusion reaction. It's otherwise similar to the fusion generator.

Antimatter Reactor (PL 7)

The antimatter reactor annihilates particles of antimatter to create vast amounts of power. Like the fusion generator, it requires some very careful containment procedures, and a significant portion of the generator's output must be devoted to maintaining the magnetic fields that insulate its fuel source from its surroundings. No fuel tank is required–the antimatter and its containment device are included in the durability cost and price of the reactor.

The antimatter reactor requires refueling about once per three to five years, although running at a minimal power configuration (nothing more than life support) could extend this to ten or fifteen years between fueling. Antimatter is expensive; refueling the reactor costs half the amount of money spent on the power plant at the time of its construction.

Mass Reactor (PL 7)

Dark matter technology presumes that nonbaryonic dark matter may have properties unknown to 20th century science. Specifically, dark matter can undergo a decay process similar to radioactive decay in which energy is released by the transformation of dark matter to "normal matter". The mass reactor harnesses this fantastic energy. Like the antimatter reactor, the mass reactor requires no fuel tank; the dark matter and its containment device is already included.

The mass reactor requires refueling about once every six months, at a cost equal to 5,000 per hull point of the power plant.

Tachyonic Collider (PL 7)

Tachyons are particles that move faster than the speed of light. The tachyonic collider slows these particles and harnesses their energy. While the collider is expensive and it doesn't provide as much power as other power systems at this progress level, it has one significant advantage: It doesn't require any fuel at all.

Dynamic Mass Reactor (PL 8)

Basically a refinement of the PL 7 mass reactor, the dynamic mass reactor accelerates the decay process, releasing more energy than its predecessor. It's also a smaller and safer installation.

The dynamic mass reactor requires refueling once every six months, at a cost equal to 10,000 per hull point of the power plant. For example, a dynamic mass reactor of 30 durability points costs 300,000 to refuel.

Matter Converter (PL 8)

This device produces energy through the total conversion of matter. Literally anything can be used as fuel. While the matter converter is expensive, it produces an immense amount of power and requires no significant fuel source.

Quantum Cell (PL 8)

Harnessing the Holy Grail of energy sources–the quantum fluctuation or zero-point energy observed in vacuum–the quantum cell produces an enormous amount of energy from no fuel source at all.

Design Tip: Power

Assuming you're using an average power system–say, a mass reactor–you probably want to devote about 10 to 15 percent of your ship's hull points to its power plant. (Fuel tanks would run another 5 to 10 percent, if necessary.) This should give you plenty of power points for all of your engines, weapons, and defenses. Under-powering a ship is a real nuisance, since you'll have to decide which systems need to be powered during each round of combat. Providing a ship with more power than it needs is safer, since you can take damage to the power plant and not lose the ability to fight effectively, but it may waste hull space and money that could be better spent elsewhere.

Singularity Generator (PL 9)

The singularity generator is an incredibly powerful device that taps the power of a small black hole. It's not a generator so much as an extremely capacious battery, but the energy contained in a tiny black hole is staggering.

Over the course of years, the singularity will shrink as it "evaporates", or loses energy; the singularity generator must be refueled by the creation of a new black hole. A singularity generator lasts for 10 to 15 years before refueling is required. Refueling costs an amount of money equal to half the cost of the power plant at the time of construction.

Step 4: Engines

Without engines, a ship can't go anywhere. Many small ships rely on their mobility and maneuverability as their first (and sometimes only) line of defense against enemy fire. Engine systems consume power points created by the ship's power plant and convert them into acceleration. Like armor, engine systems are proportional to the size of the ship and require the devotion of some percentage of the ship's hull points to reach the designated breakpoints of effectiveness.

Note that all ships are assigned a Maneuverability Class based on the hull type, which is a measure of how often they can make course changes during a combat round, *provided they have sufficient acceleration remaining*. Engines determine acceleration, but maneuverability is based on the size of the ship.

Acceleration is normally measured in Mpp, or megameters per phase per phase. An acceleration of 1 Mpp means that the ship can change its velocity by 1 megameter per phase (roughly 1,000 kilometers per hour) in a single phase of acceleration. Some low-tech engines are instead rated in KPH per phase, or kilometers per hour per phase. An acceleration of 30 KPH per phase is roughly equal to 1 G; powerful engines are capable of thousands of Gs.

Engine Fuel Requirements

Several engine types require some kind of fuel tanks, above and beyond the fuel requirements for the ship's power plant. Each hull point of fuel contains a certain number of thrust-days for a 1-hull point engine; this is the number of days the engine could operate continuously on 1 hull point of fuel. Engines with 2, 3, or more hull points

Table 5-4: Engines

			Min	Base	Cost/	Acceleration Rating at...								
Engine	**Tech**	**Pow**	**Size**	**Cost.**	**Hull**	***5%***	***10%***	***15%***	***20%***	***30%***	***40%***	***50%***	**Eff.**	**Cost**
Progress Level 6: Fusion Age														
Planetary thruster	-	1.0	1	$200 K	$50 K	0.1*	0.25*	0.5*	1*	-	-	-	10	$10 K
Photon sail	-	-	5	$500 K	$50 K	--	0.02*	0.05*	0.1*	0.15*	0.2*	0.25*	-	-
Fusion torch	-	0.33	3	$500 K	$100 K	0.5*	1*	1.5*	2*	3*	4*	5*	200	$1 K
Ion engine	S	0.5	2	$800 K	$200 K	--	0.5*	1*	1.5*	2*	3*	4*	400	$5 K
Progress Level 7: Gravity Age														
Particle impulse	-	0.75	4	$500 K	$300 K	0.5	1.0	1.5	2	2.5	3	4	-	-
Induction engine	G	1.0	2	$1 M	$500 K	1	2	3	4	5	6	8	-	-
Progress Level 8: Energy Age														
Inertial flux engine	X	1.0	1	$2 M	$500 K	2	3	4	5	6	8	10	-	-
Gravitic redirector	G	0.67	3	$3 M	$1 M	2	4	6	8	10	12	16	-	-
Progress Level 9: Matter Age														
Spatial compressor	T	2.0	4	$1.5 M	$200 K	3	6	9	12	15	18	20	-	-

* Acceleration on PL 6 game scale; see Chapter 2.

Tech: The technology type required to build an engine of this type.

Power: The number of power points required by each hull point assigned to this engine. For example, a 30-hull point fusion torch requires 10 power points to operate.

Min Size: The smallest number of hull points that can be assigned to this system.

Base Cost: The cost for an engine installation of this type.

Cost/Hull: The cost per hull point assigned to this engine; cumulative with the base cost.

Acceleration rating at...: The ship's acceleration for an installation comprising 5-50% of its overall hull. For example, a 300-hull point cruiser with 60 hull points assigned to its engines uses the 20% column. Acceleration figures are given in megameters per turn unless otherwise indicated.

Fuel Efficiency: The number of thrust-days provided by one hull point of engine fuel. Engines of more than 1 hull point burn fuel at a correspondingly faster rate, so a 20 hull point fusion torch burns 20 thrust-days of fuel in one day of continuous thrust.

Fuel Cost: The cost to purchase 1 hull point of fuel for this engine type.

will burn fuel two, three, and so on times faster than the figure listed.

The fuel use figure assumes more or less continuous maximum thrust. Naturally, a ship that spends three weeks drifting without firing its engines consumes no fuel at all.

Engine System Descriptions

Not all engines are created equal. Low-tech engines may take hours, days, or weeks of continuous acceleration to build up to a speed that a high-tech engine can match in a matter of two or three phases. When you select an engine system for your starship, record the engine's acceleration rating on your ship record sheet and assign the engines to one or more hit locations. See the later part of the chapter for more information.

Photon Sail (PL 6)

This device is an immense but incredibly fragile foil structure only a few molecules thick. It uses light pressure from a nearby star or laser drive station for its motive force. Its acceleration rates drop by 50% if the ship is more than 5 AU distant from the system's star.

The sail can be wrecked by the most minor damage, but every ship equipped with a photon sail carries at least three spares. Unfortunately, it takes hours to stow or deploy a sail.

Crew Check	Deployment
Crit. Failure	d4+1 days
Failure	3d4 hours
Ordinary	2d4 hours
Good	1d4 hours
Amazing	1 hour

In combat, *any* weapon hit destroys a deployed photon sail and prevents the sail-ship from making maneuvers until the sail can be re-deployed. The sail-ship will continue on its last course and retain its former speed until it gets a working sail again.

Since ships powered exclusively by sails can't change course easily, assume that all sail-ships are Class I maneuverability. It's a good idea for a sail-ship to carry a secondary propulsion system such as a small ion engine or rocket for emergency maneuvering and sailing against the sun.

Photon sails are completely useless in atmosphere—in fact, they're instantly destroyed by atmospheric entry. Most sail-ships carry a small back-up propulsion system for fine maneuvering.

Planetary Thruster (PL 6)

Several PL 6 engine systems are useless or dangerous in any kind of atmosphere. The planetary thruster is a back-up engine system designed specifically for use when the ship's main drives must be shut down to make planetfall. The most common varieties are the scramjet, chemical rocket, or powered airfoil. The exact form doesn't matter.

The planetary thruster requires either fuel or power, but not both. You can choose to install a standard fuel tank, or to make sure that the ship has enough power available to run a planetary thruster at need.

Fusion Torch (PL 6)

This engine is basically a fusion reactor with one wall of the magnetic bottle missing; the exhaust is incredibly hot plasma.

The fusion torch is intended for space-only work; its exhaust stream would slag anything it landed on and incinerate everything within a few hundred meters of ground zero. Many ships fitted with fusion rockets carry planetary thrusters for atmospheric work, or remain permanently in space, using shuttlecraft to reach a planet's surface.

Its fuel is hydrogen, fused in the reaction chamber and expelled as white-hot plasma.

Ion Engine (PL 6)

The ion engine uses power to break down molecules of a fuel material to create ions, and then expels them by means of a magnetic impeller. It doesn't provide the thrust potential of the fusion torch, but it's much more fuel efficient, and its exhaust is not anywhere near as dangerous.

Ion engines don't function in any kind of atmosphere, so most ships with this kind of power plant also carry a planetary thruster.

Particle Impulse Engine (PL 7)

This is simply an improved version of the PL 6 ion engine. The particle impulse drive uses magnetic fields to produce a constant stream of high-energy particles and vector it for thrust.

Unlike the ion engine, the particle impulse engine doesn't require a fuel tank. Its reaction is so efficient that the very small amount of matter present in interplanetary or interstellar space can be collected through weak magnetic fields and converted into a thrust medium.

The particle impulse engine is capable of atmospheric entry. It causes some damage to any surface close to its exhaust ports, but it's not too much worse than a modern-day jetwash.

Design Tip: Engines

An engine of 10 to 20 percent of your hull is pretty reasonable. Anything more than that is going to be nearly impossible to design around, unless you're building a special fast courier with minimal armament and amenities for the crew.

Induction Engine (PL 7)

Hands-down the best engine available at this or any previous Progress Level, the induction engine uses artificial gravity to provide incredible thrust and maneuverability. The induction engine requires no fuel and produces no exhaust; it's ideal for atmospheric, orbital, or deep-space work.

Inertial Flux Engine (PL 8)

By precisely controlling the quantum energy level of every atom on the ship simultaneously, the inertial flux engine assumes the inertial states necessary to produce motion in any direction. In effect, the pilot chooses from instant to instant what vector the ship will next possess, and the inertial flux engine makes it possible.

This engine requires no fuel and is safe for atmospheric work.

Gravitic Redirector (PL 8)

A refinement of the induction engine, the gravitic redirector changes the ambient gravity in the vicinity of the ship to produce a motive force. It's more powerful and more efficient than the induction engine.

Spatial Compressor (PL 9)

One of the most advanced engines available, the spatial compressor surrounds the ship in a field that "folds" or "wrinkles" the structure of space in the direction the pilot wishes to travel. This results in a continuous series of micro-jumps in which the ship flickers into and out of reality, teleporting thousands of times every second.

Since the ship has no intrinsic velocity (it's stationary while it teleports) the spatial compressor can instantaneously stop or change direction and thrust vector without any maneuvering whatsoever. However, the engine still needs to build up cyclic speed to increase the frequency of its micro-jumps, so it accelerates normally.

The spatial compressor requires a lot of power, but no fuel. It's safe for atmospheric flight.

Step 5: FTL Drive

The term 'FTL' stands for faster-than-light. A ship's FTL drive is the engine system that allows it to break out of the Einsteinian universe and travel at speeds that make interstellar travel easy. With an FTL drive, a ship can make a trip of many years at sub-light speeds into a voyage of months, weeks, days, or perhaps even hours.

Obviously, not every ship needs to be equipped with an FTL drive. In fact, the expense of most FTL systems means that only the ships that *need* FTL capability will be built with it, even when technology advances to the point of commonplace interstellar commerce.

Ships with no FTL drive may still enjoy access to FTL travel; it's possible for a large ship with a FTL drive to tow or carry a sub-light ship. See "Miscellaneous Installations" for information on docking clamps.

Jump Drive (PL 6)

The jump drive relies on a fairly rare technology type, the technology of matter transmission. It requires an enormous amount of power, so much so that the jump drive itself is a colossal fusion device that derives the power for its jump by annihilating massive amounts of hydrogen fuel for a single jump. Thus, the jump drive only requires 5 percent of the ship's hull points, but it must be built with a fuel tank that may account for anywhere from another 5 to 50 percent of the ship's hull. A small amount of shipboard power (1 power point per hull point devoted to the jump drive machinery) is also required to control the machinery and direct the jump.

The distance a jump drive can teleport in one jump depends on how much of the ship's mass (i.e., hull points) is annihilated for the jump. For example, a jump ship of 200 hull points might have fuel tanks with a capacity of 60 hull points of fuel–30 percent of the ship's hull. It could eliminate 10 hull points of fuel (5 percent of the hull) for a jump of 1 light-year, or it could eliminate all 60 fuel points for a jump of 6 light-years.

Since most jump ships use most or all of their available fuel in a jump, they need to jump to a point at which they can refuel their tanks. Obviously, a civilized system will have fueling capability, but if fuel can't be purchased, the jump ship must improvise. Hydrogen can be skimmed from gas giants, separated from water, or mined in the form of ice. Assuming that a suitable source of hydrogen is available, you can assume that a ship requires 1 full day of fueling per 10 hull points of fuel collected. See "Miscellaneous Installations."

The jump drive can execute a jump anytime it has enough fuel to do so. It takes 1d4 hours to cycle the engine and plot the next jump point, so there's usually a small delay between jumps even if fuel is immediately available.

Wormhole Screen (PL 6)

It's theoretically possible for an object such as a ship to pass through a wormhole–a tunnel in space produced by a spectacular event such as the creation of a black hole–and emerge dozens, hundreds, or thousands of light-years from its previous location. However, the simple act of passing through a wormhole triggers its collapse, which makes it difficult to use a wormhole as a means of interstellar travel.

The wormhole screen masks the starship's mass from the wormhole, thus keeping the conduit open long enough for the ship to pass from one end to the other. It also protects the ship from the extreme conditions in the vicinity of the wormhole.

The wormhole screen only allows transit along a natural-

ly occurring wormhole, which means that a ship can't pick its destination; it has to go wherever the wormhole takes it. (In some campaigns, networks of pre-existing artificial wormholes may make it possible to reach a great number of stars in this fashion.)

The screen device requires 5 percent of the ship's hull points, and 2 power points per hull point devoted to the system. A ship of 800 hull points must spend 40 hull points on the screen, and a total of 80 power points to energize the device. Entering a wormhole is a dicey proposition at best, so it takes 2d4 hours to perform the course calculations and maneuvering necessary to initiate a wormhole transit once the ship is in the vicinity of the next wormhole it intends to jump through.

Gate Activator (PL 7)

This device simply keys a gate device of some kind, which functions as a huge teleporter to another gate somewhere else. It doesn't require very much power compared to other FTL drives because most of the work is done by the gate itself. The gate activator requires 1 percent of the ship's hull points (1 hull point per 100 hull points of the ship), and 2 power points per hull point allocated to the system.

The ship transiting the gate automatically arrives at the other terminus and cannot jump to a place where no gate exists. The length of the transit may be instantaneous, or it could last for several hours; it depends on the GM's campaign.

A gate device usually requires some cycle time to amass the incredible energies needed to fling a ship across interstellar distances. Again, this is up to the GM, but a period of 2d4 hours as a minimum cycle time is reasonable.

Hyperdrive (PL 7)

This drive system hurls the ship into an alternate dimension or reality in which the lightspeed limit is meaningless. As with the jump drive, it's necessary to calculate a destination before entering hyperspace. This requires 1d4 (x) 10 minutes, or a Navigation skill check (complex skill check of 4 successes at no penalty, 10 minutes per check).

Once the ship is engaged in a hyperspace jump, it can't change course. It can drop out of hyperspace at any time simply by disengaging the hyperdrive, and there may be devices or natural phenomena that bar hyperspace travel and interdict any ship passing through the vicinity.

A ship's FTL speed depends on how much of the hull

Table 5-5: FTL Drives

			Min	Base	Cost/		Acceleration Rating at...					
Engine	**Tech**	**Pow**	**Size**	**Cost.**	**Hull**	***5%***	***10%***	***15%***	***20%***	***30%***	***40%***	***50%***
Progress Level 6: Fusion Age												
Jump Drive	T	1	5	$4 M	$1 M	-	var	-	-	-	-	-
Fuel spent	-	-	-		$10 K	1 LY	2 LY	3 LY	4 LY	6 LY	8 LY	10 LY
Wormhole Screen	M	2	1	$1 M	$200 K	**	-	-	-	-	-	-
Progress Level 7: Gravity Age												
Gate Activator	T	2	1	$500 K	$100 K	**	-	-	-	-	-	-
Hyperdrive	X	3	4	$5 M	$2 M	1/day	2/day	3/day	4/day	5/day	6/day	7/day
Stardrive	G	!	3	$2 M	$1 M	var	-	-	-	-	-	-
Progress Level 8: Energy Age												
Drivewave	G	!	2	$3 M	$1.5 M	var	-	-	-	-	-	-
Spacefold Drive	T	4	4	$8 M	$2 M	-	pow	-	-	-	-	-
Psychoportive Drive	P	1	10	$6 M	$200 K	-	PEP	-	-	-	-	-
Progress Level 9: Matter Age												
Transcendent Drive	P	1	4	$12 M	$400 K	-	PEP/hr	-	-	-	-	-
Warpdrive	X	2	2	$10 M	$5 M	1/hr	2/hr	4/hr	8/hr	16/hr	32/hr	64/hr

* The jump drive takes 10 percent of the ship's hull points. Its FTL rating varies with the amount of fuel expended for a jump.

** The wormhole screen takes 5 percent of the ship's hull points; the gate activator takes 1 percent. Performance varies.

! The stardrive and the drivewave require a mass reactor power plant. Performance varies.

Tech: The technology required to build this drive system.
Pow: The amount of power required, per hull point devoted to this system.
Minimum Size: The smallest installation possible for this drive.
Base Cost: The cost of the drive.
Cost/Hull: The cost per hull point allocated to this drive; cumulative with the base cost.
FTL rating at: The system's FTL travel capability. Refer to the system descriptions for details.

is devoted to the hyperdrive system, with a minimum of 10 percent. Each hull point spent on the hyperdrive requires 3 power points to activate the system. For example, a ship of 300 hull points has a hyperdrive of 45 hull points, or 15 percent of the hull; this requires 135 power points to activate, and provides the ship with a speed of 2 light-years per day of hyperdrive travel. There's no limit on the length of a jump other than the simple question of how long a ship can remain in hyperspace without refreshing its stores. (The GM may impose a limit of 1000 light-years per hyperjump at his discretion.)

Psychoportive Drive (PL 7)

Psychoportive drive technology uses the power of the mind to defeat the restrictions of time and space. The psychoportive drive works a lot like a jump drive, except that instead of burning fuel, it burns psionic energy points (or PEPs) as shown below:

Class	Psi Energy per LY
Small	3 PEP per LY
Light	6 PEP per LY
Medium	10 PEP per LY
Heavy	15 PEP per LY
Super-Heavy	25 PEP per LY

Multiple psionic characters can contribute PEPs to increase the range of the jump. Each psychoportive jump takes one full day. Psionic characters recover their psionic energy points normally after using them on the initial entry into Otherspace.

Calculating the probabilities and energies of the next jump requires one psionic character, the navigator, to perform a complex skill check against ESP-*navcognition.* The navigator requires 4 successes and may make one skill check every ten minutes to prepare the ship for its next jump.

The psychoportive drive requires 10 percent of the ship's hull, and uses 1 point of power per hull point devoted to the drive.

Stardrive (PL 7)

The stardrive creates a short-lived, controlled singularity that drops the ship out of normal space and into drivespace, a parallel dimension tied to the real universe. All drivespace submergences last for 121 hours (about five days). A stardrive must be coupled to a mass reactor; no other power system can energize a stardrive.

Like the hyperdrive or jump drive, a ship powered by a stardrive must plot its jump carefully; it can't maneuver once it enters drivespace, and nothing can interfere with its progress until it arrives at its destination.

The base distance achieved by a stardrive in a single jump is based on the ship class:

Class	Base Starfall
Small	5 LY
Light	10 LY
Medium	20 LY
Heavy	30 LY
S-heavy	50 LY

The stardrive requires 5 percent of the ship's hull and 3 power points per hull point of the system; for example, a ship of 80 hull points requires a 4-hull point stardrive and 12 power points to make starfall.

It's possible to increase the distances shown above by exceeding the power requirements found on TABLE 5–5. For every 10 power points beyond the minimum allocated to the stardrive, the ship can starfall one additional light-year. For example, a battleship of 1,000 hull points needs 150 power for its stardrive, but if 300 power points are allocated, it starfalls up to 45 light-years instead of 30 light-years.

The stardrive requires several days to recharge after a drivespace journey. Typically, it takes d4+1 days to recharge a stardrive for the next starfall.

Drivewave (PL 8)

The drivewave generator is simply an improvement of the stardrive. It resembles the earlier engine in most details, except that the length of a drivespace submergence is only 11 hours, and the recharge time for the drive is only d4+1 hours. Since it cycles much faster, it can cover territory at a correspondingly faster pace.

Spacefold Drive (PL 8)

The spacefold drive "folds space", making it possible for a ship to leap dozens or hundreds of light-years in a single instant. The range of the drive is determined entirely by the amount of energy used to power the system, as long as it meets the minimums specified on TABLE 5–5. For instance, a 200-hull point ship must allocate 20 hull points to the spacefold drive, which requires 120 power points. As long as the ship can generate 120 or more power points, it can perform a spacefold of up to one light-year per power point assigned to the drive.

The spacefold drive can cycle almost instantaneously, but it creates dangerous stresses in the fabric of space; for safety a ship must travel 5d20 (x) 10 AU (astronomical units) from its arrival point in normal space before it's safe to use the drive again.

Transcendent Drive (PL 9)

The transcendent drive system harnesses the power of a psionically gifted person and unlocks unfathomable energies with the key of an intelligent mind. The drive permits travel at FTL speeds in normal space with no careful navigation plots or calculations required. The ship's speed is a number of light-years per hour equal to the psionic energy

score of a single psionic character who is flying the ship at any given time.

A psionic character who powers the transcendent drive even for a moment immediately expends all of his psionic energy points. He can stay "in the chair" for up to eight hours before becoming exhausted. He can begin to recover psionic energy points normally after he leaves the chair.

Example: Jaleel is a fraal mindwalker with 18 psionic energy points. If he takes the helm of a ship fitted with a transcendent drive, the ship will travel at the rate of 18 light-years per hour until Jaleel runs out of steam, at which point another psionic character could take over.

Large ships of this type frequently have small teams of pilot-helmsmen who can rotate the piloting duties. The transcendent drive requires 10 percent of the ship's hull points and a modest amount of power.

Warpdrive (PL 9)

By creating a warp field in which the normal laws of physics are suspended, the warpdrive permits FTL travel. The warp field does not interfere with a ship's ability to gather information from its surroundings, and a ship traveling with warp drive can change course, stop, or start again at will, as long as power for the drive is available.

Like the hyperdrive, the warp-drive's speed is measured in the number of light-years it can cross per hour of operation. A ship of 100 hull points that devotes 15 hull points to its warpdrive has allocated 15 percent of hull to the drive, so it can travel at a speed of 4 light-years per hour.

Step 6: Support Systems and Crew Quarters

The whole purpose of a starship is to transport humans across the interstellar void. In the early days of space travel, nine out of ten systems in a spaceship are there for the explicit purpose of protecting the crew from the incredibly hostile environment of open space. With the advance of technology into the Fusion Age and Gravity Age, life support systems become smaller, more reliable, and less of a constraint to the shipbuilder.

If you don't want to figure out your ship's manpower requirements quite yet, use the crew figures on Table 5–1 as a good estimate for how many accommodations you should buy. Your crew may be significantly higher or lower than this if you take the time to figure out your manning requirements in detail, but this is a reasonable estimate. Figure on spending between 10 and 15 percent of your ship's hull points on crew accommodations, and you'll be in good shape.

Life Support

To support human life in space, a ship must provide a pressurized atmosphere, oxygen, temperature control, plus food, water, and waste management systems. This environmental engineering is fairly challenging; it takes a lot of technology to make space a safe place to work and live. The systems described below include all of these life support functions, along with lighting, artificial gravity (in some cases), acceleration-control measures, basic compartmentalization and damage control, and dozens of other critical functions.

When life support machinery is damaged or de-powered, the compartments it protects aren't rendered instantly lethal. The atmosphere inside remains pressurized. Oxygen lasts for 1d4 hours before running out. The temperature drops by 10∞ C every hour, although in the inner portion of a star system, it climbs by the same amount instead. Artificial gravity, if any, fails, which may make it difficult to maneuver.

It's entirely feasible for a ship to provide only a portion of the hull with life support. Command systems and crew accommodations *must* be fitted with life support, but all other compartments can be left unpressurized. (However, at a bare minimum hull points equal to 10 percent of the ship's total must be supplied with life support.)

The disadvantage of not pressurizing the entire hull is simple; any time that people need to work in the nonsupported sections, they must don space suits.

For example, a heavy transport of 1,300 hull points could provide life support to as little as 130 hull points, which is ten percent of its total. The remaining 1,170 hull points would be in vacuum, but if the ship is a bulk freighter or ore transport, this might not be a problem. Supplying 130 hull points of life support would require seven PL 6 life support units, four PL 7 autosupport units, or two PL 8 symbiotic hull units.

No Life Support

You can include no life support whatsoever in your design. All crewmembers and passengers must remain suited up for the entire time they're on the ship. Usually, you would do this only for fighters or launches intended for flights of no more than a couple of hours. It's not even a good idea then, since the ship's endurance is limited to the endurance of the spacesuit.

What Do I Really Need Here?

The only questions in this step that you have to consider right now are life support and crew berthing. Life support systems will take up 0 to 5 percent of your hull points; your ship design must allocate some amount of power and hull points to dedicated life support units.

If you want to figure out your ship's ideal manning, refer to the required crew sidebar in Chapter 3. You can add up the crew requirements for all the ship's departments and determine exactly how much space you should reserve for accommodations..

Life Support (PL 6)

The basic life support system requires 1 hull point per 20 hull points of climate-controlled hull. It provides pressurization, temperature control, oxygen, and gravity (or acceleration tanks) to the entire ship.

Autosupport Unit (PL 7)

This is simply a superior version of the PL 6 life support machinery. Each unit requires one hull point and provides life support to 40 hull points of the rest of the ship. Again, a shipbuilder on a budget can economize by omitting some portion of the ship from the autosupport machinery.

Symbiotic Hull (PL 8)

Sophisticated biomechanical interfaces and smart environmental engineering make it possible to combine the autosupport machinery and the recycling machinery into a single ship-wide system. The symbiotic hull can be down-sized to provide life support to only part of the ship, such as the autosupport unit.

Artificial Gravity and Acceleration Compensators

Artificial gravity is automatically included in any life support system, provided the shipbuilder has access to type G technology at PL 6 or higher, or type X technology at PL 8 or higher. Artificial gravity completely suppresses the effects of deadly accelerations and, of course, provides normal gravity throughout the ship.

If artificial gravity is not available, the ship's life support system also includes facilities for high acceleration. Characters in a ship with any kind of life support system (or characters in a cockpit or command deck seat on ships without life support) are considered to be 'protected' against acceleration (see "Acceleration Kills" in *Chapter 4: The Cold Hard Facts*). Some types of engine do not create 'real' acceleration, so a ship with a spatial compression drive is capable of thousands of Gs but doesn't require any special protective measures against acceleration.

Even if withstanding deadly acceleration is not an issue, it's very convenient (and healthier) for spacefarers to have some kind of gravity. There are two good alternatives: constant, moderate acceleration, and centrifugal force.

Constant Acceleration

Obviously, this isn't an installed system as much as it is a philosophy of spaceflight. A constant, moderate acceleration serves quite well as artificial gravity. In fact, if a ship can achieve and sustain an acceleration of 1 G (30 KPH per phase, or about 0.000025 megameters per phase, per phase) it's just like standing on the surface of the Earth.

By maintaining this slow, steady acceleration to the halfway point of the voyage, and then "flipping the ship" to

Table 5-6: Support Systems

System	Tech	Hull	Power	Cost	Notes
Progress Level 6: Fusion Age					
Life Support	-	1	1	$100 K	Life support for 20 hull points
Crew or Troop Bunkroom	-	3	0	$40 K	Berthing for 20 crewmen
Cabin	-	1	0	$20 K	Berthing for 2 crewmen
Crew Quarters	-	2	0	$20 K	Berthing for 6 crewmen
Seating Deck	-	2	0	$10 K	Short-term seating for 20 passengers
Passenger Quarters	-	2	0	$50 K	Staterooms for 2 passengers
Cryogenics Unit	-	2	1	$100 K	Capacity of 12 people
Hydroponics Bay	-	2	1	$75 K	Feeds 10 people
Recycler Unit	-	1	1	$300 K	Reduces consumption to 10% normal for 20 people
Deep Stores	-	1	0	$5 K	Increases stores by 1,000 days
Progress Level 7: Gravity Age					
Autosupport	-	1	1	$200 K	Life support for 40 hull points
Life Suspension Unit	S	1	1	$250 K	Capacity of 12 people
Progress Level 8: Energy Age					
Symbiotic Hull	P, M	1	1	$250 K	Life support for 100 hull pts, recycling for 20 people

Tech: Any advanced technology required for this system.
Hull: The number of hull points used by this system. Some systems require a percentage of the hull.
Power: The amount of power required for a system of this type. Some systems require the listed power for each hull point assigned to the system, while other systems are simply bought and installed as separate units.
Cost: The system cost, or the cost per hull point for a system requiring some percentage of the hull.

begin decelerating at the same rate, a spacecraft can simulate gravity for most of its trip. There are three problems with this method: First, the ship is limited to 1G of acceleration, which means that even relatively short interplanetary voyages will take months. Second, the ship can't maintain its simulated gravity during violent combat maneuvers. Finally, maintaining a constant acceleration for weeks or months may be beyond the capabilities of the ship's engines or force the ship to carry a prohibitive amount of fuel.

Centrifugal Force

A ship can be designed so that it spins on its axis as it travels forward, using centrifugal force to simulate the force of gravity. This acceleration is "toward" the skin of the ship; at the ship's centerline, there is no appreciable "gravity," but the farther one travels away from the center of the spinning ship, the more "gravity" the ship seems to have.

Designing a "spin-ship" requires an additional 5 percent of the hull in wasted space and costs 50,000 per hull point devoted to the spin structure. The ship can't accelerate while spinning to simulate gravity, so combat maneuvers are impossible. This system is more suitable to short, high-G accelerations, followed by long periods of coasting with spin-induced gravity for the comfort of the crew.

Accommodations

All ships that intend to remain in space for more than a few hours at a time must include living space for the crew. In the case of a large ship like a battleship or carrier, these accommodations may require hundreds of hull points, supporting thousands of people. In addition, extra accommodations are often necessary for special designs such as cold-sleep ships, troop carriers, and passenger liners.

If you want to know how many crewmembers your ship design will require, refer to *Chapter 3*.

No Accommodations

You can choose to provide a ship of with no accommodations at all. The number of stations included in the ship's cockpit or command deck is the limit of the number of people the ship can safely embark. There are no provisions for sleeping, eating, or even stretching your legs. While this is suitable for fighters or similar short-endurance military craft, it's clearly not the best way to go for any larger vessels.

Crew or Troop Bunkroom (PL 6)

Three hull points is enough to support 20 crewmembers or marines in spartan living quarters. Each crewmember has a small sleeping cubicle and little else to call her own. This is a little abstract, since corridor space, stores, galleys, mess decks, heads, and other common spaces come with the purchase of this system.

A crew or troop bunkroom includes an airlock. This may or may not be directly connected to the bunkroom, but somewhere in the passageways, lounges, and open areas that are assumed to come with a bunkroom there's an access to the exterior of the hull.

Bunkrooms can be used for passengers, but they're not suited for paying fares. No passenger would pay more than a third-rate fare for these accommodations.

Cabin (PL 6)

This is simply a condensed version of standard crew quarters, intended to provide cramped but tolerable living facilities for a small vessel. Like the cabin of a modern power boat or sailing yacht, it includes the basics–galley, head, sleeping space, and maybe a table–in a surprisingly small space. The cabin includes a hatch for exterior access, but not an airlock.

Crew Quarters (PL 6)

Two hull points of officer quarters provide high-quality facilities for six crewmembers. As with the cabin or bunkroom, crew quarters include passageways, mess decks, lounges, washrooms, laundry facilities, and so on–everything people need other than a place to sleep. Each unit of crew quarters includes one free airlock.

Typically, a warship will carry most of its crew complement in bunkrooms, reserving separate quarters only for the officers, technicians, and high-ranking crewmembers.

Passenger Suite (PL 6)

Each hull point spent on passenger suites adds two first-class or four second-class passengers to the ship's carrying capacity. Like crew quarters, passenger suites include extra passageways, lounges, galley space, dining rooms, and recreation facilities. Of course, passengers can be carried in normal crew berthing, but the passenger suite provides some degree of luxury for the trip.

Each unit includes a free airlock for access.

Cryogenics Unit (PL 6)

The cryogenic unit is designed to hold a dozen people in suspended animation for years at a time. Multiple cryogenic units can hold correspondingly more people, and require more power. For example, a cryogenic facility of 100 hull points (50 units) can hold 600 people in suspended animation and requires 50 power points.

It takes hours to safely place living creatures into cryogenic stasis, or to wake them once they're frozen. On average, it takes four hours to freeze and twelve hours to thaw a typical human. A creature in cryogenic stasis ages very slowly, about one day for every fifty days of time in cold storage.

If power to the cryogenic unit is interrupted for more than one round, its occupants begin to die. They suffer 1d4 points of mortal damage in the second and each subsequent round until they die or power is restored.

Life Suspension Unit (PL 7)

The life suspension unit is an improvement of the cryogenic unit. Organisms in the life suspension unit aren't just frozen, they're actually in true suspended animation. They don't age at all and need no provisions for food or respiration. In addition, it takes only one round to place a creature into suspension or remove it from suspension.

Interrupting power to the life suspension unit for more than one round wakes all occupants at the end of the second round without power. People who come out of stasis this way are disoriented (+2 step penalty to all actions) for 2d6 minutes, but otherwise unharmed.

Stores

Just as a hull includes facilities for some number of crewmembers, it also includes stores for those crewmembers at no cost in hull points, power, or money. Stores are measured in days; 20 days of stores could feed one person for 20 days, or 10 people for 2 days, or 20 people for a single day. Whenever you purchase accommodations for your hull, you also purchase a basic allotment of stores—enough to feed the entire crew for 100 days. In other words, a ship normally carries 100 days of stores per crewmember or passenger.

For example, a frigate with accommodations for a crew of 60 hands begins with 6,000 days of stores at no extra charge in hull points or money. If the ship's crew capacity is increased to 72 by the addition of 4 more hull points of crew quarters, the ship's stores are increased to 7,200 days at no extra cost.

Deep Stores (PL 6)

The simplest way to extend the amount of time a ship can go without new stores is to simply carry more food and water. Each hull point of deep stores adds 1,000 days of stores to the ship's capacity. Assuming that one man-day of stores is about 1 kg of food and other consumables, this means that a small ship carrying a metric ton of deep stores can keep a single person alive for years.

Hydroponics Bay (PL 6)

The hydroponics bay is a self-sustaining ecosystem that can supply the food, water, and oxygen needs of up to 10 people. Each hydroponics bay reduces the stores consumption of 10 crewmembers to that of 1 crewmember. For example, a ship with a crew of 60 people normally consumes 60 days of stores each day. If the ship is equipped with two hydroponic bays (or a single hydroponic bay of 4 hull points, if you prefer), 20 of these crewmember count as only 2, so the total stores consumption drops from 60 days to 42 days of stores per day.

Hydroponics bays are very popular for ships designed to spend extremely long periods of time in deep space.

Recycler Unit (PL 6)

Designed to recapture every gram of biomass produced by the ship's crew, the recycler unit drastically extends the life of the ship's stores. A ship equipped with a recycler unit consumes stores at ten percent the normal rate. This is cumulative with the effects of any hydroponics bays installed. For example, a ship with a crew of sixty and six hydroponics bays only consumes stores at the rate of 6 days of stores per day; if the ship was also equipped with a recycler, this would drop to 6 days of stores per ten days.

Each recycler unit reduces the stores consumption of twenty crewmembers or passengers. It's possible for some crewmembers to be covered by a recycler while others aren't, as long as you don't mind some needless math.

Step 7: Weapons

Naturally, most warships will be heavily armed. The ability to engage and destroy the enemy is critical to any kind of military spacecraft, and its weaponry is the salient feature of the design. Even nonmilitary craft frequently carry some kind of light armament to discourage piracy or enemy attack.

Weapon systems require hull points and power. Obviously, if the weapon is not currently firing at someone or something, it doesn't need to be powered. Many ships don't have enough power to energize all of their weapon systems, defenses, and engine capacity at the same time, and must shunt power from one system to the next as the situation demands.

Weapons fall into one of four categories: beams, projectiles, launched ordnance, and special weapons. Most ships will be fitted with an armament of no more than two or three different kinds of weapons; it's much more effective to pour the concentrated fire of a large battery against one target than to attack it piecemeal with one of everything.

Arcs of Fire

When a designer installs a weapon in a hull, he must choose whether the weapon will bear in the forward, starboard, port, or aft firing arc. (Launched ordnance, including missile racks and launchers, is exempt from this; it can "fire" in any direction regardless of the ship's orientation with no special arrangements.) Arcs of fire are discussed at greater length in *Chapter 1: Basic Combat*.

In addition, beam and projectile weapons of small or light firepower may bear on zero arc.

All weapons installed in small craft are assumed to include the full zero arc automatically.

Standard mounts in light or larger vessels may be designated to bear on the zero-port or zero-starboard arc, plus one other firing arc.

Turrets in light or larger vessels may be designated to bear on the zero-port or zero-starboard arc, plus two other firing arcs.

For example, a battleship might install ten plasma guns as a secondary battery in standard mounts. The designer decides that five bear on the zero-port firing arc, and five on the zero-starboard. These weapons can bear on one other firing arc in addition to the zero arc, so the designer decides that the zero-port guns bear on the port arc in addition to the zero arc, and the zero-starboard guns bear on the starboard arc.

Standard Mounts

All beam, projectile, torpedo, and special weapons include a standard mount. This mount allows that specific weapon to fire into one specific firing arc. It's possible to stagger weapons over a variety of arcs, so a destroyer armed with four fusion lasers might mount two forward, one port, and one starboard.

No more than 25% of the ship's hull points may be spent on standard mounts firing to any one arc (except the zero arc). For example, in a ship of 40 hull points, no more than 10 hull points of standard weapon mounts can be designated as weapons that bear on the forward firing arc.

Beam and projectile weapons of 9 hull points or less automatically bear on the zero arc as well as the assigned arc (or arcs, in the case of turreted weapons).

Fixed Mounts

By eliminating any mechanical training devices, it's possible to build a slightly cheaper and smaller version of a standard weapon system. A fixed mount fires along one hex row at no penalty. A weapon in a fixed mount *can* fire into the normal arc (say, the forward arc instead of just the single line of hexes dead ahead of the ship), but suffers a +3 step penalty to the attack roll because the ship must train the weapon by fine maneuvering.

Since the fixed mount requires less hardware than the standard mount, a beam, projectile, or torpedo system in a fixed mount costs 25 percent less than its listed cost, and requires 25 percent less space.

Turrets

By mounting a weapon in a raised structure with clear fields of fire to all sides, it's possible to allocate three arcs of fire to a weapon mount instead of the one arc allowed by a standard mount. The turret includes significant machinery, extra armor, climate control, and other systems common to the ship, so it costs 25% more money and hull points than the standard mount.

Table 5–7: Hull Point Costs for Fixed Mounts and Turrets

Standard	Fixed	Turret
1	1	1
2	2	3
3	2	4
4	3	5
5	4	6
6	5	8
7	5	9
8	6	10
9	7	11
10	8	13
12	9	15
16	12	20
20	15	25
30	23	38

Sponson

The sponson is a bulge or blister in the side of the ship where a weapon can be mounted for an improved field of fire. It's not as good as a turret; a sponson allows fire only into two arcs instead of three. The sponson costs 25% more than a standard mount of the same type, but it does not require any additional allocation of hull points.

Banks

Beam weapons of PL 8 or higher can instead be mounted in banks. A bank works much like a turret, in that it extends the weapon's firing arcs from one arc to three and costs 25 percent more than a standard mount. However, the banked weapon takes up no extra hull points; the bank consists of a simple emitter plate or band through which the energy beam is "steered" by phase interference, much like the electronically scanned phased array radar system.

Multiple Weapon Mounts

It's possible to save space and money by housing multiple weapons in the same fixed mount, standard mount, turret, or bank. Because the mount machinery, power supplies, targeting computers, and so on can be installed once instead of twice, this is an efficient way to increase a ship's firepower.

Apply the multiple weapon savings after you figure the space and cost requirements for the type of mount (fixed, standard, turret, or bank).

Twin Mounts require 1.5 times the space and cost of a single weapon in the same type of mount. Power requirements are unaffected, so it's just like powering up two of the weapon in question.

Triple Mounts require twice the space and money of a single weapon in the same type of mount. Again, power requirements are unaffected.

Quad Mounts take 2.5 times the space and money of a single weapon in the same type of mount. The power requirements are unaffected.

There are two disadvantages to multiple weapon mounts. First, all weapons in a multiple weapon mount must be fired at the same target, using the same fire mode, if they're fired at all. (The captain can choose to leave some barrels of a multiple mount unfired to save power or ammo, but every barrel that fires must fire at the same target using the same mode of fire.)

Second, multiple weapon mounts possess a single location for system damage. A ship with four separate fusion lasers can suffer one weapon hit and have three fusion lasers left, but a ship with four fusion lasers in the same mount can have all four knocked out or destroyed by one lucky hit.

Concealed Mounts

Weapons can be built into concealed mounts, providing an unpleasant surprise for a potential enemy. Detecting concealed weaponry requires a specific sensor check at a +3 step penalty (or +1 if the check is made via hi-res video). Deploying concealed weaponry in the course of a fight forces a new edge check, provided the weapon in question actually hits and causes damage in the fire phase.

Concealed weapons take up 1.5 times the space and cost 1.5 times the amount of money that an unconcealed mount of the exact same type.

Beams

Beam weapons direct some form of energy on the target to spectacular effect. They range from weapons as simple as a high-powered laser to monstrous devices capable of harnessing the fundamental forces of the universe against the target.

Beams represent a good mix of cost, range, accuracy, and damage potential. However, they tend to use a lot of power.

See TABLE 5-8: BEAM WEAPONS on the next page.

Laser (PL 6)

The simplest beam weapon, the laser is used generally for small craft or point-defense batteries. It directs a focused beam of white-hot light to the target. The *heavy laser* is simply an oversized laser that pours more energy on the target. It's too big to install on light spacecraft, but is common on destroyers and larger warships.

Modification: At an additional cost of 100,000 credits and 1 hull point, the laser (not the heavy laser) can be configured for burst or autofire attack modes. This increases the power consumption to 3 power points per round.

IR Laser (PL 6)

Somewhat more powerful than the visible laser, the IR (infrared) laser focuses light in the infrared spectrum. It delivers more energy to the target than the basic laser.

Modification: At an additional cost of 200,000 credits and 1 hull point, the IR laser can be configured for burst or autofire attack modes. This increases the power consumption to 3 power points per round.

X-Ray Laser (PL 6)

This device lases very high-energy x-rays. It is the most powerful of the light lasers.

Modification: At an additional cost of 300,000 credits and 1 hull point, the X-ray laser can be configured for burst or autofire attack modes. This increases the power consumption to 4 power points per round.

Neutron Gun (PL 6)

This device directs an intense blast of neutron radiation at the target, creating severe radiation effects and wreaking havoc on both mechanical and biological targets. The heavy neutron gun is simply a larger version of this device.

Fusion Laser (PL 6)

Using a controlled fusion reaction to prime an immensely powerful high-energy burst of radiation, the fusion laser is an extremely powerful version of the x-ray laser.

Graser (PL 6)

Like the x-ray laser, the graser is a device that lases very high-energy electromagnetic waves—in this case, gamma rays. It causes severe radiation damage to its target.

Hydrogen Bore (PL 6)

This mammoth weapon is basically a fusion torch drive designed to function as a weapon. It uses magnetic fields to direct a blast of fusing hydrogen at its target. The temperature of the hydrogen bore's discharge approaches ten thousand degrees.

The hydrogen bore can be fired only as a special weapon; see *Chapter 1* for details. Note that it is an area-effect weapon and may inflict damage on targets in the general vicinity of the primary target.

Particle Beam (PL 7)

An improved version of the PL 6 neutron gun, this device projects a stream of protons, neutrons, or alpha particles at the target, accelerating each to near light-speed. Not only does it deliver a scathing blast of hard radiation, but the kinetic energy of particle impact can vaporize its target. The heavy particle beam delivers a higher volume of particles to the target.

Table 5-8: Beam Weapons

Weapon	Tech	Hull	Pow	Cost.	Acc	Range	Fire	Damage	Mode
Progress Level 6: Fusion Age									
Laser	-	1	2	$100 K	-2	1/2/3	En/S	d4s/d4w/d4+2w	F*
IR Laser	-	2	2	$250 K	-2	1/2/3	En/S	d4+1s/d4+1w/d6+1w	F*
X-ray Laser	-	2	2	$350 K	-2	1/2/3	En/S	d6+1s/d4+2w/d4m	F*
Heavy Laser	-	5	5	$2 M	-1	1/3/5	En/L	d6+2s/d6+2w/d6m	F/G
Neutron Gun	-	7	7	$10 M	0	1/3/5	En/L	2d4w/2d4+2w/2d4m	F/G
Fusion Laser	F	12	12	$20 M	+1	2/4/6	En/M	2d6w/2d6+2w/2d6m	F/G
Graser	Q	15	15	$40 M	+2	3/6/9	En/M	3d4s/2d4m/3d4m	F/G
Heavy Neutron Gun	-	22	22	$60 M	+3	3/6/9	En/H	2d6w/2d6m/2d6+2m	F/G
Hydrogen Bore**	F	50	60	$100 M	+3	4/8/12	En/SH	3d4w/3d4m/3d4c	F
Progress Level 7: Gravity Age									
Plasma Cannon	F	3	3	$400 K	-2	1/2/4	En/S	d6+2w/d8+2w/d6+1m	F*
Particle Beam	-	4	5	$500 K	-2	2/4/6	En/S	d6+3s/d4+1m/d4+3m	F
Heavy Particle Beam	-	6	8	$4 M	-1	2/4/6	En/L	d12+3s/d6+1m/d6+3m	F/G
Heavy Plasma Beam	F	8	8	$12 M	0	2/4/8	En/L	d8+2w/d12+2w/d8+2m	F/G
Matter Beam	A	11	11	$20 M	0	2/5/10	En/M	2d6+1w/2d8+1w/2d8m	F/G
Fusion Beam	F	15	15	$25 M	+1	3/6/12	En/M	d12+2w/d12+4w/d8+5m	F/G
Quantum Cannon	Q	18	18	$50 M	+2	4/8/12	En/M	2d8w/2d6m/2d4c	F/G
Boson Gun	-	20	20	$80 M	+3	4/8/12	En/H	3d6w/3d6m/4d6m	F/G
Heavy Matter Beam	A	24	24	$100 M	+3	4/8/16	En/H	2d6+1m/2d8+1m/2d8c	F/G
Fusion Bore**	F	60	75	$200 M	+3	5/10/15	En/SH	3d6m/3d4c/3d6c	F
Progress Level 8: Energy Age									
Maser	-	4	3	$400 K	-3	1/3/5	En/S	d6+2w/d4+1m/d6+2m	F*
Kinetic Lance	X	2	1	$750 K	-3	2/4/6	HI/S	d4+1w/2d4w/d4+3m	F*
Pulse Maser	-	6	4	$4 M	-1	2/5/10	En/L	d8+4w/d8+2m/d12+2m	F/G
EM Cannon	-	8	8	$10 M	-1	3/6/12	En/L	3d6s/4d6s/4d8s	F/G
Dark Fusion Gun	D	15	15	$40 M	0	4/8/12	En/M	2d6w/3d4m/2d4+1c	F/G
Gatling Maser	-	18	36	$50 M	+1	3/7/14	En/M	d8+4w/d8+2m/d12+2m	F/G/B/A
Weak Force Gun	M	25	25	$120 M	+2	5/10/15	En/H	4d4w/4d4m/4d4c	F/G
Strong Force Gun**	M	32	32	$150 M	+3	5/10/20	En/H	3d6+2m/3d4c/4d6c	F/G
Zero Bore**	Q	100	120	$300 M	+3	6/12/18	En/SH	4d6m/3d6c/3d8c	F
Progress Level 9: Matter Age									
Blacklaser	D	3	3	$1 M	-3	2/4/6	En/S	d8w/d12w/d8m	F/B/A/G
Tachyon Gun	X	12	12	$40 M	0	4/8/12	En/M	2d8+2w/2d8m/d8+1c	F/G
String Projector	Q, G	24	30	$200 M	+2	6/12/24	LI/H	4d8w/3d8m/3d8c	F/G

* Weapon modifications may make additional fire modes available.
** Area effect weapon; see TABLE 5-11.

Weapon: The name of the weapon.
Tech: The tech track required by this weapon. If more than one tech track code appears here, the builder need only have access to one of the tech tracks mentioned.
Hull: The number of hull points required for the installation of this weapon system.
Pow: The power required to employ this weapon in one round of combat.
Cost: The cost, in millions of credits, Concord Dollars, or denomination appropriate to your game.
Acc: The weapon's base accuracy modifier.
Range: The weapons short/medium/long ranges in megameters (units of 1,000 kilometers).
Fire: The weapon's type (low impact, high impact, or energy) and firepower (Small, Light, Medium, Heavy, or Super-Heavy).
Damage: The weapon's damage for an Ordinary/Good/Amazing-quality success on the attack roll.
Mode: The weapon system's allowed fire modes. 'F' stands for single-shot; 'G' stands for group (or battery) fire; 'B' stands for burst fire; and 'A' stands for autofire.

Plasma Cannon (PL 7)

The plasma cannon uses a powerful charge to convert a mix of chemicals into a white-hot plasma and then accelerates the mass toward the target with a simple rail gun. The result is a bolt of incandescent plasma that can explosively vaporize mundane materials. The heavy plasma cannon simply fires a larger bolt.

Modification: At an additional cost of 200,000 credits and 1 hull point, the plasma cannon can be configured in a rapid-fire quad mount for burst or autofire attack modes. This increases the power consumption to 5 power points per round.

Fusion Beam (PL 7)

Like the hydrogen bore of Progress Level 6, the fusion beam initiates a fusion reaction and then directs the blast at the target. The PL 7 version is simply smaller and more efficient. The colossal fusion bore is simply an exceedingly large example of this same technology.

The fusion bore can be fired only as a special weapon; see *Chapter 1* for details. The fusion bore is an area-effect weapon.

Matter Beam (PL 7)

The matter beam works much like a particle accelerator, except that it fires particles of antimatter. The power requirements to manufacture and contain antimatter within the weapon's bore are significant, but the effects are nothing short of spectacular. The heavy matter beam fires a substantially greater number of antimatter particles with a correspondingly greater effect. Note that this weapon cannot be fired through an atmosphere.

Quantum Cannon (PL 7)

The quantum cannon fires a stream of highly charged subatomic particles designed to destabilize the atoms of the target and create localized fission reactions. The boson gun is simply a larger and more powerful version of this device.

Maser (PL 8)

The maser channels an enormous amount of power through a linear antenna array, creating a broad-spectrum blast of electromagnetic energy. It devastates the target with heat, light, and intense radiation. The pulse maser is a larger version of the same weapon, firing in high-energy pulses. The gatling maser uses multiple firing arrays to handle even higher energy compressions into shorter pulse widths without burning out the emitters.

Modification: At an additional cost of 300,000 credits and 1 hull point, the maser cannon can be configured for burst or autofire attack modes. This increases the power consumption to 6 power points per round. The pulse maser can be configured for burst or autofire attack modes at a cost of 2,000,000 and 2 hull points. Its power consumption increases to 8 points.

Kinetic Lance (PL 8)

The kinetic lance creates a stream of virtual particles simulating solid matter. At the speeds involved with space combat, the impact of the lance is quite destructive.

EM Cannon (PL 8)

The EM cannon works much like the laser or maser cannons, but it concentrates its peak power in the radio band. It is especially effective against electronic equipment, inducing an EMP (electromagnetic pulse) effect similar to that of a nuclear explosion.

Dark Fusion Gun (PL 8)

Based on dark matter reactions, the dark fusion gun initiates a reaction in which normal matter fuses into dark matter, releasing an extreme amount of energy.

Weak Force Gun (PL 8)

The weak force gun interferes with the nuclear weak force, causing intense radioactive decay effects at the point of impact. The target suffers thermal and radioactive damage as its own atoms irradiate the vicinity.

Strong Force Gun (PL 8)

The nuclear strong force is the force that binds atoms together. The strong force beam emitted by this weapon causes the target's atomic nuclei to bind together so tightly that they fuse, releasing an incredible amount of energy. The target, in effect, becomes its own hydrogen bomb.

The strong force gun is an area-effect weapon; see TABLE 5–11.

Zero Bore (PL 8)

The zero bore creates a stream of energy that encourages extraordinary amounts of quantum energy fluctuation–the so-called "zero point" energy. Anything in its path is wrecked by the spontaneous detonation of space itself. Like the hydrogen and fusion bores, the zero bore can be fired only as a special weapon.

The zero bore is an area-effect weapon; see TABLE 5–11.

Blacklaser (PL 9)

Using the fluorescence of a gaseous form of dark matter, the blacklaser fires a beam of coherent light. To human eyes, it resembles the low-ultraviolet glow of a blacklight, but it's actually composed of much more energetic and dangerous radiation than ordinary photons.

String Projector (PL 9)

The string projector creates a short-lived cosmic string that passes through the target. A cosmic string is a very short-lived chain or rift of extraordinarily mass; think of it as punching a mountain through the target.

Tachyon Gun (PL 9)

The tachyon gun actually fires a blast of high-energy, faster-than-light particles at the target. Due to its ability to fire in a line of sight regardless of relative speed between the firing ship and the target, the tachyon gun ignores all penalties for firing at extreme high-velocity targets (see *Chapter 4*).

Projectiles

Like the naval cannons of old, projectile weapons use a motive force of some kind to deliver a distinct payload to the target. The simplest projectile weapons use nothing more than kinetic energy to defeat the target; a 1-kilo block of vanadium steel moving at 20 or 30 percent of light speed delivers energy comparable to a small nuke. More advanced projectile weapons use more efficient propulsion or deliver more dangerous payloads.

Projectile weapons generally cost less and use less power than beam weapons, but they don't have the same range or accuracy. The damage is about the same.

Table 5-9: Projectile Weapons

Weapon	Tech	Hull	Pow	Cost.	Acc	Range	Fire	Damage	Mode
Progress Level 6: Fusion Age									
Point Defense Gun	-	1	0	$200 K	-1	1/2/3	HI/Gd	d4s/d4w/d4+2w	F/B/A
Rail Cannon	-	4	3	$500 K	0	1/2/5	HI/S	2d4s/d6+2w/d4+1m	F/G
Needle Driver	-	6	6	$2 M	+1	1/3/5	HI/L	d6+1w/d6+3w/d4+3m	B/A
Gauss Gun	S	8	6	$5 M	+2	2/4/6	HI/M	d6+1w/d6+2m/d4+1c	F/G
Hi-Velocity Rail Gun	-	20	16	$50 M	+4	3/6/12	HI/H	d8+2w/d8+2m/d6+2c	F/G
Progress Level 7: Gravity Age									
Mass Cannon	G	2	3	$300 K	-1	1/3/5	LI/S	d6+2s/d6+1w/d6+3w	F/G
Heavy Mass Cannon	G	5	6	$2 M	0	2/4/6	LI/L	2d6s/2d6w/3d6w	F/G
Accelerator*	-	9	7	$10 M	+1	3/5/7	En/M	2d6s/2d6w/2d6m	F/G
Tach Rifle	X	12	8	$30 M	+1	6/8/10	HI/M	d12w/d8m/d12m	F/G
Heavy Accelerator*	-	18	14	$40 M	+3	4/8/10	En/H	2d6w/2d6m/2d6c	F/G
Antimatter Gun*	A	25	18	$80 M	+4	4/8/12	En/H	3d6w/3d4m/3d4c	F/G
Super Tach Rifle	X	40	30	$120 M	+4	8/10/14	HI/SH	2d8m/2d12m/2d8c	F
Progress Level 8: Energy Age									
Sliver Gun	-	4	2	$250 K	-2	1/2/4	HI/S	d6+1w/d6+3w/d4+2m	F/B/A
Neutronium Driver	S	8	4	$4 M	0	2/4/8	HI/L	d6+3w/d6+1m/d6c	F/G
Bomb Projector*	T	10	15	$15 M	-1	4/6/8	En/M	2d6s/2d6w/2d6m	F
Bomb Salvo*	T	12	18	$20 M	-1	5/7/10	En/M	2d6s/2d6w/2d6m	F
Kinetic Converter*	X	20	10	$50 M	+2	4/8/16	LI/H	d12+3w/d12+3m/d12+1c	F/G
Progress Level 9: Matter Age									
Tunneling Driver*	Q	30	15	$90 M	+3	5/10/20	En/M**	2d6s/2d6w/2d6m	F/G
Black Hole Gun	G	75	40	$200 M	+1	6/12/24	LI/SH	3d6m/4d6m/3d8c	S

* Area effect weapon; see TABLE 5-11 for more information.
** Ignores target armor and shields or screens.

Weapon: The name of the weapon.
Tech: The tech track required by this weapon.
Hull: The number of hull points required for the installation of this weapon system.
Pow: The power required to employ this weapon in one action round of combat, regardless of how many shots it actually fires.
Cost: The cost, in millions of credits, Concord Dollars, or denomination appropriate to your game.
Acc: The weapon's base accuracy modifier.
Range: The weapons short/medium/long ranges in megameters.
Fire: The weapon's type (low impact, high impact, or energy) and firepower (Small craft, Light, Medium, Heavy, or Super-Heavy).
Damage: The weapon's damage for an Ordinary/Good/Amazing-quality success on the attack roll.
Mode: The weapon system's allowed fire modes. 'F' stands for single-shot;'G' stands for group (or battery) fire; 'B' stands for burst fire; and 'A' stands for autofire.

Point Defense Gun (PL 6)

The point defense gun is primarily a defensive system intended for use against incoming missiles. At close ranges, it can be employed in an offensive role. The point-defense gun can't be used both defensively and offensively in the same action round.

The point-defense gun can fire in burst or automatic mode with no additional modification.

Rail Cannon (PL 6)

Using a series of electromagnets to propel projectiles down a magnetic track, the rail cannon can be devastating at close ranges. The projectiles are kinetic-energy weapons with no explosive charge.

Needle Driver (PL 6)

The needle driver is a larger and heavier version of the rail cannon with an extremely high rate of fire. It fires small metal flechettes at the rate of thousands of rounds per minute. It can fire only in burst or autofire mode.

Gauss Gun (PL 6)

Based on superconducting technology, the gauss gun is another electromagnetic accelerator that fires its BB-like slugs at an extremely high velocity.

High-Velocity Rail Gun (PL 6)

The largest and most powerful of the electromagnetic rail weapons, the hi-velocity rail gun uses a long track and an immense amount of power to accelerate a relatively small mass to 0.95c, or 95 percent of the speed of light. The kinetic energy delivered by even a few grams of mass striking at this speed is incredible; the BB-sized projectile can vaporize several hundred cubic meters of solid steel.

Mass Cannon (PL 7)

The mass cannon uses gravitic technology to "charge" a small bit of matter with an incredible amount of gravitational energy and then hurls it at the target. It strikes with the effect of a wrecking ball, battering the enemy to pieces. The heavy mass cannon is a larger and more powerful version of the same weapon.

Accelerator (PL 7)

Of all the weapons available to spacecraft, this might be the closest to the old naval rifles that ruled Earth's oceans for centuries. It uses a linear accelerator to throw an unguided warhead at the enemy. (Refer to TABLE 5–9.) Any warhead of size 2 or smaller may be used as the accelerator's payload (the listed damage and firepower figures assume that a low-yield nuke is the warhead of choice).

The accelerator has a capacity of 16 warhead size points, so it hold sixteen 1-point warheads or eight 2-point warheads. The weapon's magazine can be increased by four warhead size points by spending an extra hull point and 50,000 on the weapon system.

The *heavy accelerator* fires any warhead of size four or smaller; the default figures represent a high-yield nuke. Its magazine has a capacity of thirty-two warhead size points, which can be increased by four warhead size points per hull point allocated, at an additional cost of 50,000 per hull point.

The warheads fired by the accelerator and heavy accelerator are area-effect weapons.

Tach Rifle (PL 7)

The tach rifle falls somewhere in between a projectile weapon and a missile system. Its projectiles are self-powered tachyon rockets, but the rounds are not self-guiding—since the tachyon rocket actually breaks the light-speed barrier for an infinitesimal moment, there is no way that it could possibly implement course corrections in mid-flight. The rocket's guidance system is basically a timer that drops it back into real space just in time to strike the target with an extreme high-velocity impact.

The super tach rifle is a more powerful version of the same weapon, firing larger tach rockets.

Antimatter Gun (PL 7)

This refinement of the PL 6 rail gun technology throws a piece of antimatter at the target. The impact alone is extremely destructive, but the "splatter" of antimatter from the disintegrating warhead creates a cluster-bomb effect for hundreds of meters around the point of impact.

The antimatter gun is an area-effect weapon.

Sliver Gun (PL 8)

An extremely efficient mass driver armed with flechettes (or slivers) of tungsten steel, the sliver gun is the 27th-century version of a heavy machine gun or autocannon. It cycles at a rate of fire of almost 4,000 rounds per minute, and each sliver can tear through a meter or more of heavy armor.

The sliver gun can be fired in burst or autofire modes with no special modification, but this increases its power consumption to 6 points of power per round.

Neutronium Driver (PL 8)

This weapon is basically a rail gun configured to fire a projectile of false neutronium–an object the size of a baseball with a temporary mass of thousands of tons. Since neutronium is electrically neutral, the driver mechanism actually encapsulates the projectile in a sleeve or sabot of ordinary matter to fire the slug.

Bomb Projector (PL 8)

Capitalizing on the rare technology of matter transmission, the bomb projector is simply a device that teleports a powerful bomb to the vicinity of an enemy ship and detonates it. Its range is short, but it's unusually accurate for a projectile weapon. Any warhead of size 2 or smaller can be installed; refer to TABLE 5–10. The weapon stats assume that the warhead is a low-yield nuke.

The bomb projector has a capacity of sixteen warhead size points, so it holds sixteen 1-point warheads or eight 2-point warheads. The magazine can be increased by four warhead size points per extra hull point (and 50 K) spent on the weapon system.

Most of the warheads fired by this system are area-effect weapons.

Bomb Salvo (PL 8)

An improvement of the bomb projector, this weapon is possible only with matter transmission technology. It teleports a salvo of four size 2 warheads (see TABLE 5–10) to the vicinity of the enemy ship. These attack as missile salvo or battery fire, with a –1 step bonus to the attack roll of the second warhead, a –2 step bonus to the attack roll of the third, and a –3 step bonus to the attack roll of the fourth.

The bomb salvo has a capacity of sixteen warhead size points, so it holds sixtee 1-point warheads (four salvoes) or eight 2-point warheads (two salvoes). The magazine can be increased by four warhead size points per extra hull point (and 50 K) spent on the weapon system.

Kinetic Converter (PL 8)

Based on the technology of energy transformation, the kinetic converter instantaneously imparts an immense amount of kinetic energy to a projectile, firing it at tremendous speed. No magnetic acceleration or propellant is necessary, so the converter can fire projectiles of almost any size or composition.

Black Hole Gun (PL 9)

Related to the singularity projector, the black hole gun creates a quantum black hole and fires it at the enemy. A quantum black hole is extremely small–no bigger than a single molecule–but it contains a mass of hundreds of millions of tons. Each projectile is roughly the mass of a mountain. Tidal effects within a few dozen meters of the black hole are extreme, ripping even the toughest armor to shreds.

The black hole gun can be fired only in 'special' mode; see *Chapter 1* for details.

The warheads delivered by this system are usually area-effect weapons.

Tunneling Driver (PL 9)

This device employs the principle of quantum tunneling to launch a projectile that materializes inside the target, bypassing the enemy's surface armor. Any warhead of size 2 or smaller (see TABLE 5–10) may be delivered in this fashion; the weapon stats assume that the tunneling driver is firing a low-yield nuke.

The tunneling driver ignores the target's shields, screens, and armor. (Jammers and other devices that interfere with targeting still affect the attack roll, however.) The driver has a capacity of sixteen warhead size points, which can be increased four size points by spending an extra hull point and an additional 50,000 on the weapon system.

Missiles, Bombs, and Mines

Missiles, bombs, and mines are grouped together because they all share two important features: The weapon's effectiveness is largely determined by the type of warhead delivered to the target, and the launch system is extremely simple compared to a beam or projectile weapon. Weapons in this category consist of four basic components: the launch system, propulsion system, warhead, and guidance system.

There are a couple of ways to handle missiles, bombs, and mines in combat. Four missiles fired at the same time make up a salvo; forty missiles fired at one time make up a flight (a very impressive display of firepower). Ten bombs or mines deployed at the same time comprise a pattern. Generally, it's advantageous to hit the enemy with a number of warheads at the same time instead of firing a bunch of weapons one at a time.

Launch Systems

Launch systems are designed much like other weapon systems. They take up some number of the ship's hull points, require some power to operate, and cost money to install. The launch system chosen also governs how many missiles, bombs, and so on, can be fired in a single round. However, the important weapon characteristics–accuracy, range, firepower, and damage–are determined by the type of ordnance carried.

Launched Ordnance

Here's a brief summary of how you need to equip your warship to carry launched ordnance:

Bombs require a bomb rack or bomb bay, a bomb propulsion system (really just a casing), and a warhead. Mines require a minelayer, a mine propulsion system (again, a simple casing), a warhead, and a guidance system.

Missiles require a missile rack or tube, a missile propulsion system, a warhead, and a guidance system.

If you don't want to go to the trouble of customizing your ship's ordnance, check out the standard launch systems described later in this section.

Table 5-10: Missiles, Bombs, and Mines (Part 1)

Launch Systems

Weapon	Tech	Hull	Power	Cost	Cap	Reload	ROF	Notes
Progress Level 6: Fusion Age								
Bomb Rack	-	1	0	$10 K	4	N	All	
Bomb Bay	-	10	1	$100 K	40	Y	10/rd	
Extra capacity	-	+1	0	$10 K	+4	-		
Minelayer	-	5	2	$100 K	10	N	10/rd	Deploys one mine pattern
...Extra capacity	-	+5	+2	$50 K	+10	-		
Missile Rack	-	2	1	$50 K	8	N	4/rd	
Missile Tube	-	3	1	$100 K	12	Y	1/rd	
Magazine	-	+1	0	$50 K	+4	-	-	
Progress Level 7: Gravity Age								
Ordnance Cell Array	-	10	2	$1 M	40	N	All	Carries missiles, bombs, or mines
Extra cells	-	1	0	$25 K	+4	N	-	

Tech: The tech track required by this weapon.
Hull: The number of hull points required for the installation of this weapon system.
Pow: The power required to employ this weapon in one turn of combat.
Cost: The cost, in millions of credits, Concord Dollars, or denomination appropriate to your game. The launch system cost does not include the cost of any ordnance carried.
Capacity: The capacity of the launch system. Missiles, mines, and bombs of Size 1 require 1 point each; weapons of Size 2 require 2 points each.
Reload: Whether or not this system can be reloaded in open space.
ROF: The number of missiles, bombs, or mines that may be fired in a single round.

Propulsion Systems

Weapon	Tech	Size	War	Cost	Acc	End	ACC	Notes
Progress Level 6: Fusion Age								
Bomb or mine, light	-	1	1	$5 K	-3	-	-	
Bomb or mine, med	-	2	2	$10 K	-2	-	-	
Bomb, or mine, hvy	-	4	4	$20 K	-1	-	-	
Rocket, chem	-	2	1	$15 K	+2	2	2*	
Missile, light	S	2	2	$25 K	0	2	4*	
Missile, heavy	S	4	4	$50 K	+1	4	3*	
Progress Level 7: Gravity Age								
Missile, light	Q, G	1	1	$40 K	-1	4	6	
Missile, medium	Q, G	2	2	$60 K	0	6	5	
Missile, heavy	Q, G	4	4	$100 K	+1	8	4	
Progress Level 8: Energy Age								
Missile, light	X	1	2	$50 K	-2	6	8	
Missile, medium	X	2	4	$100 K	-1	10	6	
Progress Level 9: Matter Age								
Missile, tachyon	Q	4	4	$500 K	0	-	-	Hits target in same phase

* On the PL 6 scale. In PL 7 encounters, divide this figure by ten.

Size: The number of launch system capacity points required by this weapon. For example, two bombs (size 1) or one heavy bomb (size 2) could fit into a bomb rack with a capacity of 2.
Warhead: The size of the warhead that can be mounted on this propulsion system.
Acc: The basic accuracy modifier for the weapon, in steps.
End: The number of rounds in which this propulsion system can apply its acceleration before its fuel or power is exhausted.
ACC: The acceleration rating of the missile system, in megameters per phase per phase.

Table 5-10: Missiles, Bombs, and Mines (Part 2)

Warheads (Mines, Bombs, and Missiles)

Weapon	Tech	War	Cost	Acc	Fire	Damage
Progress Level 6: Fusion Age						
AA Burst*	-	1	$5 K	-2	HI/S	d8w/d6m/2d4m
CHE*	-	2	$10 K	0	En/L	d6+1s/d6+1w/d4+2m
KE Submunition*	-	2	$20 K	-1	HI/L	d6+2s/d6+2w/d6+4w
Low-yield Nuke*	-	2	$500 K	0	En/M	2d6s/2d6w/2d6m
Hi-yield Nuke*	-	4	$1 M	+1	En/H	2d6w/2d6m/2d6c
Progress Level 7: Gravity Age						
Plasma*	F	1	$50 K	-1	En/L	d6+3w/d8+3w/d6+2m
MRB (Mass Reaction)*	D	2	$200 K	0	En/M	2d4+1s/2d4w/d8+1m
Matter*	A	4	$2 M	+1	En/SH	3d6w/3d6m/2d6+2c
Progress Level 8: Energy Age						
Starload*	D	1	$80 K	-2	En/L	2d6w/2d6m/2d4c
Nova Burst*	G	2	$500 K	-1	LI/H	2d8w/2d6m/2d4c
Zero Point*	Q	4	$3 M	0	En/SH	3d8w/3d8m/3d6c
Progress Level 9: Matter Age						
Null Bomb*	X	4	$5 M	-1	En/SH	4d6w/4d6m/4d6c

* Area effect weapon.

War: The size of the warhead.
Acc: The warhead's accuracy modifier.
Fire: The attack type (low impact, high impact, or energy) and its firepower (small, light, medium, heavy, or super-heavy.)
Damage: The damage inflicted by an Ordinary, Good, or Amazing-quality success on the attack roll.

Guidance Systems (Missiles, Mines)

Weapon	Tech	Cost	Acc	Notes
Progress Level 6: Fusion Age				
Active Radar	-	$20 K	0	Can be jammed by ECM
EM Homing	-	$10 K	0	Accuracy drops to +2 step penalty if target is not EM active
IR Homing	-	$10 K	0	Accuracy drops to +2 step penalty if target is not IR hot
Command	-	$5 K	+1	Can be jammed by ECM
Progress Level 7: Gravity Age				
Mass Homing	G	$10 K	-1	
Progress Level 8: Energy Age				
AI Probability	C	$20 K	-2	

Acc: The guidance system's accuracy modifier, cumulative with the propulsion system and warhead accuracy.

All launch systems possess a special characteristic called capacity, which indicates how much ordnance the system can carry. Obviously, a missile rack can carry a lot of small missiles or a few big ones. Generally, each hull point devoted to a launch system provides two to four points of capacity for ordnance. As the designer, you can choose to buy extra capacity for your launch system by allocating some extra hull space and money to the launch system.

Missiles, bombs, and mines come in three sizes—light, medium, and heavy. Light weapons take up 1 point of the launch system's capacity, medium weapons take up 2 points, and heavy weapons take up 3 points. For example, a bomb rack (capacity 4) could carry 4 light bombs, 2 medium bombs, or 1 heavy bomb.

Most launch systems can be reloaded only in a friendly base or port. Even if a ship is carrying extra missiles in its cargo space, it takes a long and complicated EVA procedure to maneuver the ordnance into its firing position. Reloading bomb racks, missile racks, or ordnance cells in open space requires the ship to avoid all speed

Table 5-10: Missiles, Bombs, and Mines (Part 3)

Sample Systems

Weapon	Tech	Hull	Pow	Cost.	Acc	Range	Fire	Damage	Mode
Progress Level 6: Fusion Age									
SMP Bomb Rack	-	1	0	$70 K	-3	0	HI/L	d6+2s/d6+2w/d6+4w	F (2)
Fusion Bomb Rack	-	1	0	$1 M	-1	0	En/H	2d6w/2d8m/2d6c	F (1)
CHE Missile Rack	S	2	1	$270 K	0	*	En/L	d6+1s/d6+1w/d4+2m	F (4)
Missile Mount	S	10	1	$1.6 M	-	*	-	-	F
SMP Missiles					-1	*	HI/L	d6+2s/d6+2w/d6+4w	(10)
AA Missiles					-2	*	HI/S	d8w/d6m/2d4m	(10)
Progress Level 7: Gravity Age									
Plasma Missile Rack	F, G	2	1	$850 K	-3	*	En/L	d6+3w/d8+3w/d6+2m	F (8)
Matter Missile Rack	A, G	2	1	$4.2 M	+1	*	En/SH	3d6m/2d6c/2d6+2c	F (2)
Ordnance Array	!	20	2	$16 M	-	*	-	-	F
Plasma Missiles					-3	*	En/L	d6+3w/d8+3w/d6+2m	(20)
Matter Missiles					+1	*	En/SH	3d6m/2d6c/2d6+2c	(10)
MRB Mines					-3	0	En/M	2d4+1s/2d4w/d8+1m	(10)
Progress Level 8: Energy Age									
Nova Array	G, C	10	2	$23.8 M	-5	*	LI/H	2d8w/2d6m/2d4c	(40)

* Missile systems have special range considerations; see text.
! The PL 7 ordnance array requires technology types A, D, F, and G.

changes or maneuvers for 1d4 hours.

Bomb bays and missile tubes are an exception to this rule; they can be reloaded in space, as long as the ship is carrying extra ordnance in an internal magazine.

Finally, every launch system possesses a basic rate of fire, which indicates how many weapons it can fire, drop, or dispense in a single round. A missile tube must cycle through the process of bringing the next missile from the magazine to the rail and then firing it off, but a simple rack or cell system can torch off a number of missiles at the same time.

Bomb Rack (PL 6): As you might expect, this launch system is designed to carry bombs. Its capacity can't be expanded, but a ship could buy and mount multiple bomb racks.

Bomb Bay (PL 6): The bomb bay has a capacity of 40 light, 20 medium, or 10 heavy bombs. Its capacity can be expanded by 4 points (4 light, 2 medium, or 1 heavy bomb) for each additional hull point assigned to the system beyond the 10 hull points normally required.

Minelayer (PL 6): This system consists of two or more mine rails, low-powered magnetic accelerators designed to deploy a pattern of mines into one hex adjacent to the launching ship in a single phase. Unlike other launched weapons, at least ten mines (a single mine pattern) must be deployed to be effective.

Since the minelayer also includes machinery for deploying the mines, it has half the capacity of other launch systems of a similar size.

Missile Rack (PL 6): This is a system that can hold eight light missiles, four medium missiles, or two heavy missiles. Its capacity can't be increased, but it's easy enough to buy multiple missile racks.

Missile Tube (PL 6): This is an internal missile storage and launch facility. Its basic capacity is twelve, and it can fire one missile per round. While its rate of fire is inferior to the missile rack, the missile tube enjoys one advantage; it can be reloaded in space.

Ordnance Cell Array (PL 7): This system is similar to the vertical launch cells of today's naval vessels. Each missile is pre-loaded into a single cell or canister; the array consists of dozens of these canisters. Bombs, mines, and missiles of various sizes and warheads can be carried as the shipbuilder sees fit, offering a great deal of tactical flexibility.

Propulsion Systems

The fuselage, engine, casing, and general design of the weapon is included in this category. Propulsion systems range from virtually none (bombs or mines) to sophisticated devices such as the tachyon missile.

The *size* of the propulsion system indicates how many points of launch system capacity it takes up. For example, a medium bomb takes 2 points of capacity, so a bomb rack (capacity 4) could carry two medium bombs.

The warhead rating of the propulsion system describes the maximum size of the warhead that can be fitted to that propulsion system. Very large and powerful warheads require heavy propulsion systems, while small warheads require light propulsion systems.

The weapon's propulsion system also provides a basic accuracy rating. This reflects the fact that small missiles are generally more nimble than large missiles, and thus more likely to hit a target that's trying not to be hit.

Endurance is the number of rounds in which the missile can accelerate. After the missile's endurance runs out, it must maintain its last course and speed and can no longer maneuver. (Bombs and mines don't accelerate, so they don't have an endurance rating of any kind.)

Acceleration measures the missile's ability to change its course and speed each phase. If you prefer to play with simpler missile rules, refer to *Chapter 1* for details on light, medium, or heavy missile speeds.

Bombs (PL 6): A bomb is basically nothing more than a warhead delivered through the deft maneuvering of some ship. Light, medium, and heavy versions exist to accommodate warheads of various sizes.

Mines (PL 6): Again, a mine doesn't require much in the way of propulsion. Light, medium, and heavy versions are available.

Chemical Rocket (PL 6): In the absence of any better technology, a simple chemical rocket works as a propulsion system. It has no chance of catching any ship equipped with a decent engine, but it's dangerous to low-speed ships such as sailships.

Missile (PL 6, 7, 8): As different engines become available, missile capacity and speed increase. It's important to make a note of exactly what Progress Level missile a ship carries, since the PL 7 and 8 missiles are hundreds of times faster than the PL 6 missile engines.

The PL 6 missiles are built around ion engines; PL 7 missiles are built around particle impulse drives or gravity induction engines; and the PL 8 missiles are built around inertial flux drives or gravitic redirectors.

Tachyon missile (PL 8): This is a special missile propulsion system that uses an FTL drive to deliver the warhead to the target instantaneously. A ship firing a tachyon missile ignores the penalties for firing at targets moving at extremely high velocity. In fact, the tachyon missile can be fired even while a ship is traveling FTL against another FTL target within range. (See "FTL Combat" in *Chapter 1.)*

Warheads

The warhead is the business end of the bomb, mine, or missile. Warheads range from simple kinetic energy penetrators–steel spears–to explosive devices harnessing the fundamental forces of the universe.

Warheads vary in size, and so require different propulsion systems and launch arrangements. This is reflected by the warhead's size. For example, a mass reaction warhead is a size 2 warhead, which means that it's too big for a light bomb or a light missile. A medium or heavy bomb or missile would be required to carry a mass reaction warhead.

Accuracy represents just how good of a hit is necessary for the warhead to take effect. Very large weapons such as fusion bombs and matter bombs don't need to detonate on top of their target to wreck it, so they have an accuracy bonus. This is cumulative with the accuracy modifiers for the propulsion system and the guidance system.

Firepower rates the type (low impact, high impact, or energy) and firepower (small craft to super-heavy) of the warhead. It's the best indication of just how destructive the warhead is; a light bomb can blow up a vehicle or a building, while a super-heavy warhead may destroy fortress ships or entire cities.

The weapon's damage rating indicates the damage inflicted by an Ordinary, Good, or Amazing-quality success on the attack roll.

AA Burst (PL 6): This small warhead is intended for use against small craft, enemy missiles, and vehicles. It can seriously damage a fighter or trader, but it's unlikely to cause any significant damage to a destroyer or cruiser. The warhead consists of a high explosive burst charge and a directed spray of shrapnel.

The AA burst is an area-effect weapon. It can damage targets dozens of meters from its burst point. The quality of the attack roll indicates how close to the target the missile got before it detonated.

CHE (PL 6): The conventional high-explosive warhead can wreck many small craft, but it's useful only in salvos or flights against light and medium warships. Heavy vessels such as battleships can ignore the weapon despite its payload of hundreds of kilos of advanced chemical explosives.

The CHE warhead is an area-effect weapon.

KE Submunition (PL 6): This warhead consists of a bundle of dozens or hundreds of tungsten steel darts or rods, each mounted on small rocket motors. When the weapon approaches its target, the warhead splits into a deadly sleet of high-velocity metal arrows. The impact energy alone can vaporize meters of heavy armor.

Any other targets within 200 meters of the primary target are attacked at the same time. Each target gets its own attack and damage rolls.

Low-Yield Nuke (PL 6): Marginally more acceptable than the H-bomb, the low-yield nuke is a fission weapon designed to "fizzle" in an explosion of only 2 or 3 kilotons, instead of a 30 or 40 kiloton city-killer. This is still an enormous amount of firepower, capable of devastating a city center or military base.

The low-yield nuke is an area-effect weapon. Don't forget that damage upgrades against targets of inferior toughness–the nuke inflicts 2d6m against things like people and cars within its 800-meter blast radius.

While the low-yield nuke will devastate an area more than a kilometer across, in a space battle this almost always means that only a single enemy ship is affected. On the megameter scale of combat, a single hex is 1,000 kilometers across.

High-Yield Nuke (PL 6): This a 1-megaton monster, a city-busting fusion bomb hundreds of times more powerful than the low-yield weapon. In open space, it's unlikely that more than one enemy ship could be affected by a single blast. However, a high-yield nuke is a city-killer.

Plasma (PL 7): The plasma warhead is an improvement on the advanced explosives of the previous Progress Level. It creates a blast of white-hot plasma that can blast a small ship like a fighter out of the sky with one shot.

MRB (PL 7): This warhead uses a dark matter reaction to

Table 5-11: Area Effect Weapons

Weapon	Type	Range for Damage of Quality: Ama	Good	Ordinary	Notes
Progress Level 6: Fusion Age					
Hydrogen Bore	beam	100m	200m	300m	TA
AA Burst	warhead	10m	20m	40m	TA
CHE	warhead	20m	40m	60m	TA
KE	warhead	all targets within 200m attacked			TA
Low-yield Nuke	warhead	200m	400m	800m	MD
High-yield Nuke	warhead	5 km	10 km	20 km	SA
Progress Level 7: Gravity Age					
Fusion Bore	beam	200m	400m	600m	TA
Strong Force Gun	beam	150m	300m	600m	TA
Antimatter Gun	proj.	100m	200m	300m	MD
Plasma	warhead	60m	120m	180m	TA
Matter Reaction	warhead	500m	1 km	2 km	SA
Matter Bomb	warhead	10 km	20 km	40 km	SA
Progress Level 8: Energy Age					
Zero Bore	beam	300m	600m	1 km	MD
Kinetic Converter	proj.	200m	400m	800m	MD
Starload	warhead	80m	160m	240m	TA
Nova Burst	warhead	1 km	2 km	4 km	SA
Zero Point	warhead	20 km	40 km	80 km	SA
Progress Level 9: Matter Age					
Null torpedo	torpedo	100m	200m	300m	TA
Null bomb	warhead	30 km	60 km	100 km	SA

Type: The weapon's category (beam weapon, projectile weapon, or warhead for a missile, bomb, or mine).
Range for Damage of Quality: The range at which the weapon inflicts its Amazing, Good, and Ordinary damage figures. For example, the low-yield nuke inflicts its Amazing damage of 2d6m within 200 meters of the detonation point, its Good damage of 2d6w within 400 meters, and its Ordinary damage of 2d6s within 800 meters.
Notes: Weapons marked TA are considered tactical arms and may be freely employed. Weapons marked MD are considered weapons of mass destruction and may be specially limited or controlled. Weapons marked SA are strategic arms and generally can't be used with the direct approval of a national command authority.

create a powerful wave of energy. It's more concentrated than a nuclear blast, but less likely to cause unwanted collateral damage. See TABLE 5–11 for details on area-effect weapons.

Matter (PL 7): The matter warhead is more properly called the antimatter warhead; it contains a kilo or two of antimatter in a magnetic bottle, and detonates simply by shutting down the containment vessel. It's equivalent to a nuke.

Starload (PL 8): The most powerful of the purely tactical warheads, the starload is fueled by a dark-matter reaction akin to that of the matter reaction burst of PL 7. However, it's miniaturized for smaller applications. Like most warheads, it can cause damage in a wide area of effect. Note that the bantam starload rocket described in the *Player's Handbook* is a much smaller version of this weapon.

Nova Burst (PL 8): This warhead creates an incredible gravitational force to compress normal matter into an incredibly dense mass, which then explodes in a colossal detonation. A single nova burst can cripple a destroyer or cruiser, and may seriously damage larger warships. The nova burst is an area-effect weapon.

Zero Point (PL 8): This bomb creates a spontaneous quantum fluctuation of energy akin to the Big Bang, albeit on a smaller scale. It can devastate thousands of square kilometers in an instant. The warhead may miss its target by dozens of kilometers and still inflict lethal damage to robust targets such as orbital fortresses or heavily armored battleships.

Null Bomb (PL 9): This horrifying weapon simply generates a field in which all atomic bonds cease to exist. All nearby matter is reduced to subatomic dust.

Guidance Systems

The last component of a missile or mine is its guidance system. How does it recognize its target, and what controls its detonation? The only game effect a guidance system provides is a final modifier to the weapon's accuracy. Most missiles

tend to be very accurate, but this is balanced by the fact that they must survive enemy counter-fire to reach their target.

Active Radar (PL 6): The weapon carries an active radar seeker that locks onto the target and guides the weapon. It's a 'fire and forget' system, since the weapon needs no guidance from the launch platform once its radar seeker activates. This guidance system is most appropriate for missiles, since mines with actively emitting warheads would be very easy to spot and avoid.

EM Homing (PL 6): The weapon is fitted with a sensitive antenna array that detects the target's electromagnetic emissions and homes in on them. EM emissions normally include sensors, fire control, radio communications, and "engine noise" caused by powerful magnetic fields in fusion or antimatter plants. EM homing is especially effective against attempts to jam the missile through electronic countermeasures; the seeker head defaults to a "home on jam" mode that guides the warhead to the source of the electronic emissions.

If the target is not actively emitting in the electromagnetic spectrum, the missile's accuracy drops to a +2 step penalty.

IR Homing (PL 7): The weapon is fitted with a sensor that detects the target's heat signature. Ion engines, fusion torches, missile launches, and other heat-producing devices create a large infrared signature for the warhead to lock onto.

If the target is "cold and dark" and doesn't emit any heat, the guidance system's accuracy drops to a +2 step penalty.

Command (PL 6): The weapon is directed through an active command signal from its launch platform. In other words, someone on the launching ship is using a joystick to fly the missile at the target (actually, he's probably using some kind of sophisticated hands-off computer software, but you get the idea). Command guidance is cheap and reasonably accurate, but it's not a 'fire and forget' system like the other forms of guidance available at PL 6.

Mass Homing (PL 7): The mass detector, a Gravity Age technology, makes this seeker head possible. The weapon locks onto the gravitational signature of the target and pursues it with great accuracy. Unlike the EM or IR homing

Sample Bomb and Missile Systems

If you don't want to go to the effort of custom-building every missile your warship carries, you might want to check over this list for some pre-packaged weapon systems to install. Obviously, any of these systems could be customized easily by changing the ordnance carried.

SMP Bomb Rack (PL 6)
The SMP bomb rack weapon system consists of a bomb rack with two KE submunition warheads in medium bomb casings. It takes up only a single hull point, so it's suitable for fighters, strike fighters, and other small craft that need to deliver a reasonable punch to a ground target or a large ship.

Fusion Bomb Rack (PL 6)
Take the two KE bombs off the rack and replace it with a high-yield nuke, and you've got a weapon of mass destruction. The fusion bomb can destroy a hardened enemy base, wipe out a city, or wreck a battleship in a single blow. Of course, the bomb rack mounts only one fusion bomb, but how many fusion bombs do you really need?

CHE Missile Rack (PL 6)
This is a launch rack fitted with four light missiles, each equipped with a CHE warhead and an active radar guidance system. It's most useful against small craft, light warships, or relatively soft ground targets. This weapon system would be a good mount for a strike fighter against small craft or light ships, or for an extra antiship punch on board a larger vessel.

Missile Mount (PL 6)
Consisting of a launch tube with 7 hull points devoted to an expanded missile magazine, this system features 20 light missiles–10 with KE submunition warheads for use against enemy vessels, and 10 with AA burst warheads for use against fighters and enemy missiles. All missiles are guided by active radar, so they're fire-and-forget. It's a good general-purpose mount for a PL 6 destroyer or corvette, providing both offense and defense.

Plasma Missile Rack (PL 7)
This system consists of a missile rack with eight light missiles, each armed with a mass-homing plasma warhead. It's a good weapon for fighters or strike fighters to use against other small craft, and it offers a reasonable antiship punch against light warships such as destroyers.

Matter Missile Rack (PL 7)
Substitute two heavy missiles with matter warheads for the light missiles of the previous system, and you've got a capital ship killer or city-buster. This rack mounts two matter missiles with mass-homing warheads. The super-heavy firepower and extreme damage of these weapons means that a single fighter or strike craft can blast a battleship out of existence–with a lucky shot.

Ordnance Array (PL 7)
This 20-hull point ordnance cell system includes 20 plasma missiles, 10 matter missiles, and 10 mass reaction burst mines (enough for one mine pattern). This would constitute the main battery of a light cruiser or destroyer. The plasma missiles can be used against small craft or incoming missiles, the matter missiles can threaten a capital ship, and the mines are suitable for a variety of missions.

Note that the ordnance array is very flexible; a ship designer could mix and match the ordnance carried to any number of specific missions.

Nova Array (PL 8)
This is an ordnance cell array packed with forty AI-guided nova burst warheads on light missiles. This is sufficient for ten salvoes or one flight of missiles. The nova array could be the main armament of a missile corvette or cruiser. It can overwhelm medium or heavy warships with a massive volley of powerful missiles.

systems, there aren't many countermeasures that can fool the mass homing warhead.

AI Probability (PL 8): This guidance system consists of a passive/active EM seeker head coupled to a powerful computer processor. Not only can it home in through the target's electromagnetic signature, but it can also form extremely accurate predictions of the target's future movement and plot sophisticated intercept courses.

Torpedoes and Special Weapons

The last category of weapons available to the shipbuilder is torpedoes and various special weapons. Torpedoes generally carry a punch disproportionate to their size, offering a small ship the ability to damage a much larger one. Special weapons are a catch-all for a number of strange devices that just don't fit anywhere else.

Cable Gun (PL 6)

The cable gun fires a magnetic grapple to a distance of about 10 kilometers; its winches can then drag the grappling ship (or its target) into contact, making a boarding action possible. The firing ship must be in the same hex as the target, and it must match the target's course and speed (see *Chapter 1*).

The winch attached to the cable gun can "drag" 50 hull points of mass. This means that a ship larger than 50 hull points that cables another ship larger than 50 hull points simply doesn't have the winch capacity to drag its target closer or itself to its target. However, multiple cable guns add their capacities together, so a ship with four cable guns can pull 200 hull points—enough to drag itself to its target or its target to itself if either is 200 hull points or less in size.

The reel speed is 100 meters of cable per phase, so a target one kilometer away would take ten phases to reel in.

If the grappled target creates an acceleration of 0.01 Mpp that isn't instantly matched by the grappling ship, the cable snaps. The cable gun mount and winch includes one spare cable per cable gun, which can be installed in about an hour of work.

RF Spike (PL 6)

Also known as the HERF gun (High Energy Radio Frequency), this weapon consists of a powerful capacitor and a simple linear antenna. It generates a one-shot electromagnetic pulse that burns out the capacitor and its antenna, but it can cause serious EMP damage to the target. The RF spike has super-heavy firepower, but it never upgrades its damage against any target, regardless of toughness. In other words, it has the same effect on a dreadnought that it does on a fighter (although the dreadnought probably has a lot more boxes on its damage track).

The main drawback to this weapon is the fact that each use wrecks the equipment; the RF spike can be fired once, and then the installation must be replaced.

Spare components for the RF spike cost 100,000 and take up one hull point of space per three shots. It takes d4 hours to replace the RF spike if the parts are on board.

Thermal Inducer (PL 6)

This is the classic heat ray, an energy field in which molecular motion is drastically accelerated, thus raising the target's temperature. It affects all targets in a single hex within range. The inducer begins with an accuracy of +3 steps in the first round that it is fired, but this improves by one step in each consecutive round that the weapon is trained on the same target ship. For example, if an inducer is fired at the same ship three rounds in a row, its accuracy is +3 steps in the first round, +2 steps in the second, +1 steps in the third, and so on. The weapon's best possible accuracy is –3 steps.

Thermal Nullifier (PL 6)

The opposite of the thermal inducer is the thermal nullifier. This weapon creates a field that suppresses molecular motion, lowering the target's temperature. In extreme cases, all molecular activity is arrested, reducing the target to absolute zero—a very damaging state for most spaceships. Like the thermal inducer, this is a beam or field that affects all targets in a single hex, plus any targets that lie directly between the firing vessel and the target.

The inducer begins with an accuracy of +3 steps in the first round that it is fired, but this improves by one step in each consecutive round that the weapon is trained on the same target ship, to a maximum accuracy of –3 steps.

Tractor Beam (PL 7)

An application of advanced gravity tech, the tractor beam works a lot like the cable gun of PL 6, except that it's much better. It can be used at range, and against targets whose course and speed differ wildly from the firing ship. Each tractor beam mount is capable of capturing up to 50 hull points. Multiple tractor beams can "combine" to capture larger vessels.

If the tractor beam can affect the target, the firing ship can apply an acceleration of 0.25 Mpp per phase to the target vessel. If the firing ship has enough tractor beams to affect the target multiple times, this acceleration capacity increases as shown below:

Tractor Overage	Target Acceleration
1x	0.25 Mpp
2x	0.5 Mpp
3x	1 Mpp
4x	2 Mpp
5x	3 Mpp

Table 5-12: Torpedoes and Special Weapons

Weapon	Tech	Hull	Pow	Cost.	Acc	Range	Fire	Damage	Mode
Progress Level 6: Fusion Age									
Cable Gun	S	2	1	$150 K	+1	0	--	Special	F
RF Spike	-	3	6	$500 K	-2	1/2/3	En/SH	3d4s/3d6s/2d4w****	F
Thermal Inducer	X	8	12	$4 M	+3@	2/4/6	En/M	d6w/d6+1w/d6m	F
Thermal Nullifier	X	15	20	$35 M	+3@	2/4/6	En/M	d6+3w/d6+4w/d6+2m	F
Progress Level 7: Gravity Age									
Tractor Beam	G	2	5	$500 K	-1	2/4/8	--	Special	F
Mass Converter	M	4	6	$1 M	-4	2/4/6	En/S	d6+3s/d6+3w/d6+2m	F
Matter Torpedo	D	5	7	$600 K	0	2/4/8	En/M	2d6s/2d6w/d6+3m	F
Plasma Torpedo	F	10	15	$10 M	+1	3/6/9	En/H	3d6s/3d6w/d8+3m	F
Progress Level 8: Energy Age									
EM Torpedo	Q	3	5	$450 K	-2	2/5/10	En/M	d6+3s/2d8s/d4+2w	F
Neural Inhibitor	P	12	20	$40 M	0	1/2/3	**	1d12s/1d12w/1d20w**	F
Fission Activator	M	25	75	$80 M	0	4/8/12	En/H	2d4m/2d4+2m/3d4+2c	F
Progress Level 9: Matter Age									
Boarding Transporter	T	6	9	$10 M	--	4/6/8	--	Special	F
Null Torpedo	X	18	25	$50 M	+2	3/6/15	En/SH	2d8w/2d8m/2d8c	F
Code Arranger	M	25	50	$100 M	+1	4/8/12	***/H	d8m/d8+4m/d8c	F

** The neural inhibitor only affects crewmen; see the weapon description.
*** The code arranger ignores armor.
**** The RF spike never upgrades damage against targets of inferior toughness.
@ Accuracy improves by 1 step for each consecutive round the weapon is fired at the same target, to a maximum of a –4 step accuracy bonus.

Weapon: The name of the weapon.
Tech: The tech track required by this weapon.
Hull: The number of hull points required for the installation of this weapon system.
Pow: The power required to employ this weapon in one round of combat.
Cost: The cost, in millions of credits, Concord Dollars, or denomination appropriate to your game.
Acc: The weapon's base accuracy modifier.
Range: The weapons short/medium/long ranges in megameters (units of 1,000 kilometers).
Fire: The weapon's type (low impact, high impact, or energy) and firepower (Small craft, Light, Medium, Heavy, or Super-Heavy).
Damage: The weapon's damage for an Ordinary/Good/Amazing-quality success on the attack roll.
Mode: The weapon system's allowed fire modes. 'F' stands for single-shot.

6x	4 Mpp
7x	5 Mpp
8x	6 Mpp
9x	7 Mpp
10x	8 Mpp

For example, a destroyer mounts three tractor beams, so it can affect a target of up to 150 hull points. It encounters a scoutship of 30 hull points and tries to capture it. The tractor capacity is 5 times that needed to hold the scout, so the destroyer can apply an acceleration of 3 Mpp to the ship each phase. Depending on the power of the scout's engines, this may be enough to slow it down, halt it altogether, and begin to pull it in. Ships without acceleration compensation can be instantly destroyed by the extreme acceleration imparted if the operator is not careful; see "Acceleration Kills" in *Chapter 4*.

If the target is too big to affect but the tractor-armed ship isn't, the tractor beam will pull the firing ship towards its target, not the other way around. If both ships can be affected, the smaller ship moves toward the larger. Note that the acceleration applied by the tractor beam always pulls the target in; a tractor-armed ship can't shove another ship into a convenient asteroid or planet.

Once the tractor beam scores a successful hit, it remains "locked on" and exerts its acceleration each phase until the firing ship releases the beam or the target escapes. A target ship can shake off a tractor beam with a successful crew check (or pilot skill roll against Vehicle Operations-*space craft*) provided the check equals or exceeds the success grade of the tractor beam's attack roll. In other words, it takes a Good success in a crew check to shake off a tractor beam that scored a Good hit when it initially captured the target vessel.

Mass Converter (PL 7)

The mass converter manipulates matter at a distance, causing the target's atoms to strip each other of electrons. The corrosive effect can turn steel into a fine gray powder in seconds. The mass converter ignores all defensive screens or shields except for the ablative screen.

Matter Torpedo (PL 7)

This energy torpedo launches a ball of dark matter plasma at the target, which explodes with tremendous effect upon impact. Its outstanding firepower makes up for a short range and high power demand. The plasma torpedo is a larger and more dangerous version of the same weapon.

EM Torpedo (PL 8)

This weapon is built around a specialized electromagnetic pulse warhead powered by a fusion reaction. It's kind of like guided ball lightning fueled by a small H-bomb. It generates an extreme amount of EM noise, and causes ionization damage and electronics degradation in the target.

Neural Inhibitor (PL 8)

This weapon creates a pattern of neural interference that is essentially incompatible with all multicellular life. It ignores all defenses and armor, and causes no damage to the ship at all. Instead, the damage inflicted by the neural inhibitor only causes crew losses. On an Ordinary success, the neural inhibitor reduces the target's crew check rating by 1 point; on a Good success, 2 points; and on an Amazing success, 4 points. A given ship can only be affected by a neural inhibitor once per battle (the crewmembers susceptible to the particular frequency of the interference die or collapse, and additional exposures don't harm those who survived the first shot).

The damage figures listed for this weapon are directly applied to any important crewmember (i.e., player-controlled hero) on board the target ship.

Fission Activator (PL 8)

This field generator creates a region in which otherwise stable atoms—for instance, the alloys of a ship's hull—begin to undergo nuclear fission. Depending on the type of fissionable involved, the reaction may release a great amount of energy, or it might just "fizzle," creating local weaknesses and ruptures in the target's structure. The fission activator affects all targets in a single hex, but it has no effect on any targets intervening between the target area and the firing ship.

Boarding Transporter (PL 9)

Based on the very rare matter transmission technology, this weapon is a teleportation device that is safe for human use. It transports up to ten characters at one time onto an enemy vessel, provided the target does not have a functional ablative screen to interfere with the transporter's carrier signal. In most cases, the boarding transporter is used to insert teams of heavily armed marines or bomb-equipped saboteurs to take the fight to the enemy directly.

Code Arranger (PL 9)

Perhaps the ultimate weapon, the code arranger "re-codes" the basic characteristics of the target's atomic structure into something not at all useful, such as antimatter, hydrogen, or random energy. Armor is completely useless against the code arranger's insidious attack, since it is normal matter too and can thus be affected in the exact same manner as the rest of the target vessel.

Null Torpedo (PL 9)

This weapon consists of an energy field that neutralizes all electromagnetic energy at the point of impact. Without electromagnetic energy, matter cannot exist—chemical bonds of all kinds instantaneously fail, leaving nothing but an electrically neutral cloud of subatomic dust. In effect, the null torpedo disintegrates whatever it hits.

Step 8: Defenses

Large warships are extremely valuable investments, both in terms of the amount of money required to build one and in the training and skill of the crew. Preventing lethal damage and balancing firepower, mobility, and protection have always been major concerns of the naval architect. No one wants to build the next *Vasa* or *Hood.*

The first line of defense for any ship is its sheer size and basic compartmentation. Because large ships have superior toughness ratings, fire from smaller weapons and ships downgrades in its effectiveness; see *Chapter 1*. It's hard for a space marine with an assault rifle to cause serious damage to a colony transport, even if the colony transport is completely unarmed and unarmored.

The warship's second line of defense is its armor, discussed earlier in this chapter. Armor serves to block or reduce damage that could otherwise cause the ship grievous harm. However, armor isn't the only to protect a ship—many other advanced defensive systems exist.

See Table 5-13: Defensive Systems on the next page.

Chaff (PL 6)

Consisting of a number of small rocket launchers positioned around the ship, the chaff system deploys a cloud of millions of tiny metal strips or particles to interfere with active sensors and missile seekers. Deploying chaff adds a +1 step penalty to enemy missile attack rolls and sensor checks for three full action rounds. Enemy vessels equipped with mass detectors may ignore the effect of chaff.

Table 5-13: Defensive Systems

System	Tech	Hull	Power	Cost	Coverage	Notes
Progress Level 6: Fusion Age						
Chaff	-	1	0	$50 K	100 hull pts	+1 step to missiles, sensors
Damage Control	-	5%	1/hull	$100 K/hull	--	-2 step bonus to Damage Checks
Decoy Drone	C	1	1	$600 K	100 hull pts	3 drones
Jammer	-	1	1	$100 K	100 hull pts	+2 steps to missiles, sensors
Magnetic Screen	S	4	2	$400 K	20 hull pts	+2 steps to missiles, projectiles
Stealth Hull	S	2	1	$500 K	50 hull pts	+2 steps to enemy Sensor Checks
Progress Level 7: Gravity Age						
Defense Network	C, F	2	2	$500 K	100 hull pts	Special
Deflection Inducer	G	1	2	$500 K	20 hull pts	+2 step penalty to enemy attacks
Particle Screen	Q	2	3	$750 K	20 hull pts	Adds d4 (LI), d4 (HI), d6 (En) armor
Stealth Shield	M	2	2	$2 M	100 hull pts	+3 steps to missiles, sensors
Stardrive Scrambler	G	1	2	$200 K	100 hull pts	+4 step penalty to drive detectors
Repair Bots	C	5%	1/hull	$500 K/hull	--	-3 step bonus to Damage Checks
Progress Level 8: Energy Age						
Ablative Shield						
Generator	--	1	2	$500 K	20 hull pts	capacitor or compiler required
Capacitor	--	1	-	$100 K	--	10 shield points
Energy Compiler	X	1	-	$500 K	--	20 shield points
Cloaking Unit	M	1	5	$1 M	100 hull points	+4 steps to missiles, sensors
Displacer	T	2	3	$1 M	20 hull points	+3 step penalty to enemy attacks
Progress Level 9: Matter Age						
Nanite Repair Array	C	5%	2/hull	$1 M/hull	--	-5 step bonus to Damage Checks

Tech: The technology type necessary to build this device.

Hull: The number of hull points required by the system. Some systems require hull points equal to 5 percent of the ship's total, so a ship of 240 hull points would require 12 hull points for a damage control system.

Power: The number of power points required by one unit of this type, or one hull point of this system in the case of a system defined as a percentage of the hull. A ship dedicating 12 hull points to a damage control system requires 12 points of power to keep the system operational.

Cost: The cost for one unit of this system, or per hull point of a system based on a percentage of the hull.

Coverage: The number of hull points one unit of this type can protect. For example, a deflection inducer covers 20 hull points, so a ship of 200 hull points needs 10 inducers to gain the protective benefits.

If the ship changes its course or speed after deploying chaff, it leaves the cloud and loses the defensive benefits. The chaff system includes enough rockets for 4 chaff launches (although it's easy to buy multiple chaff systems and increase this to 8, 12, or more chaff launches).

Since large ships require more chaff for complete coverage, the system is ineffective if there is not at least one launcher per 100 hull points of the ship to be covered. For example, an armored cruiser of 500 hull points requires 5 chaff dispensers for basic coverage. If the shipbuilder wanted to increase the system capacity from 4 launches to 8 launches, he'd have to buy 10 chaff dispensers.

Damage Control (PL 6)

While all ships are equipped with some damage control provisions, this system represents a sophisticated and complete approach to compensating for damage. It includes redundant systems, casualty control modes for major machinery, extra compartmentation, repair materials, and advanced monitoring systems throughout the ship. Equipping a ship with damage control systems requires 5 percent of the hull, but the ship gains a –2 step bonus to all damage checks it must make. In other words, it's more likely to keep its systems operational under heavy enemy fire.

Decoy Drone (PL 6)

This is a small, unmanned vehicle equipped with electronic devices designed to mimic the EM and IR signature of the launching ship. Launching a decoy drone forces any enemy ships to make a sensor check or break track on the launch ship. If the enemy succeeds, the drone is spotted and ignored. If the enemy fails, it can still fire at the launch ship, but there's a 50-50

chance that it targets the drone instead. Naturally, any successful hit destroys the drone and resolves the enemy's uncertainty as to the true position of the ship that deployed the decoy drone.

One hull point devoted to the decoy drone purchases a drone bay with three drones. Additional drones can be bought by installing this system multiple times. Since large ships require larger drone emitters, the drone bay must be 1 hull point in size for every 100 hull points of the launch ship. For example, a battleship of 1,000 hull points requires a drone bay of 10 hull points, which contains three big decoy drones.

Jammer (PL 6)

A jammer system interferes with fire control radar and missile guidance systems. A ship equipped with a jammer can attempt to scramble missile seekers and enemy sensor checks. The jammer-equipped ship adds a +2 step penalty to enemy missile attacks and sensor checks.

Large ships require multiple ECM emitters to cover the entire hull. An armored cruiser of 500 hull points must purchase 5 jammers to use this system at all.

Magnetic Screen (PL 6)

The first primitive energy shield, the magnetic screen uses vast amounts of power to surround the ship with potent lines of magnetic force. While it's running, the magnetic screen adds a +2 step penalty to missile attack rolls and projectile weapon attack rolls. It has no effect on beam weapons or torpedoes.

Large ships require multiple screen units to cover their larger hulls. Note that a ship may have only one kind of screen (magnetic, particle, deflection inducer, or ablative shield) active at any one time.

Stealth Hull (PL 6)

By coating the ship's hull in a soft covering of radar-absorbent material, the stealth hull makes it more difficult to detect the ship with radar or laser energy. Enemy active sensor checks suffer a +2 step penalty against the stealth ship. Mass detectors, IR detectors, and EM detectors are not affected. Like many other systems, the stealth hull requires more hull points for larger ships.

Defense Network (PL 7)

This system consists of scores of small, disposable laser weapons deployed in a cloud surrounding the launching ship. Once deployed, the defense network is creates a near-impenetrable screen against missile and mine attack. Each time a missile attack is made against the protected ship, make a crew check and consult the following table:

Number of Surviving Missiles

Attack	M	O	G	A
1 missile	–	0	0	0
Salvo	–	2	1	0
Pattern	4	2	1	0
Flight	6 s	4 s	2 s	1 s

Missile flights are reduced to a number of salvos. Ordnance that "leaks through" the network attacks normally.

The defense network blocks one missile flight, four mine patterns, ten salvoes, or forty individual missile or mine attacks before it's exhausted. Since the constellation of defensive remotes can't maneuver, the ship loses its defense network if it changes course or speed after deploying the remotes.

One hull point holds three cloud deployments (larger ships need multiple hull points to hold three deployments appropriate to their size). The shipbuilder can provide additional deployments of the defense network by buying multiple systems.

Deflection Inducer (PL 7)

The deflection inducer surrounds the ship in belts of gravitational energy intense enough to bend beam weapons away from the ship and stop projectiles cold. An operational deflection inducer adds a +2 step penalty to all enemy fire.

Large ships require multiple inducers to cover the hull, so a ship of 40 hull points requires 2 inducers, a ship of 400 hull points requires 20 inducers, and so on. A ship may only have one type of screen (magnetic, particle, deflection inducer, or ablative shield) active at one time.

Particle Screen (PL 7)

This defensive device generates a shell or aura of alpha particles–helium nuclei stripped of their electrons. This adds to the ship's armor rating by the following amounts: d4 (LI), d4 (HI), or d6 (En). Secondary damage is calculated normally; the particle screen simply increases the ship's armor roll by the appropriate amount.

For example, a destroyer might be fitted with light cerametal armor, which stops d6 points of high-impact damage. If a particle screen also protects the destroyer, it stops d6 points of primary damage for the armor, plus an additional d4 points for the particle screen, for a total of 2 to 10 points.

A ship can't have more than one screen, shield, or deflection inducer active at the same time. Large ships require multiple screen units.

Stealth Shield (PL 7)

The stealth shield is a sophisticated electromagnetic transceiver that detects incoming EM energy from radars, ladars, and other sensor devices, and then generates an interfer-

ence pattern to negate it. It also monitors the protected ship's own EM emissions and cloaks them in a similar manner. Finally, the stealth shield masks the ship's mass signature. A ship equipped with a stealth shield applies a +3 step penalty to all enemy sensor checks and missile attack rolls. Note that the stealth shield can't be used in conjunction with a jammer, although it can operate with chaff or a defense network.

Stardrive Scrambler (PL 7)

This device scrambles the distinctive mass signatures and drivespace resonances created when a ship enters drivespace, making it very difficult for a starfall detector to determine where the ship is bound when it makes the jump. This adds a +4 step penalty to the listening ship or outpost's sensor check to predict the departing vessel's destination. Naturally, the scrambler must be active and powered during the jump to mask the ship's signature.

Repair Bots (PL 7)

In addition to the features described under the PL 6 version of damage control, the ship is equipped with a number of robotic devices stored at various points throughout the hull. These bots are directly controlled by sophisticated damage control hardware and software. The repair bots can rapidly deploy to the damaged part of the ship and begin to effect repairs. This provides the ship with a –3 step bonus on any damage checks. In addition, the ship's engineer can repair stun or wound damage remotely–see "Repairs" in *Chapter 1*.

Ablative Shield (PL 8)

This device surrounds the ship in an energy field that absorbs and dissipates attacks. In other words, it uses the ship's power to ablate attacks before they take their normal effect. There are two components to an ablative shield: the generator and the capacitor.

The generator works much like other defensive devices; each unit purchased provides a certain amount of hull coverage and demands a certain amount of power. All of the ship's generators must be powered to create the ablative shield.

The second component is a shield capacitor. Energy pouring into the ship's shields needs to be diverted somewhere, and so shield-protected ships often carry huge capacitors to store this energy until it can be safely discharged later. Each hull point devoted to the capacitor can store up to 10 *shield points* of energy. This means that a shield generator is useless without a capacitor to absorb the energy.

Incoming damage converts into shield points as shown below:

Stun	1 point
Wound	2 points
Mortal	3 points
Critical	5 points

For example, a shielded ship is struck by a neutron gun for 6 points of mortal damage, which converts to 18 shield points. Next round, it's hit by three laser shots for 5 stun points each, raising the total in the capacitors to 33. The following round, a nuclear missile detonates nearby, inflicting 4 critical points (another 20 shield points), for a total of 53 shield points into the ship's capacitors.

When the ship's capacitors are full, the ablative shield automatically fails. There's just nowhere else for the energy to go. A hit may be partially ablated by a failing shield. If the ship's capacitors had 3 more shield points left and the ship was struck for 6 mortals, one point of mortal damage would take up the last 3 shield points, and 5 mortals would continue through to affect the shielded ship. Thus, ablative shields offer an impervious defense–for as long as the capacitors hold out.

Note that damage upgrades or downgrades due to firepower versus toughness are applied *before* the shield takes effect.

Capacitor Bleed-off Rates: Each round, capacitors bleed off 1 shield point of stored energy per 10 shield points currently stored, with a minimum of 1 shield point per round. This takes place during the repair phase. If a ship is carrying 23 shield points in its capacitors, it loses 2 points, dropping to 21 shield points at the end of the round. This represents radiators, heat sinks, or energy grounds designed to dissipate stored energy harmlessly.

Ablative Shields and Toughness: Generally, an ablative shield has the same toughness as the generating ship. Heavy ships produce heavy shields, for instance. However, it's possible to buy more ablative shield generators than are strictly necessary to generate a stronger shield (albeit at the cost of more power and space).

A shield of at least three generators (6 hull points) is light toughness.

A shield of at least ten generators (20 hull points) is medium toughness.

A shield of at least thirty generators (60 hull points) is heavy toughness.

A shield of at least one hundred generators (200 hull points) is super-heavy toughness.

Energy Compilers: The energy compiler is a refinement or modification to the ablative shield capacitor. When an ablative shield backed by an energy compiler is struck by enemy fire, the compiler funnels some of the attack's energy back into the shield, reinforcing it and making it more resistant to damage. The energy compiler has a capacity of 20 shield points per hull point, and reduces the power requirement for the ship's shield generators from 2 power points per unit to 1 power point per unit, provided there is some amount of energy stored in the compiler from previous enemy fire.

Cloaking Unit (PL 8)

This device is an improvement of the PL 7 stealth shield. It renders the ship essentially invisible in every known medium.

The cloaking unit imposes a +4 step penalty to enemy sensor checks and missile attack rolls. Obviously, the cloaking unit can't be used in conjunction with a jammer or chaff bloom, since those devices would give away the ship's position.

Displacer (PL 8)

Based on the spatial compression engine, the displacer is a device that "slides" the ship a few hundred meters several times a second in a series of randomized local teleportations. All enemy attacks against the displacing ship suffer a +3 step penalty. Like most other defense systems, large ships may require multiple units to receive the defensive benefit.

Nanite Repair Array (PL 9)

The final refinement of damage control systems, the nanite repair array consists of nodules or blisters filled with microscopic repair machines scattered throughout the ship. It offers a –5 step bonus to all damage checks the protected ship must make. In addition, the ship's engineer can repair stun, wound, or mortal damage remotely. See *Chapter 1*.

Step 9: Command and Control Systems

Sometimes referred to as "C-4" (command, communication, computers, and control), command systems represent the brains of a ship. Power, armor, shields, and weapons are important, but the command systems dictate just how effectively the warship can employ its armament.

Command Systems

Before you install any of the systems described on Table 5–13, you need to be aware that you must install either a cockpit or command deck on your ship. Larger ships require larger command decks. Regardless of how big your ship is, the command deck is large enough to accommodate all personnel and all the system controls necessary to fly and fight the ship.

You can buy a secondary or tertiary command deck if you wish. In fact, most large warships (cruisers or bigger) almost always have an auxiliary bridge or secondary command deck, so that one lucky hit to the primary bridge won't completely incapacitate the ship.

Cockpit (PL 6)

The cockpit is the nerve center of a small ship. For half a hull point, it includes one control station or seat. The maximum size of a cockpit is four seats or stations (2 hull points). Anything larger than that is more accurately described as a small command deck. While it's theoretically possible for a ship of several hundred hull points to be controlled by a single pilot in a one-seat cockpit through heavy automation, in practice a cockpit is just too small to handle anything larger than 50 hull points.

The cockpit includes a hatch (or sliding canopy) for access, but it's not a full airlock. It also provides life support to its occupants, with a maximum duration of three days. Ships requiring more endurance than that must purchase a normal life support system.

Table 5-14: Command, Control, and Communication Systems

System	Tech	Hull	Power	Cost	Notes
Progress Level 6: Fusion Age					
Cockpit	-	0.5	0	$100 K	per station (max 3 stations)
Command Deck	-	2+	0	$300 K/hull	+1 hull point per 100 hull (max 10)
Flag Bridge	-	3	0	$50 K	-
Launch Tower	-	2	0	$50 K	-
Laser Transceiver	-	1	1	$50 K	-
Radio Transceiver	-	0.5	1	$25 K	-
Progress Level 7: Gravity Age					
Mass Transceiver	G	1	1	$100 K	-
Drivesat Comm Array	G, C	150	300	$2000 M	interstellar comms
Progress Level 8: Energy Age					
Drive Transceiver	G	2	2	$200 K	-
Psionic Transceiver	P	1	2	$150 K	-
Progress Level 9: Matter Age					
Ansible	M	4	4	$1 M	instantaneous interstellar comms

Tech: The technology type necessary to build this device.
Hull: The number of hull points required by the system.
Power: The number of power points required by one unit of this type.
Cost: The cost for one unit of this system, or per hull point of a system based on a percentage of the hull. Some systems are more expensive in larger installations.

Command Deck (PL 6)

Every ship requires either a cockpit or a command deck. A command deck begins at 2 hull points, and requires 1 extra hull point for each 100 hull points after the first 100 (a total of 3 hull points for a ship of 100 or more hull points, 4 for a ship of 200 or more, and so on). However, a command deck of 10 hull points can handle a ship of any size. A command deck includes three seats or stations per hull point.

In a pitched battle, enemy fire may knock out the ship's bridge or command deck. Many ships install an auxiliary command deck as a little bit of insurance against that lucky hit. All command functions are duplicated in the auxiliary bridge. It takes one round to switch command from one bridge to another.

The command deck includes an airlock for exterior access, if the ship designer wants one there.

Flag Bridge (PL 6)

Many armored cruisers, battleships, carriers, or dreadnoughts are equipped with a flag bridge–a command deck with facilities for coordinating the actions of an entire fleet of ships. The flag bridge eliminates penalties applied to Tactics skill checks by the squadron commander or fleet admiral due to command and control limitations; see *Chapter 3*.

Launch Tower (PL 6)

Carriers and other ships that carry a large number of embarked small craft usually set aside special facilities for controlling the launch and recovery of their fighters and bombers. The launch tower is a center for coordinating the activities of small craft squadrons and maintaining "traffic control" in the vicinity of the ship.

The Computer Core

Basic systems monitoring, navigation, and engineering controls require some amount of computer support. Any ship equipped with a cockpit or command deck possesses built-in computers with the bare minimum of computing power necessary to fly the ship.

However, it's possible to install computers that add substantially to the ship's combat abilities. You can install a computer core of Ordinary or better quality if you so choose. A computer core is necessary to support dedicated control computers, which are computers that enhance the functioning of one particular system. For example, a fire control computer may be installed to provide bonuses to attack rolls with one particular weapon system. The quality of the control computer can't exceed the quality of the ship's computer core. In other words, if you want to install a Good

Table 5-14a: Computers

System	Tech	Hull	Power	Cost	Notes
Progress Level 6: Fusion Age					
Computer Core, Ordinary	C	1	1	$500 K/hull	1 required per 200 hull points
Fire Control, Ordinary	C	1	0	$200 K/hull*	-1 step bonus to dedicated weapon
Sensor Control, Ordinary	C	1	0	$200 K/hull*	-1 step bonus to dedicated sensor
Tac Control, Ordinary	C	1	0	$100 K	-1 step bonus to Tactics skill checks
Nav Control, Ordinary	C	1	0	$500 K	-1 step bonus to Maneuver checks
Progress Level 7: Gravity Age					
Attack Computer	C	0.5	0	$200 K	-1 step bonus to attack rolls
Computer Core, Good	C	1	1	$1 M/hull	1 required per 200 hull points
Fire Control, Good	C	1	0	$300 K/hull*	-2 step bonus to dedicated weapon
Sensor Control, Good	C	1	0	$300 K/hull*	-2 step bonus to dedicated sensor
Tac Control, Good	C	1	0	$200 K	-2 step bonus to Tactics skill checks
Nav Control, Good	C	1	0	$750 K	-2 step bonus to Maneuver checks
Progress Level 8: Energy Age					
Computer Core, Amazing	C	1	1	$2 M/hull	1 required per 200 hull points
Fire Control, Amazing	C	1	0	$300 K*	-3 step bonus to dedicated weapon
Sensor Control, Amazing	C	1	0	$300 K*	-3 step bonus to dedicated sensor
Tac Control, Amazing	C	1	0	$400 K	-3 step bonus to Tactics skill checks
Nav Control, Amazing	C	1	0	$1 M	-3 step bonus to Maneuver checks

* Per hull point of the system the computer is dedicated to.

Tech: The technology type necessary to build this device.
Hull: The number of hull points required by the system.
Power: The number of power points required by one unit of this type.
Cost: The cost for one unit of this system, or per hull point of a system based on a percentage of the hull.

fire control system for your ship's strong force guns, you have to install a Good or Amazing computer core; an Ordinary computer core just isn't up to snuff.

Computer Core (PL 6-9)

While the most advanced computer cores are available at the higher Progress Levels, you don't have to install the best computer core available into a ship. It's perfectly acceptable to install no computer core at all in a PL 9 ship, especially if the ship is a bulk freighter or hauler that isn't intended to come anywhere near a fight. However, most warships carry the best computers they can fit into the hull.

The computer core itself does not add any bonuses to the ship's combat rolls, but it enables dedicated control systems (the rest of the computers described here) to do so. In addition, a computer core is the equivalent of the following computer types described in *Chapter 10* of the ALTERNITY *Player's Handbook:*

Core	Equivalent to...
Ordinary	Mainframe (Ord)
Good	Mainframe (Good)
Amazing	Mainframe (Ama)

Computer cores require 1 hull point per 200 hull points of the ship. For example, a battlecruiser (1000 basic hull points) requires a computer core of 5 hull points. The cost in hull points reflects networking, work stations, wiring closets, shock mountings, climate control, and other paraphenalia.

Fire Control (PL 6-9)

A dedicated fire control computer adds a –1, –2, or –3 step bonus to attack rolls made with one weapon battery. A weapon battery is defined as all weapon installations that are identical to each other. For example, a ship with three hypermass cannons, six plasma cannons, and one launch cell array could define three different batteries: the hypermass cannons, the plasma cannons, and the launch cell array. Similarly, a ship armed with two launch racks could combine both under the same fire control computer.

Large weapon systems require a more expensive fire control installation, although it doesn't take any more hull points.

Sensor Control (PL 6-8)

A dedicated sensor control computer adds a –1, –2, or –3 step bonus to sensor checks made with one sensor system. Special filter and enhancement routines account for the superior sensor sensitivity.

Tac Control (PL 6-8)

This computer collects data from a number of different sources and presents a synthesized diagram or summary in some kind of tactical display–a flat screen or holo display. The tac control computer adds a –1, –2, or –3 step bonus to Tactics checks.

Nav Control (PL 6-8)

The nav computer adds a –1, –2, or –3 step bonus to maneuver checks and Navigation-*system astrogation* or Navigation-*drivespace astrogation* skill checks. It continuously calculates potential course changes and helps the pilot to evaluate the effectiveness of various maneuvers in midround.

Attack Computer (PL 7)

This unit combines a small computer core with a small fire control computer slaved to one single weapon system. The dedicated weapons gain a –1 step bonus to all attack rolls. Weapons totaling more than 5 hull points are simply too big for the attack computer to handle; this system is designed for fighters, bombers, and other small craft in which space is at a premium.

Communications

A large ship may require dozens of transceivers to coordinate a task force, maintain communications with nearby ships, and maintain control over a distant flight of strike fighters.

Laser Transceiver (PL 6)

The signal laser uses a beam of coherent light to transmit messages. The laser is extremely directional; the signal can't be intercepted or jammed unless it's beamed directly at a hostile ship or station. If the comm officer doesn't know exactly where the receiving station is, the laser transceiver is a waste of power–you can't use this for a general distress call to all stations in the area, for instance.

A ship can't receive laser communications unless it is equipped with the transceiver. Lasers are limited to the speed of light (8 AU or 1 million megameters per hour).

Radio Transceiver (PL 6)

The radio transceiver is an advanced, frequency-agile set that transmits in either LOS (line of sight) or omnidirectional mode. Like the laser, it's limited to the speed of light. A radio transceiver can handle up to ten simultaneous two-way conversations, so ships with unusually large comm demands often purchase multiple transceivers.

Mass Transceiver (PL 7)

This device can transmit instantaneously to any point in the same star system, with no "lag" due to FTL limitations. However, its range is limited to about 1,000 AU, so the signal

can't cross interstellar space. A ship must be equipped with a mass transceiver to receive mass-burst communications.

Drivesat Comm Array (PL 7)

This massive installation provides Gravity Age ships or stations with a very potent capability–interstellar communications. The drivesat array consists of a constellation of dozens of drive satellites, small stardrive-equipped transmitters that enter drivespace, transmit and receive messages, and then surface again. It enables FTL comms with a range of 50 light-years. Any signal takes 11 hours to reach its destination. Naturally, only a ship or station similarly equipped can receive the drivesat's signal.

To transmit and receive messages, the ship must remain stationary. If the ship moves while its drivesats are cycling, 10–40 percent (d4 x 10 percent) of its constellation will be lost in drivespace. The ship cannot transmit or receive while it's in drivespace itself. Despite these limitations, the drivesat array is about the best way to send a message to another star system at PL 7.

Drive Transceiver (PL 8)

The drive transceiver is the first interstellar communication device that's practical for small ships or second-rate colonies. Like the drivesat comm array of PL 7, it can send a signal up to 50 light-years distant. It takes 11 hours for the signal to reach the target station, which must also be equipped with a drive transceiver. The drive transceiver can neither transmit nor receive while the ship itself is in drivespace.

The drive transceiver is cheaper and smaller than its predecessor by an order of magnitude.

Psionic Transceiver (PL 8)

This device consists of a special array of psi-enhancing devices that make it possible for a mindwalker with the Telepathy broad skill to communicate over interstellar distances. The receiving station must also have a telepath equipped with a psionic transceiver, or the ship's mindwalker is wasting his time.

Monitoring the transceiver for incoming messages requires the mindwalker's attention, although he can go about other duties as long as he wears the headset that links him to the transceiver. Guarding the psionic frequencies counts as psionic activity, so the character can't recover psionic energy points while he's on watch.

Using the transceiver to send messages requires a successful Telepathy-*contact* skill check, with the following modifiers:

Target	Modifier
Same system	–3 step bonus
1-5 LY distant	0
6-10 LY distant	+1 step penalty
11-20 LY distant	+2 step penalty
21-30 LY distant	+3 step penalty
31-50 LY distant	+4 step penalty
51-100 LY distant	+5 step penalty

It costs 1 PEP per 5 light-years for a communication of 1 minute. Communication is instantaneous and two-way, if the receiving character wishes to spend psionic energy points to respond; otherwise, communication is one-way.

Unlike the other communication systems described here, the psionic transceiver can't transmit anything that a human character couldn't transmit in speech. Compressed data files, technical diagrams, or tactical readouts can't be sent–unless the ship's mindwalker also has the *datalink* specialty skill, in which case he may make a skill check to successfully transmit the nonverbal material.

Ansible (PL 9)

The ansible is a device that induces precise energy state changes in atomic nuclei without regard to distance or time. In effect, it permits instantaneous interstellar communications–voice, video, or data transfer–to any other ship or station equipped with an ansible. Much like a radio, the receiving station has to be attentive to a particular "frequency", so the two ansible-equipped stations must have some prearranged communications protocols; the ansible can't pick up any transmissions not intended for that specific station.

Step 10: Sensors

Any experienced spacehand can tell you that winning the information battle is every bit as crucial as winning the armament battle. Without good information on the enemy's course, speed, and capabilities, even the most powerful weapon system is virtually useless.

It's highly advisable to purchase at least one air/space radar set. This is the minimum necessary to practice safe navigation in heavily trafficked areas and hazardous regions such as asteroid belts or ring systems. If you're building anything more militant than an ore hauler, you probably want to equip your ship with the best sensors money can buy. Seeing the enemy before he sees you is simply too significant an advantage to skimp on sensors.

Design Tip: Sensors

Purchase at least two comm systems and three sensor systems, even for fairly small ships. They don't take up many hull points, and it's critical to have redundancy for these vital systems. Large warships should set aside 10 to 20 hull points for command and sensor systems to ensure that they've got the capability to fight effectively in a pitched space battle. Smaller warships such as corvettes and destroyers may get away with 5 or 6 hull points of command and sensor systems.

Table 5-15: Sensors

System	Tech	Hull	Power	Cost	Type	Range	Arcs	Targeting
Progress Level 6: Fusion Age								
Air/space Radar	-	0.5	1	$20 K	Active	5/10/20 Mm	1	Normal
EM Detector	-	0.5	0	$20 K	Passive	10/20/60 Mm	2	+3 step penalty
Hi-Res Video	-	0.5	0	$10 K	Passive	1/2/10 Mm	1	+2 step penalty
IR Detector	-	0.5	0	$20 K	Passive	2/4/8 Mm	1	+2 step penalty
Ladar	-	1	1	$100 K	Active	5/10/30 Mm	1	Normal
Probe	-	1	0	$200 K	Remote	Special	4	-
Progress Level 7: Gravity Age								
Mass Detector	G	1	1	$100 K	Passive	10/30/50 Mm	2	+1 step penalty
Multiband Radar	-	0.5	1	$50 K	Active	10/20/40 Mm	1	Normal
Probe, advanced	C	1	0	$500 K	Remote	Special	4	-
Remote Network	C	2	2	$750 K	Remote	Special	4	-
Spectroanalyzer	-	1	1	$100 K	Active	Special	1	None
Drive Detection Array	G, C	80	120	$1000 M	Passive	Special	4	None
Progress Level 8: Energy Age								
CE Passive Array	C	2	1	$1 M	Passive	30/60/100 Mm	2	Normal
Drive Detector	G	4	4	$500 K	Passive	Special	4	None
Madar	G	1	1	$200 K	Active	20/30/40 Mm	1	Normal
Multiphase Radar	Q	1	0	$250 K	Active	20/40/80 Mm	1	Normal
Omniscience Sphere	P	3	1	$2 M	Passive	50 Mm	4	Normal

Tech: The technology type necessary to build this device.
Hull: The number of hull points required by the system.
Power: The number of power points required by one unit of this type.
Cost: The cost for one unit of this system.
Type: Active, passive, or remote. See *Chapter 2* for details on sensor types.
Range: Short, medium, and long range for sensor checks made with this system. See *Chapter 2.*
Arcs: How many arcs of fire one sensor unit bears on. Multiple sensor systems may be purchased to provide 360-degree coverage.
Targeting: Attack penalties for firing on a target using this sensor information.

Sensor Arcs

Sensor systems have "arcs of fire", much like weapons: forward, port, starboard, and aft. However, many sensors can cover more than one arc at a time. For example, the drive detector automatically covers all four sensor arcs; it's an omnidirectional installation that doesn't require any special provisions to achieve a 360 degree coverage of the surrounding area.

Extending the coverage of a sensor system from one arc to multiple arcs is simple: Just buy more. Four 1-arc systems provide coverage of all four sensor arcs, as do two 2-arc systems. Obviously, a sensor system can't make a sensor check against a target that's outside its current arc, so it's a good idea to provide plenty of coverage for search radars and threat receivers.

Tracking Capability

Unless otherwise stated in the system description, all sensor systems are limited in their ability to track multiple targets at the same time. In most space battles, this isn't a problem–there aren't more than a half-dozen contacts that matter at any one time. In large battles, tracking capability becomes crucial.

If a sensor system is currently maxed out on its tracking capability and new targets appear, the sensor operator must choose whether or not he will "drop track" on an existing contact to attempt a sensor check against one of the new targets. See *Chapter 2: Advanced Combat* for details.

Tracking capability is a function of the Progress Level at which the ship (not the sensor!) is constructed and the quality of any dedicated sensor control computer assigned to the system.

For example, a PL 7 ship with a Good-quality sensor control computer can track 20 targets simultaneously.

A shipbuilder can increase the tracking capability of his ship's sensors by purchasing multiple sensor systems. For example, a PL 6 cruiser with an EM detector can track up to 6 targets with that sensor, but if the shipbuilder installs 4 EM detectors, he increases the ship's tracking capability to 24 targets with the EM detector.

Purchasing extra sensor sets to cover additional arcs counts toward increasing the ship's tracking capability with that type of sensor. In other words, you can increase from one to two arcs and double your tracking capability by purchasing one extra sensor set instead of three extra sensor sets.

Sensor Range

Like weapons, sensor systems possess short, medium, and long ranges. sensor checks at medium range suffer a +1 step penalty, and sensor checks at long range suffer a +3 step penalty.

Sensor Systems

For ships of 30 hull points or less, it's a good idea to set aside 1 or 2 hull points for sensor systems requiring hull space. Larger ships should set aside anywhere from 2 to 10 hull points for sensors. Redundant sensors are also a good idea–you don't want your super-dreadnought to be incapacitated by the lucky hit that takes out its only sensor system.

Air/Space Radar (PL 6)

The minimal sensor system acceptable on a spaceship hull, the air/space radar is the most common sensor system of the Fusion Age. It works equally well in atmospheres or open space.

EM Detector (PL 6)

The electronmagnetic detector is an antennae array designed to detect and localize EM emissions such as radio signals and radar beams. If the target is using active sensors, the EM detector gains a –2 step bonus on the sensor check.

It's possible to detect targets that aren't active by listening for drive emissions and miscellaneous radio noise, but it's harder–the EM detector suffers a +2 step penalty when used against nonradiating targets.

Hi-Res Video (PL 6)

This is a high-powered camera system designed to spot targets by their visual profile. It includes a very powerful zoom feature, allowing close inspection of far-off targets. It's not a very good targeting or sensor system, but it's perfect for evaluating damage the target has suffered. It's hard to find a system that provides a better *look* at an object of interest.

IR Detector (PL 6)

Also known as a heat sensor, the infrared detector looks for targets that are radiating infrared energy–heat. It confers a –2 step bonus to sensor checks against targets maneuvering with a fission rocket, fusion torch, ion engine, or antimatter rocket.

Ladar (PL 6)

A laser detection and ranging system uses low-powered laser beams to pinpoint the target. Ladar ignores jamming, and it's considered a passive sensor if the target does not itself possess ladar or a laser transceiver.

Probe (PL 6)

The sensor probe is a small rocket fitted with a video camera and a small air/space radar set. It has an acceleration of .05 Mpp per phase (or 50 KPH per phase) and enough fuel to operate for up to 48 hours after launch. The probe's telemetry package allows it to transmit its video and radar data up to 100 Mm without degradation, and up to 1,000 Mm (1 million kilometers) with reasonably clear results.

A common tactic in Fusion Age space battles is to launch several probes before contact and activate the probe radar sets, while leaving the ship on passive sensors. This allows the ship to gain the benefits of active targeting without making itself easier to detect.

Each probe bay contains four probes. They can be replaced at a cost of 40 K each.

Table 5-16: Tracking Capability

	Sensor Control Computer			
PL	**None**	**O**	**G**	**A**
PL 6	5	10	20	40
PL 7	10	20	40	unlimited
PL 8	20	40	80	unlimited

PL: The Progress Level at which the ship is built.
Sensor Control Computer: The quality of the sensor control computer dedicated to the system.
#: The number of contacts the system can track simultaneously.

Mass Detector (PL 7)

This device detects targets through their gravitational signatures. Even though a spaceship has an infinitesimal mass compared to a planet, a sufficiently sensitive sensor can determine its bearing and approximate range by measuring the target's influence on the sensing ship.

Multiband Radar (PL 7)

This is a more powerful and sophisticated version of the air/space radar.

Probe, Advanced (PL 7)

Obviously, this is a PL 7 version of the probe. It has an acceleration of 2 Mpp per phase (or 2000 KPH per phase) and enough power to operate for up to 72 hours after launch. The probe's telemetry package allows it to transmit its video and radar data up to 1,000 Mm without degradation, and up to 1 AU (150 million kilometers) with a reasonably clear results.

Each probe bay contains four probes. They can be replaced at a cost of 100 K each.

Remote Network (PL 7)

The remote network is a constellation of sensor probes that can be deployed in a ring or globe thousands of kilometers in diameter. This doubles the range of one other sensor system designated at the time the remote network is installed, so it's possible to have a network that doubles the range of the ship's EM detector, or its air/space radar, or its mass detector.

It only takes one round to deploy the remote sensors. The remotes stay active for one day before their batteries are exhausted. Since the constellation of sensors can't maneuver, the ship loses its remote network if it changes course or speed after deployment.

The remote network system holds six constellations in its two hull points. The shipbuilder can provide three additional deployments of the remote network per additional hull point assigned to the system. Each extra hull point costs 250 K.

Drive Detection Array (PL 7)

Based on the same technology as the drivesat comm relay, the drive detection array provides a ship with the ability to detect events occurring across interstellar distances—specifically, the starfalls and starrises of ships traveling by means of a stardrive, drivewave generator, or jump drive.

The drive detection array has a range of fifty light-years. It takes eleven hours for the "splash" of the ship entering or emerging from drivespace to propagate, so the drive detection array doesn't provide real-time information. However, it does indicate the class of ship traveling (small, light, medium, heavy, or super-heavy) and the number of ships traveling.

The location of the arrival or departure is also recorded, although the sensor operator can't tell where the arriving ship came from, or the departing ship is heading to. The detection array does not function while the array-equipped ship is traveling in drivespace itself.

Spectroanalyzer (PL 7)

While the spectroanalyzer isn't useful as a targeting sensor, it is a powerful analytical tool. It combines spectrum analysis of visible light, radar mapping, and precise mass measurements to create a profile of a planet or space object. The spectroanalyzer is an active sensor that confers a –2 step bonus on sensor checks for Battle Damage Assessment (see *Chapter 2*) and any Physical Science—*astronomy* or *planetology* skill checks for the purpose of determining the mass, composition, or characteristics of a space object.

Ship-sized objects may be examined at distances of 2/4/16 Mm for short/medium/long range on the sensor check; planets may be examined at ranges of 1/5/25 AUs for short/medium/long range.

CE Passive Array (PL 8)

This system collates and analyzes all electromagnetic energy received by the sensor. It combines the properties of an EM, IR, and video scan and receives a –4 step bonus to detect a target using active sensors.

Drive Detector (PL 8)

The drive detector works much like the drive detection array of the Gravity Age, but it's much smaller and cheaper.

Mass Radar (PL 8)

Sometimes abbreviated as "madar", the mass radar uses pulses of gravitational energy to precisely range and pinpoint objects. It also has the ability to detect objects buried beneath radar-reflective surfaces. The mass radar can penetrate up to 100 kilometers of ice or water, 20 kilometers of normal stone or rock, or 2 kilometers of nickel-iron or similarly dense and metal-rich rock. This makes the mass radar ideal for locating bases or facilities buried deep underground.

Multiphase Radar (PL 8)

This radar system works much like the multiband radar of PL 7, but it's even more powerful and sophisticated. Due to its track-with-scan capabilities, the multiphase radar has a tracking capability 50 percent higher than normal.

Omniscience Sphere (PL 8)

Based on rare psi-technology, the omniscience sphere is a sensor device that automatically detects any and all objects

that approach within 50 megameters of the ship or station. No sensor checks are required. Sophisticated neural filters and data-feed programs allow the operator to instantly relay his findings to the ship's computers for fire control solutions and detailed tracking predictions.

The omniscience sphere must be manned by a psionic character who possesses the broad skill of ESP. The character cannot rest or meditate while plugged in to the sphere. Operating the sphere requires 2 psionic energy points per hour. Usually, ships with this sensor system will employ a team of "ESPers" to continuously man the sphere while underway.

Step 11: Hangars and Small Craft

Almost all ships of destroyer size or larger carry a couple of small craft–a launch, pinnace, gig, or a scout fighter–to get into places that the ship itself can't go. In fact, many warships rely on small craft as their exclusive main armament. Big carriers may embark hundreds of fighters and strike fighters.

If your ship design includes any room for embarked small craft, you should also design the fighters and launches your ship carries. You can save some time by using existing small craft designs.

Docking Clamps (PL 6)

The docking clamp is a hardpoint and airlock where another ship can secure itself to the hull. The maximum capacity of a docking clamp is 10 hull points per 2 hull points installed; a docking clamp capable of securing ships of up to 30 hull points would require 3 docking clamps, or one docking clamp purchased at three times the normal size and cost. Ships mated to docking clamps can disengage in a single phase.

Many carriers are built with their fighters carried on docking clamps. Not only does this save a lot of space, it also allows all the fighters to disengage simultaneously–there's no restriction on the number of embarked craft that can be launched in one round in this fashion.

Docking clamps have several drawbacks. First, the embarked ships are outside the carrier's hull and are not protected by its armor, bulk, or life support. Repair work or service to the embarked craft must be carried out in e-suits under vacuum conditions, which is hazardous and inefficient.

Second, it's impossible to enter a planetary atmosphere while embarked craft are attached to docking clamps. The craft must be detached and flown down separately, or parked in a convenient orbit for retrieval when the carrier leaves the atmosphere again.

Finally, the embarked ships may not exceed more than 10 percent of the carrier's hull. In other words, a 400-hull point cruiser can carry up to 40 hull points of embarked craft, but no more.

Note: You may exceed this limit if you wish, but if the embarked craft total to more than 10 percent of the carrier's hull points, then they count toward the carrier's hull point total for purposes of calculating maneuverability and FTL travel.

For example, a 400-hull point ship with 20 docking clamps could carry as much as 200 hull points of embarked craft. However, this means that its 40-hull point engines–10 percent of the hull, in normal circumstances–now comprise only 6.67 percent of the total hull points. (This rounds down to 5 percent.) In this case, the carrier probably loses some of its acceleration and travels at a slower FTL rate while all those embarked craft are alongside.

Hangar (PL 6)

The hangar is an internal docking, launch, storage, and service facility for embarked craft. It requires 1 hull point for each hull point of embarked craft, so a super-carrier with a hangar of 1000 hull points could carry 100 fighters of 10 hull points each. Regardless of the hangar capacity, a ship of 100 hull points or more is simply too big to fit into any other ship's hangar.

A hangar is not anywhere near as efficient as a set of exterior docking clamps for carrying a large number of craft. However, it has several advantages. The embarked ships are stored inside the carrier's hull, and cannot be targeted by enemy weapons (although the carrier itself can certainly be attacked). Second, the carrier can freely enter planetary atmospheres while its embarked craft are inside the ship.

Last but not least, embarked craft carried in a hangar *do not* count toward the ship's hull points, and have no effect on the carrier's acceleration or FTL travel rates.

Hangars may launch or recover no more than one craft per phase per hangar; some ships divide their hangar space among two or more hangars so that embarked craft can be launched and recovered at a faster rate.

At Progress Levels 6 or 7, the hangar must be depressurized to launch or recover embarked craft. However, if PL 8 technology of type Q or M is available, the hangar can be sealed by energy screens. This allows the ship to launch straight to space without exposing the hangar to vacuum.

Magazine (PL 6)

Just because a carrier embarks 50 fighters armed with matter bombs, it doesn't mean that there are more matter bombs lying around for the fighters to rearm and strike again. Carriers whose embarked craft rely on dropped ordnance or missiles require vast ordnance stores to sustain any kind of prolonged hostilities. Each hull point spent on magazines can store 4 size points of missiles, mines, or bombs.

Table 5-17: Hangars and Miscellaneous Installations

System	Tech	Hull	Power	Cost	Type	Notes
Progress Level 6: Fusion Age						
Airlock	-	1	0	$10 K	Hangar	Free with command deck or crew quarters
Brig	-	2	0	$20 K	Accom.	per 4 prisoners
Cargo Space	-	1	0	$10 K	Cargo	per 24m3
Cargo Bay	-	2	0	$20 K	Cargo	per 50m3
Cargo Hold	-	3	0	$50 K	Cargo	per 100m3
Docking Clamps	-	2	0	$50 K	Hangar	per 10 hull point capacity
Escape Pod	-	1	0	$50 K	Hangar	10 man capacity
Fuel Collectors	-	2	0	$100 K	Fuel	-
Hangar	-	1	0	$100/25 K*	Hangar	per hull point capacity
Lab Section	-	2	0	$100 K	Accom.	-
Magazine	-	1	0	$50 K	Misc.	per 4 size points of carried ordnance
Reentry Capsule	-	0.5	0	$5 K	Hangar	2 crewmen
Sick Bay	-	2	0	$150 K	Misc.	4 beds
Workshop	-	2	1	$20 K	Misc.	-
Progress Level 7: Gravity Age						
Accumulator	S	1	0	$40 K	Power	stores 10 power points
Autocargo	-	1	1	$30 K	Cargo	per 6 hull points of cargo serviced
Boarding Pod	-	2	0	$200 K	Hangar	10 troop capacity
Evac System	-	4	0	$250 K	Hangar	4 10-man lifeboats
Extra pods	-	1	0	$50 K	Hangar	2 10-man lifeboats
Fabrication Facility	-	4	2	$200 K	Misc.	-
Ordnance Transfer System	-	2	2	$150 K	Hangar	-
Security Suite	-	1	1	$200 K	Cmd	per 40 hull points protected
Stabilizer	G, X	5%	1/hull	$200 K/hull	Engine	Adds 1 to maneuverability class
Progress Level 8: Energy Age						
Holofield Bay	Q, C	1	1	$100 K	Misc.	
Nanomanufacture Bay	S, C	4	4	$500 K	Misc.	

* A hangar costs $100 K, plus $25 K per hull point spent on the system.

Tech: The technology type necessary to build this device.
Hull: The number of hull points required by the system.
Power: The number of power points required by one unit of this type.
Cost: The cost for one unit of this system.
Type: The general category of this system for purposes of assigning it to the damage diagram.

Step 12: Miscellaneous Installations

The last systems a shipbuilder normally considers are the miscellaneous facilities that don't really fit into any other category. Some of these may be crucial to the ship's mission; a heavy freighter should buy its cargo space first, and its defensive armament second.

Airlock (PL 6)

A small compartment with two heavy-duty hatches—one leading outside the ship, the other leading inside—the airlock also includes the pumps and controls necessary to pressurize or depressurize the room. A ship automatically includes one free airlock per command deck, crew quarters, crew bunkroom, docking clamp, hangar, cargo hold, or ordnance transfer system; additional airlocks may be purchased at a cost of 1 hull point and 10 K each.

Brig (PL 6)

Think of the brig as accommodations for undesirable passengers. Each two hull points devoted to the brig provides individual cells for four individuals, plus a security station, interrogation room, visiting area, and alarm system in case any of the guests decides to leave.

Cargo Space (PL 6)

One hull point provides enough space for 10 cubic meters of cargo, or one cargo unit. A compartment 2 meters tall, 2 meters wide, and 2.5 meters deep would be typical for 1

hull point of cargo space. Simply buying this system multiple times can purchase more cargo space.

Cargo Bay (PL 6)

Two hull points provide enough space for 50 cubic meters of cargo, or five cargo units. This is more efficient than two one-hull point cargo space because systems such as bulkheads, hatches, monitoring, and climate control don't need to be duplicated in the larger cargo bay. A space 4 meters wide, 2.5 meters tall, and about 5 meters deep is reasonable for a cargo bay. A cargo bay can be made larger by purchasing the system multiple times.

The cargo bay includes an exterior hatch, although this isn't an airlock.

Cargo Hold (PL 6)

Three hull points provide space for 100 cubic meters of cargo, or ten cargo units. This is more efficient than three one-point cargo spaces, or even a two-point bay plus a one-point space. An area 2.5 meters tall, 4 meters wide, and about 10 meters deep is reasonable for a 3-point hold. Large ships might purchase a cargo hold several times to create a hold with a capacity of 500 or 1,000 cubic meters.

The cargo hold includes a large cargo or vehicular airlock for exterior access.

Escape Pod (PL 6)

The escape pod is a stripped-down version of the boarding pod. It can carry ten people, and it includes 100 man-days of air and supplies. It's equipped with an emergency distress beacon and an automated landing program that will get its passengers to a planetary surface if there isn't a pilot on board. The power cells allow up to 6 hours of flight.

Hangar (PL 6)

The hangar is an enclosed, internal space where small craft can be stored, maintained, launched, and recovered. Its capacity is one hull point of small craft per hull point allocated to the system, so a 200-hull point hangar could carry 20 10-hull point fighters.

The hangar itself is a triple-airlock that can be opened to space, sealed from space, or sealed with a portion open to space for launch and recovery of small craft.

Fuel Collectors (PL 6)

Many Fusion Age systems require large amounts of hydrogen fuel. A ship could be stranded without propulsion or power by exhausting its fuel supply in a system lacking any kind of fuelling facilities.

A fuel collector system allows a ship to process fuel from sources found even in the most desolate star systems. Gas giants hold incredible reserves of hydrogen, and water (which can be processed into hydrogen) can be found on planets, moons, and comets as ice or liquid water. Each fuel collector unit can process enough fuel to fill a 1 hull- point tank in one day, provided the ship spends that day engaged in fueling operations–siphoning water, mining ice, or skimming gas giant cloud-tops.

Note that a ship trying to fill several hundred hull points of fuel tanks will take months to completely fuel with only one fuel collector system. Large ships should carry several fuel collectors to fuel in a reasonable amount of time.

Lab Section (PL 6)

The lab section consists of a small number of offices, laboratories, and conference rooms suited for various types of scientific work. Four scientists or technicians can work comfortably in this space, and as many as a dozen can use it with significant crowding. General-purpose instruments and recording devices are also included.

An Ordinary-quality mainframe (see *Chapter 10* of the ALTERNITY *Player's Handbook*) is included in the cost of this system. It contains databases on the broad skills of Physical Science, Life Science, and Technical Science.

Reentry Capsule (PL 6)

A reentry capsule is an emergency escape device with room for two people. After ejection, the capsule has enough air and survival supplies for ten days. It drifts through space, or it can de-orbit and make planetfall if it was launched within 10,000 kilometers of a planet's surface.

Sick Bay (PL 6)

This is a small shipboard hospital with care and treatment facilities for up to four in-patients. Buying the sick bay multiple times increases its capacity accordingly, so a 10-hull point sick bay can accommodate 20 beds. The sick bay includes a small operating theater, a reasonable supply of medical equipment and supplies, and constant vitals monitoring for all patients. The sick bay qualifies as a facility of Ordinary (–1 step), Good (–2 step) or Amazing (–3 step bonus) quality for Medical Science-*treatment* or *surgery* skill checks at Progress Levels 6, 7, and 8, respectively.

Workshop (PL 6)

The workshop is a small but lavishly equipped machine shop for repair work, light manufacturing, and special fabrication jobs. A shipboard workshop makes it possible to attempt repairs of mortal damage in space, but any such attempts suffer a +3 step penalty.

Accumulator (PL 7)

The accumulator stores extra power points. Each hull point can store up to 10 excess power points, which can be allocated or spent just like normal power points in the power distribution phase. However, once the accumulator's stored power points have been allocated, they're unavailable until the accumulator is recharged in a subsequent power distribution phase. Accumulators are useful for providing ships with quick one-shot recharges on high-powered weapons or extra power for maneuverability in an emergency situation.

Autocargo (PL 7)

Consisting of automated cargo loading and handling machinery, the autocargo system provides service to cargo holds, bays, or spaces totaling 6 hull points or less. It allows the rapid loading or unloading of cargo, handling heavy or awkward loads with ease.

Boarding Pod (PL 7)

The boarding pod is a small assault module equipped with gravity induction engine powered by a large lanthanide cell. It can hold ten troops in normal gear, or six troops in body tanks.

The boarding pod has an acceleration of 0.5, a Maneuverability Class of 2, and enough power to sustain flight for up to 10 game rounds. This means that it's generally used against targets that aren't maneuvering or accelerating any more. The pod can be "flown" remotely from the launching ship, or controlled by a pilot with the Vehicle Ops-*spacecraft* skill. It has 5/5/2 stun/wound/mortal points, Good toughness, and 1d4 points of external armor against all types of damage. The power cells can provide 6 hours of flight and up to 48 hours of life support.

When the pod reaches its target, it uses a set of mechanical grapples to fasten itself to the enemy's hull. It doesn't have any facilities for cutting into the enemy ship, but the marines on board normally carry shaped charges or laser torches to make their entrance. This normally takes 1d4 rounds, although it depends a lot on what kind of gear the boarders have and what they're trying to get into.

Evac System (PL 7)

This is a system of four escape pods, designed to serve a large ship. Each has a capacity of 10 people, carries 100 man-days of air and supplies, and can sustain up to 6 hours of independent flight with an acceleration of 1. An automated landing program can bring the pod to a planet's surface if there isn't a pilot available.

The system can be expanded for larger ships. Each additional hull point provides two more life pods, at a cost of 50,000. Most warships and liners carry enough evacuation pods to provide all hands a chance to escape a major catastrophe in space.

Fabrication Facility (PL 7)

This facility is a large, automated workshop with a manufacturing computer that holds design specs for thousands of useful devices and critical machinery. Virtually any part or component of the ship can be duplicated by the fabrication facility. Not only is the facility useful for creating special-purpose tools, furniture, or repair parts, it also makes possible the repair of mortal damage to the ship without returning to a shipyard.

Ordnance Transfer System (PL 7)

The ship is equipped with a special airlock and ordnance transfer crane or tractor beam. It can reload external missile racks, bomb racks, or ordnance cells in d4 x 10 minutes, instead of d4 hours. Ammo carriers are often fitted with this system to permit faster reloading of expended missiles and bombs.

Security Suite (PL 7)

The ultimate in shipboard security, this suite of protective devices includes video, sound, and thermal monitoring of all protected compartments by surveillance computers. All doors in the protected area are heavy-duty armored security hatches that can be set to open by key card, retinal scan, or positive control from the ship's security center. Finally, each security suite purchased includes four weapon cupolas that can be used to mount any ranged or heavy weapon from the *Player's Handbook* in strategic locations such as airlocks, passage intersections, or vital compartments.

While it's possible to protect the entire hull of a large system with security suites, it's more cost-efficient to create "security zones" or "security decks" to guard vital areas or control access throughout the ship, leaving most of the hull with routine security measures and monitoring.

Stabilizer (PL 7)

The stabilizer is a modification to the ship's engine system that increases its maneuverability. A ship equipped with a powered stabilizer increases its base Maneuverability Class by 1 point. For example, a fighter with a stabilizer is Maneuverability Class 5, not 4.

The stabilizer requires 5 percent of the hull, and 1 power point per hull point of the system. For example, a corvette of 80 hull points requires a stabilizer of 4 hull points, consuming 4 points of power.

Holofield Bay (PL 8)

The ultimate in personal entertainment, the holofield bay uses virtual matter and holoprojection technology to create fully immersive virtual reality. Sometimes the verisimilitude of the setting is not completely perfect, but it's good enough for extremely realistic training (–2 step bonus to Teach skill checks made with holofield bay classrooms) and just having fun.

Nanomanufacture Bay (PL 8)

The final step in shipboard manufacturing and repair technology, the nanomanufacture bay combines many of the fabrication facility's machines with a nanite tank–a large fluid-filled chamber in which a matrix of microscopic devices can construct virtually anything imaginable from the crudest raw materials. The ship's engineer gains a –1 step bonus to repair checks to repair mortal damage, despite the fact that a shipyard is normally required to effect such repairs.

Step 13: Adding It Up

When you finish with your first pass on a ship design, you'll probably find that you've spent too many hull points or that your ship doesn't have enough power to fight efficiently. You may need to throw out some features that seemed like interesting accessories, or possibly reduce the ship's armament or defenses, to fit everything into the hull. Similarly, if the finances available in the campaign are a serious restriction, the ship may be too expensive to be practical. You may need to look for cheaper alternatives to expensive systems.

The Fire Diagram

You may find it useful to chart which firing arcs your ship's weapons bear on. This is referred to as a firing diagram.

First, you'll need to code each type of weapon your ship carries. Use the abbreviations below as a starting point, and add extras as you see fit.

MB–main battery
SB–secondary battery
TB–tertiary battery
ASM–antiship missile launcher
SAM–antiair missile launcher
TT–torpedo tube
BB–bomb bay

Mark the general location of each weapon mount by drawing a small circle, square, or triangle in the right part of the diagram and coding it in the manner explained above.

TRIANGLE – standard mount
CIRCLE – turret or sponson
SQUARE – missile or bomb launcher or rack

Indicate which arc of fire the weapon bears on by drawing an arrow from the symbol to each arc it faces. If the weapon can fire into the zero-port or zero-starboard arcs, indicate this by marking a 'z' at the end of arrow. Finally, if the weapon is a fixed mount, indicate this by marking a 'f' at the end of the arrow.

You can indicate multiple mounts simply by drawing one arrow per barrel extending from the mount symbol.

Damage Diagram

The final step of the ship construction process is to build your ship's hit location chart. This chart indicates what systems on the ship are located near each other and might be endangered by hits to a particular portion of the ship's hull. It's intended to be somewhat abstract, since a hit in one part of a ship might cause cascading damage or systems failures in an entirely different part of the ship.

Step A: Define Zones

Every ship is broken up into a number of zones. A zone serves no purpose other than identifying roughly where in or on a ship a particular system is located.

Small craft of 20 hull points or less have two zones: fore (F) and aft (A).

Small craft of more than 20 hull points have four zones: fore, forward center, aft center, and aft. These are marked F, FC, AC, and A.

Light vessels have six zones: fore, forward center, port side, starboard side, aft center, and aft. These are marked F, FC, P, S, AC, and A.

Medium vessels have eight zones: fore, forward port side, forward center, forward starboard side, aft port side, aft center, aft starboard side, and aft, or F, FP, FC, FS, AP, AC, AS, and A.

Heavy vessels have twelve zones: fore, forward center, forward port side, forward starboard side, midships port, center forward, midships starboard, aft port, center aft, aft starboard, aft center, and aft. These are marked F, FC, FP, FS, P, CF, S, AP, CA, AS, AC, A.

Super-heavy vessels have twenty zones. In addition to the twelve zones of a heavy vessel, super-heavy vessels add forward-forward center, forward-forward port and starboard, port center, starboard center, after-after port, after-after center, and after-after starboard. These are abbreviated as F, FFP, FFC, FFS, FP, FC, FS, P, PC, CF, SC, S, AP, CA, AS, AAP, AC, AAS, AAC, and A.

Step B: Assign Systems

Every system on your ship needs to go somewhere. You have a great deal of liberty in deciding where a system goes, but here are some basic guidelines.

Weapon Assignments

Weapons can't be placed in a zone that they couldn't reasonably reach their arcs of fire from. For example, a turret that is designated to fire forward, port, and starboard can't be placed in any zone marked "aft" (or any zone including 'aft' as part of its title).

Hull Point Limits

No zone can contain systems whose hull point total exceed the "zone" limit based on the hull type. For example, a battleship's zone limit is 195 hull points, so the systems installed in a particular zone can't exceed 195 hull points.

Every zone must contain at least one system. Note that it's risky to leave zones very lightly filled, since zones that are "shot through" in combat will permit fire to reach other parts of the ship.

Multiple Units

Not all systems of the same type need to go into the same zone. In fact, it's advisable to distribute systems around the hull so that one lucky hit won't take out all of a ship's power, or its weaponry, or whatever. A ship with three power plants may choose to place them in three different zones, group them all together in one zone, or put one plant in one zone and two in another. A ship with twenty crew bunkrooms may put ten in one zone, five more in another, and one each in five zones after that. Weapon systems will frequently be broken up to shoot into different arcs of fire.

Systems that are whole-ship installations (defenses, recyclers or life support, and so on) may be distributed around the hull or concentrated in one zone. For example, a deflection inducer requires an installation of 1 hull point per 20 hull points of the ship to be protected. If the ship is 1,000 hull points, the deflection inducer requires 50 hull points. This can be described as one 50-hull point unit, five 10-point units, ten 5-point units, or anything else that is reasonable. The important thing to remember is this: A failure of any component of a whole-ship installation means that the whole installation fails.

Common Sense

Instead of attempting to legislate every possible arrangement of ship systems into particular zones, we recommend simply using your common sense. If you can reasonably imagine a ship with the arrangement you have in mind, it's probably okay. If you have a hard time imagining how a ship with all of its life support systems concentrated in one zone out of twenty manages to provide a comfortable climate for everyone, you should break up the life support units into separate installations and scatter them around the ship.

Another good example of this is the "strategy of the myriad smalls." A ship might devote hundreds of hull points to its engines to achieve a certain level of acceleration. These could be described as one massive engine, a handful of reasonably sized engines, or many dozens of tiny engines. For the sake of sanity, you might decide that a battleship can't really be powered efficiently by a hundred fighter engines. There is a tangible game benefit to using a number of fighter engines, since dozens of "extra" hit locations will be manufactured by this strategy. But it isn't really in the spirit of the rules.

See TABLE 5-18: HIT LOCATIONS AND ZONE LIMITS on the next page.

Step C: Organizing the Hit Location Zones

After you assign each system on the ship to a particular zone, the next step is to create the order in which systems in that zone will be affected by enemy fire. In general, the following order should be used:

- Weapons, from lightest to heaviest firepower
- Defenses
- Sensors
- Comm systems
- Fuel tanks
- Hangars or Cargo
- Accommodations
- Miscellaneous
- Support systems
- Engines
- Power plant
- FTL drive
- Command and computers
- Next zone

Most zones will only be fitted with two or three of these systems (although small ships will need to load up their hit location zones with a greater variety of equipment). The hierarchy here assumes that systems at or near the surface of the ship will be affected first by enemy fire, and systems deeper inside the ship will be affected later.

Within each of these categories, you should designate an order based on the largest (and most likely to be struck) to the smallest system. For example, if a crew bunkroom of 3 hull points and a passenger stateroom of 2 hull points occupy the same zone, the bunkroom goes first on the hit list. Weapons are an exception to this rule; lighter weapons usually have more exposed mountings than heavy weapons, so the smallest weapons are affected first.

Step D: Filling Out the Hit Location Chart

Refer to the hit location chart in *Chapter 2*. Record which systems are located in each zone, and the hit location roll for each zone.

AN EXAMPLE OF SHIP CONSTRUCTION

Let's say that John has decided that his ALTERNITY game will be based around a large survey cruiser that visits new planets each week. His campaign is set at Progress Level 7, and all technologies except M (matter coding), T

(teleportation), and X (energy transformation) are available for this ship.

John names the ship the *Endurance*, after Sir Ernest Shackleton's ship; most ships of a particular type share the same naming convention, and it seems reasonable to name his survey cruisers after the ships of famous explorers.

Step 1: Class and Hull Selection

John decides that the heavy cruiser is a good hull to work from. The heavy cruiser hull has 400 hull points, plus an additional 80 for economy of scale. The heavy cruiser is a medium hull, with medium toughness. It costs 100 million credits.

Table 5-18: Hit Locations and Zone Limits

	Hull Type	Hull Points	Zones	ZoneLimit
Military Hulls				
Small Craft				
	Fighter	10	2	7
	Strike fighter	15	2	10
	Cutter	20	2	14
	Scout	30	4	10
	Escort	40	4	14
Light Ships				
	Corvette	80 (+8)	6	22
	Frigate	120 (+12)	6	33
	Destroyer	160 (+16)	6	44
Medium Ships				
	Light cruiser	320 (+64)	8	75
	Heavy cruiser	400 (+80)	8	96
	Armored cruiser	480 (+96)	8	115
Heavy Ships				
	Battlecruiser	960 (+288)	12	156
	Battleship	1200 (+360)	12	195
	Fleet carrier	1600 (+480)	12	260
Super-heavy Ships				
	Dreadnought	3200 (+1600)	20	480
	Super-carrier	4000 (+2000)	20	600
	Super-dread.	6400 (+3200)	20	960
	Fortress ship	12000 (+6000)	20	1800
Civilian Hulls				
Small Craft				
	Launch	8	2	5
	Courier	16	2	10
	Trader	24	4	8
	Fast freighter	32	4	11
	Fast transport	40	4	14
Light Ships				
	Hauler	72 (+7)	6	20
	Industrial	96 (+10)	6	27
Medium Ships				
	Medium freighter	240 (+48)	8	58
	Clipper	360 (+72)	8	87
	Medium transport	480 (+96)	8	115
Heavy Ships				
	Tanker	720 (+216)	12	117
	Liner	840 (+252)	12	137
	Heavy transport	1280 (+384)	12	208
Super-heavy Ships				
	Super-freighter	2400 (+1200)	20	360
	Colony transport	3600 (+1800)	20	540

Step 2: Armor

The *Endurance* is intended for long-range operation and exploration instead of battle fleet operations—John decides that medium armor is fine. Medium armor requires 5 percent of the ship's hull points (20, in this case), so the *Endurance* now has 460 hull points remaining for other systems. He chooses neutronite armor as the best available at PL 7. At 500,000 per hull point, the ship's armor costs 10,000,000. The ship's armor ratings are d6+1/d6+1/d6 vs. low impact, high impact, and energy attacks.

Step 3: Power Plant

John doesn't know exactly how much power the *Endurance* is going to need, but a good guideline for a power plant is 10 to 15 percent of the hull, or a power output equal to about half the ship's hull. The mass reactor is the best power plant available under his technology restraints, so he buys 72 hull points of mass reactors to generate 252 power points.

John chooses to install these as 4 18-point reactors. Each mass reactor costs 2 million to install and 4.5 million for its size, for a total expense of 26 million.

Step 4: Engines

The induction drive is the best engine available at PL 7. It takes a lot of power, but it offers tremendous acceleration and doesn't need fuel. Referring to TABLE 5–4, John finds that allocating 15 percent of the hull to an induction drive will give the *Endurance* an acceleration of 3. That's pretty fast for a heavy cruiser, but John sees the *Endurance* as a ship designed for speed over protection or firepower.

Fifteen percent of the ship's hull is 60 hull points. The engine consumes 60 power points and costs 31 million. John decides to split this into two 30-hull point engines, which increases the price to 32 million.

Step 5: FTL Drive

The *Endurance* definitely needs some kind of faster-than-light drive; it's a survey cruiser, after all. Since John's already decided that the energy transformation and teleportation technologies aren't available, the stardrive is the best remaining option.

The stardrive requires 5 percent of the hull, or 20 hull points. It takes 60 power points to activate the device, but this power only needs to be available to enter drivespace—the *Endurance* can shut off its induction engines or weapons systems to free up the power points for a starfall. With 60 power points, the *Endurance* can leap up to 20 light-years in one starfall; if all of the ship's power is brought to bear, it can make a starfall of 39 light-years.

A stardrive of 20 hull points costs 22 million credits.

Step 6: Support Systems

This step includes four sub-steps: life support, artificial gravity, crew accommodations, and stores.

John decides to equip the *Endurance* with complete life support. He wants the characters in his game to have the choice of wandering all over the ship without the inconvenience of suiting up for vacuum work. At PL 7, each auto-support system covers 40 hull points; 10 will cover the entire ship. Life support takes 10 hull points, 10 power points, and costs 2 million.

Artificial gravity isn't a problem. Since the *Endurance* is a PL 7 ship with access to Type G (gravity) tech, true artificial gravity is included in the life support system at no extra cost in hull points, power, or money. This protects the crew and the hull from deadly accelerations, and provides a comfortable 1G environment.

Crew accommodations are a little tricky, since John doesn't really know how many crewmembers the *Endurance* requires. TABLE 5–1 recommends a crew of 300 for a heavy cruiser, so John elects to buy accordingly. Twelve 20-man crew bunkrooms, eight 6-man crew quarters (for senior enlisted hands and junior officers), and nine 2-passenger staterooms (for the department heads and commanding officer) total 306 crew accommodations. These require a total of 70 hull points and cost 2,600,000 credits. The *Endurance* may have up to 29 airlocks installed as part of its crew berthing and general accessibility.

Since the *Endurance* provides quarters for 306 crewmembers, it carries 30,600 days of stores, which will be consumed in about three months. John wants to increase this drastically; equipping the ship with recycler units is the best way to do that. Fifteen recycler units reduce the consumption of 306 crewmembers to just around 30. At that rate, it will take 1,000 days—almost three years—to deplete the ship's stocks of food, water, and oxygen. The recycler units take 15 hull points, 15 points of power, and cost 4.5 million credits.

Step 7: Weapons

The *Endurance* is primarily an exploration vessel, not a battle-line warship, but it still needs some serious weaponry for self-defense.

First, John installs a main battery of 6 matter beams, organized into two triple-mount turrets. Each cannon costs 25 million and takes up 14 hull points after the turret penalty is figured in. However, in a triple mount, three guns take up the space and have the cost of two guns mounted singly. So, instead of spending 84 hull points and 150 million, the triple mounts reduce the cost to 55 hull points and 100 million. The beams consume 11 points of power each. John decides that one turret is mounted to fire forward, port, and starboard, while the other is mounted to fire aft, port, and starboard.

Next, John decides to install something for an extra punch. He decides that two plasma torpedoes in fixed

mounts are fairly economical for space and power, and provide the *Endurance* with a heavy-firepower weapon. In a fixed mount, each torpedo only takes 8 hull points and costs 7.5 million credits. It uses 15 power points.

Finally, John arms the *Endurance* with a secondary battery of 18 mass cannon in triple turrets. A single mass cannon requires 2 hull points, 3 power points, and 300,000 credits. Mounting the weapons in turrets raises this to 3 hull points and 375,000 each. However, the triple mount means that three weapons count for two in terms of space and money, so only twelve of the eighteen add to the ship's space requirements and construction costs. The mass cannon battery totals 30 hull points, 54 power, and 4.5 million. John distributes the turrets around the ship so that three each cover the zero-port and zero-starboard arcs, three each cover the port and starboard arcs, four bear forward, and two bear aft. (Each turret bears in three arcs.) The mass cannon should serve well against enemy missiles and small craft.

The armament may be a little light for a heavy cruiser, but you'll recall that the *Endurance* carries full life support and recycling, and she's fast. Combat is a secondary role, but watch out for the plasma torpedo!

John realizes that he's running short on power at this point. He'll need more to fight the ship effectively. He returns to Step 3 and increases the power plant from 72 hull points to 84 hull points.

Step 8: Defenses

John needs to give the *Endurance* some high-tech defenses. The particle screen is probably the best bet at PL 7, but John decides that it takes too much power and space, and settles for the deflection inducer as his ship's primary defense. Since the Endurance is a cruiser of 400 hull points, it needs 20 inducers. This takes 20 hull points and 40 points of power, and costs 10 million.

He also equips the ship with a jammer. The jammer requires 4 hull points and 4 power points to cover a ship of 400 hull points; the cost for the system is 400,000. John would like to get some damage control, but he has other systems he needs to address first. All ships are assumed to have some amount of integral damage control, anyway.

Step 9: Command, Computers, and Communications

John starts by buying a command deck for the *Endurance,* one of the few systems that's mandatory for a starship. This takes 6 hull points, and costs 1.8 million.

Next, John he buys the best suite of computers available. He chooses a Good computer core, Good fire control computers for each of the three weapon batteries, three Good sensor computers, a Good tactical control computer, and a Good navigation control computer (Note that John doesn't know exactly how much the sensor control computers will cost until he actually buys his ship's sensors; we filled this in early.)

Finally, John equips the *Endurance* with a communication suite of 4 radio transceivers and 2 mass transceivers. These take up 4 hull points and cost 300,000. If all comm systems are in use at the same time (a rare event), they consume 6 power points.

Step 10: Sensors

Since the whole point of a survey cruiser is to gather information, John lavishes money on the ship's sensors. He starts with a multiband radar, purchased four times to cover all four arcs, then purchased four more times to increase tracking from 40 contacts to 200 contacts at once. Then he purchases a backup multiband radar to cover all four arcs with tracking up to 120 contacts.

Next, he purchases a mass detector and an EM detector, expands their coverage to four arcs, and buys up their tracking to 120 contacts. He finishes with a hi-res video system for all four arcs, and then a spectroanalyzer (useful for scientific work of all kinds).

The sensors total 16 hull points and 19 power points.

Step 11: Hangars and Small Craft

What's a survey cruiser without a couple of small shuttlecraft? While John would love to embark a number of launches or fighters on board the *Endurance,* there just isn't room. He decides to settle for two launches, which require a hangar of 16 hull points. (He'll design the launches later.) A hangar of 16 hull points costs 500,000.

Step 12: Miscellaneous Installations

Now for the final details. First, John wants to make sure that the player characters have plenty of opportunities to get off the ship if it ever gets blown to pieces by enemy action. He installs an evacuation system capable of handling 300 crew members, which takes 13 hull points in addition to the basic 4 hull points of the installation, a total of 17 hull points. He has 14 hull points left to fill.

In addition to the evacuation system, John purchases a brig, a fabrication facility, a lab section, a sick bay, and a cargo hold to round out the *Endurance.* With one hull point left over, he decides to install a security suite that covers 40 hull points of the ship—probably the command deck, the computer room, and a few other important areas. John figures he'll decide exactly what is covered later on.

None of the miscellaneous systems are exactly lavish, but each adds some basic functionality to the hull: security, a small hospital, science facilities, repair facilities, and a hundred cubic meters of cargo space. You never know what you might need in deep space exploration.

John could go back and fiddle with the design to make more room for special facilities, but he decides that the basic plan is sound. The *Endurance* is done. The final

The Endurance

Type	System	Hull Pts	Pow. Req.	Cost
Hull	Heavy cruiser	400 (+80)	-	$100 M
Armor	Medium neutronite	20	-	$10 M
Power	4x 21-pt mass reactor	84	+294	$29 M
Engine	2x 30-pt induction drive	60	60	$32 M
FTL	Stardrive	20	(60+)	$22 M
Support	10x autosupport	10	10	$2 M
	12x crew bunkroom	36	-	$0.48 M
	8x crew quarters	16	-	$0.16 M
	6x staterooms	12	-	$0.3 M
	15x recyclers	15	15	$4.5 M
Weapons	2x3 matter beam turret	56	66	$100 M
	1 fixed plasma torpedo	8	15	$7.5 M
	6x3 mass cannon turret	36	54	$4.5 M
Defense	20x deflection inducers	20	40	$10 M
	4x jammer	4	4	$0.4 M
Command	Command deck	6	-	$1.8 M
	2x mass transceivers	2	2	$0.2 M
	4x radio transceivers	2	4	$0.1 M
	Computer core, Good	2	2	$2 M
	3x Fire control, Good	3	-	$38.7 M
	Tactical control, Good	1	-	$0.2 M
	Nav control, Good	1	-	$0.75 M
	3x Sensor control, Good	3	-	$3,3 M
Sensors	Multiband radar #1	4	8	$0.4 M
	Multiband radar #2	3	6	$0.3 M
	Mass detector	4	4	$0.4 M
	EM detector	2	-	$0.08 M
	Hi-res video	2	-	$0.04 M
	Spectroanalyzer	1	1	$0.1 M
Hangar	Hangar	16	-	$0.5 M
Misc.	Evacuation system	17	-	$0.9 M
	Brig	2	-	$0.02 M
	Lab section	2	-	$0.1 M
	Sick bay	2	-	$0.15 M
	Fabrication facility	4	2	$0.2 M
	Cargo hold	3	-	$0.05 M
	Security suite	1	1	$0.2 M

DAMAGE DIAGRAM

F Plasma torpedo, hi-res video, mass transceiver, cargo hold, evac system (4 pods), bunkroom, bunkroom, crew quarters, lab section, recycler (6 pts), autosupport (4 pts), power plant #1

FP Mass cannon turret #2, mass cannon turret #4, radio transceiver, evac system (4 pods), bunkroom, bunkroom, crew quarters, stateroom, stateroom, recycler (3 pts)

FC Matter beam turret A, jammer, multiband radar #1, mass detector, spectroanalyzer, evac system (main–4 pods), crew quarters, recycler (3 pts), power plant #2, stardrive

FS Mass cannon turret #1, mass cannon turret #3, radio transceiver, evac system (4 pods), bunkroom, bunkroom, crew quarters, stateroom, stateroom, recycler (3 pts)

AP Mass cannon turret #6, radio transceiver, evac system (4 pods), bunkroom, bunkroom, crew quarters, stateroom, autosupport (3 pts), induction engine #2

AC Matter beam turret X, deflection inducer, multiband radar #2, EM detector, evac system (4 pods), sick bay, power plant #3, command deck, security suite, computer core and control computers

AS Mass cannon turret #5, radio transceiver, evac system (4 pods), bunkroom, bunkroom, crew quarters, stateroom, autosupport (3 pts), induction engine #1

A mass transceiver, hangar, evac system (2 pods), bunkroom, bunkroom, crew quarters, crew quarters, brig, fabrication facility, power plant #4

price tag is over 370 million credits. Major warships aren't cheap!

The Damage Diagram

Everything fits in the hull, there's enough power to run everything that needs to run at the same time, and John doesn't have any financial constraints to discourage him from a 372 million cruiser. The last step for the *Endurance* is to allocate systems to hit locations. What's where, in general terms?

John refers to TABLE 5–18 and discovers that, as a Medium ship, the *Endurance* must divide its systems into eight zones or locations. Since the ship is a heavy cruiser, it cannot hold more than 96 hull points worth of systems in any single zone.

He begins by placing the weapons, since they're the first priority on the hit chart anyway. The matter beam turrets are pretty clearly in central locations, with one facing forward and one facing aft, so John selects the FC and AC (forward center and aft center) zones for the big guns. The plasma torpedo is a fixed mount weapon firing forward; John puts in the F (forward) section. Since the mass cannon turrets are arranged with 4 covering the front and sides and 2 covering the stern and sides, John puts two turrets each in the FP and FS (forward port and forward starboard) zones, and one turret each in the AP and AS zones.

Next come defenses. John decides to keep the deflection inducer as one big 20-point installation; breaking it up into a number of small installations is a poor idea, since a hit against *any* of the deflection inducers will knock down the shields for the whole ship. It's better to reduce the chance of the deflection inducer being hit at all by limiting its exposure to a single zone, so John drops it in the AC zone.

Sensors and communications systems John scatters around the ship, with a preference toward the FC and AC zones–the hit chart for a Medium ship tends to shelter these locations a little more than the other areas of the ship. He places the hangar in the aft section, since it's pretty big and it needs to go somewhere.

Since the evacuation system is prioritized as a hangar, John scatters escape pods all over the ship. Unlike the deflection inducer, this makes sense: it doesn't matter if a small number of evacuation pods are destroyed, it doesn't really affect the functionality of the entire system, so he might as well disperse them. Accommodations deserve a similar treatment, as do the ship's support systems.

Finally, John gets to the major engineering systems: engines, power plants, and the FTL drive. There's no reason he couldn't place all of them in the front of the ship, the back of the ship, or the port side, but it suits his sense of aesthetics to balance out these systems and protect them in the middle of the ship as best he can. He places the two big induction engines in the AS and AP zones, even though he'd rather hide them in the center of the ship. But the forward center and aft center sections are getting pretty full, and John decides he wants to use them to protect more important systems.

The power plants he places in the four centerline zones: F, FC, AC, and A. Enemy fire may take out one of the power plants pretty easily, but the only way the *Endurance* could lose power altogether is if the entire ship is riddled to the point of uselessness. John places the stardrive in the FC section, which almost fills that section to its limit (91 hull points installed out of a maximum of 96).

Finally, John finishes by placing the command deck, security suite, and the ship's computers in the AC zone. The AC zone is pretty full, too, at 95 out of 96 hull point maximum.

Overall, the *Endurance* is very symmetrically arranged, even though this is not a requirement at all. Its weapons are placed in areas that would logically be useful considering the assigned arcs of fire. Nonvital systems are dispersed around the ship, while a handful of critical systems are buried in the relatively safe center areas. It's a pretty good arrangement, and one that could be easily rendered into a map or deckplan with a little work and artistic license.

CHAPTER 6: STATIONS AND BASES

Spaceships aren't the only platforms for weapons, sensors, docking facilities, and other such tasks that exist in a science fiction setting. Space stations and ground bases often have many of the same missions and capabilities, and are even more commonplace than large warships or commercial ships. A space station is basically a ship without engines–and, to extend the analogy, a ground base is a ship without engines or life support (although that depends on the local conditions).

Note: This final chapter of *Warships* was not completed before the cancellation of the product line. However, we include these sections as originally written, along with TABLE 6-1 below, to serve as a good starting point for you to use to develop your own stations and bases.

FACILITIES

In very general terms, there are three types of stations: ground bases, outposts, and space stations. You might also consider any kind of industrial complex or settlement to be a potential station or base, but that exceeds the scope of this product.

Ground Base

A ground base consists of a good-sized stretch of land on which a number of free-standing buildings and structures have been built. Usually, a ground base is located on a planetary surface with environmental conditions more or less suitable for human life, but a large base with sealed buildings and bunkers linked by subterranean transit tubes could be built on airless worlds. Ground bases may be built for a number of reasons: supply depots, naval repair and refueling, observation, defense, scientific research, heavy industry, trade and commerce, or even just habitation.

Ground bases can exceed the size of even the largest starships. A major defensive complex and naval base might sprawl for hundreds of kilometers, ringed by powerful bunkers and dotted with hardened shelters for grounded ships. Small ground bases are cheap compared to spaceships; they can make use of bulky and inexpensive materials such as reinforced concrete or fused rock. The largest ground bases may cost three or four times as much as a fortress ship and beggar a galactic civilization.

Table 6-1: Stations and Bases

Installation	Hull Pts	5%	10%	Tough	Target	s	w	m	c	Zones	Limit	Crew	Cost
Light													
Habitat Dome	100 (+10)	5	10	Small	0 steps	25	25	13	7	6	28	10	$5 M
Light Platform	150 (+15)	8	15	Light	0 steps	38	38	19	10	6	41	15	$10 M
Light Post	200 (+20)	10	20	Light	-1 step	50	50	25	13	6	55	20	$20 M
Medium													
Hab Complex	300 (+60)	15	30	Light	-1 step	38	38	19	10	8	72	150	$30 M
Medium Platform	400 (+80)	20	40	Med	-1 step	50	50	25	13	8	96	200	$60 M
Medium Bunker	600 (+120)	30	60	Med	-2 steps	75	75	38	19	8	144	300	$100 M
Heavy Ships													
Heavy Platform	1000 (+300)	50	100	Hvy	-3 steps	63	63	32	16	12	163	500	$250 M
Heavy Bunker	2000 (+600)	100	200	Hvy	-4 steps	125	125	63	32	12	325	1000	$500 M
Super-heavy Ships													
Super Platform	10000 (+5000)	500	1000	S-Hvy	-4 steps	313	313	157	78	20	1500	2500	$5000 M
Fortress	20000 (+10000)	1000	2000	S-Hvy	-5 steps	625	625	313	157	20	3000	5000	$20000 M

Hull Points: The number of hull points available in this type, representing its capacity for installing systems. The first number is the basic hull point total, the number in parenthesis is the bonus hull point total.

Tough: The installation's toughness rating.

Target: The installation's basic resistance modifier to enemy fire, based on its size.

5% and 10%: This is the number of hull points a system requiring 5 or 10 percent of the hull requires. This information is simply a shortcut to save you time and effort. Note that you can add them to get 15 percent, double the 10 percent score to get 20 percent, etc., etc.

S, W, M, C: The installation's Stun, Wound, Mortal, and Critical damage tracks.

Crew: For information purposes only, a general estimate of how many crewmen a typical installation of this size requires.

Cost: The cost of the hull, in credits, Concord dollars, or the appropriate currency for your campaign.

Outpost

An outpost is a sealed structure built on or in a significant body–a planet, moon, or asteroid. While a ground base is really a collection of buildings sharing a common purpose, an outpost is more like a spaceship built on the ground. It's designed to protect its inhabitants from the environment around them, and it's usually placed in a location that no one would want to live in if there wasn't some overriding reason to be there.

Like a spaceship, an outpost can be pictured as a collection of systems all located in the same general vicinity. Outposts are cheaper than spacecraft of similar size, since bulky but inexpensive materials such as concrete and rock can be used freely in their construction.

An outpost doesn't need engines and doesn't have to worry about drifting into the nearest gravity well if seriously damaged by enemy fire. Since outposts (and ground bases, for that matter) don't have to devote space and equipment to mobility, they are more heavily armed and armored than a similarly sized spacecraft. In fact, it's downright dangerous to attack a serious defensive installation. But the base can't ever run away, and the enemy always knows where to find it.

Space Stations

Compared to an outpost or ground base, a space station is more expensive and more vulnerable. So why build a space station when an outpost would do?

First, not all planets or positions are suitable for bases or outposts. A space station has to compensate for a number of hostile factors–vacuum, climate control, and radiation, among others–and these factors can be defeated competently by any civilization capable of building vessels for space travel. But the engineering challenges posed by building in the atmospheres of Jovian worlds or the murderous temperature extremes of Mercurian worlds may not be so easily conquered. A space station orbiting the planet in question can perform many of the same functions as a ground base, and be easier to build and operate too.

Secondly, space stations are mobile. Even if they lack propulsion of their own, it's possible to tow most space stations to new positions once they've outlived their usefulness in their original position. Ground bases are much less portable.

Next, many facilities or industries are more efficient in zero-G than they would on the ground. For example, the size of a drydock or cradle offers serious constraints to the size of a spaceship that can be built in a ground-based shipyard, but an orbital shipyard can make use of zero-G construction techniques to build much bigger ships.

Finally, there are tactical advantages to a position in orbit or in open space. The space station's sensors don't have permanent blind spots behind the bulk of a planet, or distortions due to atmospheric interference. Ground forces from a hostile planet can't attack a space station, and the indigenous population of a primitive world may never even detect an orbital station if the visitors overhead don't want to be seen.

Missions

For purposes of *Warships,* a base or station exists to perform one of four basic missions: defense, observation, spaceport, or shipyard. While there are many other reasons to build an outpost or a space station, these four reasons have the most bearing on the action and support of major warships.

Defense

This is perhaps the simplest mission to describe. A base or station designed for defensive purposes is armed with heavy anti-ship weapons and sited in some location where enemy vessels are not welcome. Defensive stations may be placed to support the passive defense of a star system or planet, much like the coastal fortresses and shore batteries of a seagoing navy.

Defensive stations can also assume an offensive role by interdicting an enemy planet, system, or transit route. Two battle platforms towed into opposing orbits around an enemy planet would form a fairly effective blockading force, while a battle station protecting a wormhole or stargate of some kind could very easily bar the passage of enemy ships. If the science of the campaign allows for the creation of chokepoints in space, some specific place where spaceships *must* pass in order to reach other locations, a powerful star-fortress may be able to completely immobilize enemy movements.

The measure of a defense station's capability is pretty simple: How much weaponry does it support, and how resistant is it to enemy fire? Defense bases or stations may range from a small missile battery or a pair of fusion beams in a hardened bunker to titanic orbital battle-stations capable of standing off a squadron of battleships.

Defensive Systems
Type Zero: none
Type One:
Type Two: sparse defense network
Type Three: small network
Type Four: armed space stations
Type Five: planetary shields, advanced satellites and weaponry

Shipyard

Shipyards are a special type of ground base or space station. Any ship bigger than a corvette or light freighter requires a major shipyard for its construction. The construction of a large ship is not only a highly technical process, but also a process requiring the ability to manipulate thousands (sometimes hundreds of thousands) of tons of the toughest and most durable materials around. The industrial machinery re-

quired to fashion hundreds of precisely shaped hull plates or structures weighing hundreds of tons is immense. Mills, refineries, power plants, and manufacturing facilities capable of producing each component of the new vessel limit a planet's ability to rapidly construct large numbers of big ships.

Most large shipyards are located in one of three places: high orbit around an industrialized planet, a stable trailing orbit (or LaGrange point) a few million kilometers away, or in the vicinity of an asteroid belt. While planet-bound shipyards are still quite common, it's much easier for very large ships to be built in low- or zero-gravity conditions. The disadvantage of working in space, of course, is the fact that the work force must be housed somewhere near their job, and that power, materials, and supplies must be provided to the site of the work. Lifting extremely massive sub-components like armored turret assemblies or induction engines from a planet's surface to high orbit is obviously a difficult process. However, a serious space-based manufacturing capability allows the shipyard to build and outfit these components without lifting anything other than people from the planet below.

Stations in Combat

Hits in one zone of a ground base never "bleed through" to another zone, unless the attacking weapon is an area effect device. In other words, when Building 1 has been pulverized, leftover damage does not spill over and wreck Building 2. This is because most ground bases make use of the local terrain and the lack of space constraints to disperse important structures. Subsequent hits that strike the same "zone" are basically wasted.

Appendix: Space Combat Hex Maps

The last two pages of this book offer hex maps for use in playing out space combat scenarios. Both a color and a black-and-white version are presented here; we recommend using the "negative" (white) version for photocopying. You can use starship miniatures or even tokens or coins to represent the ships of each sidde.

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