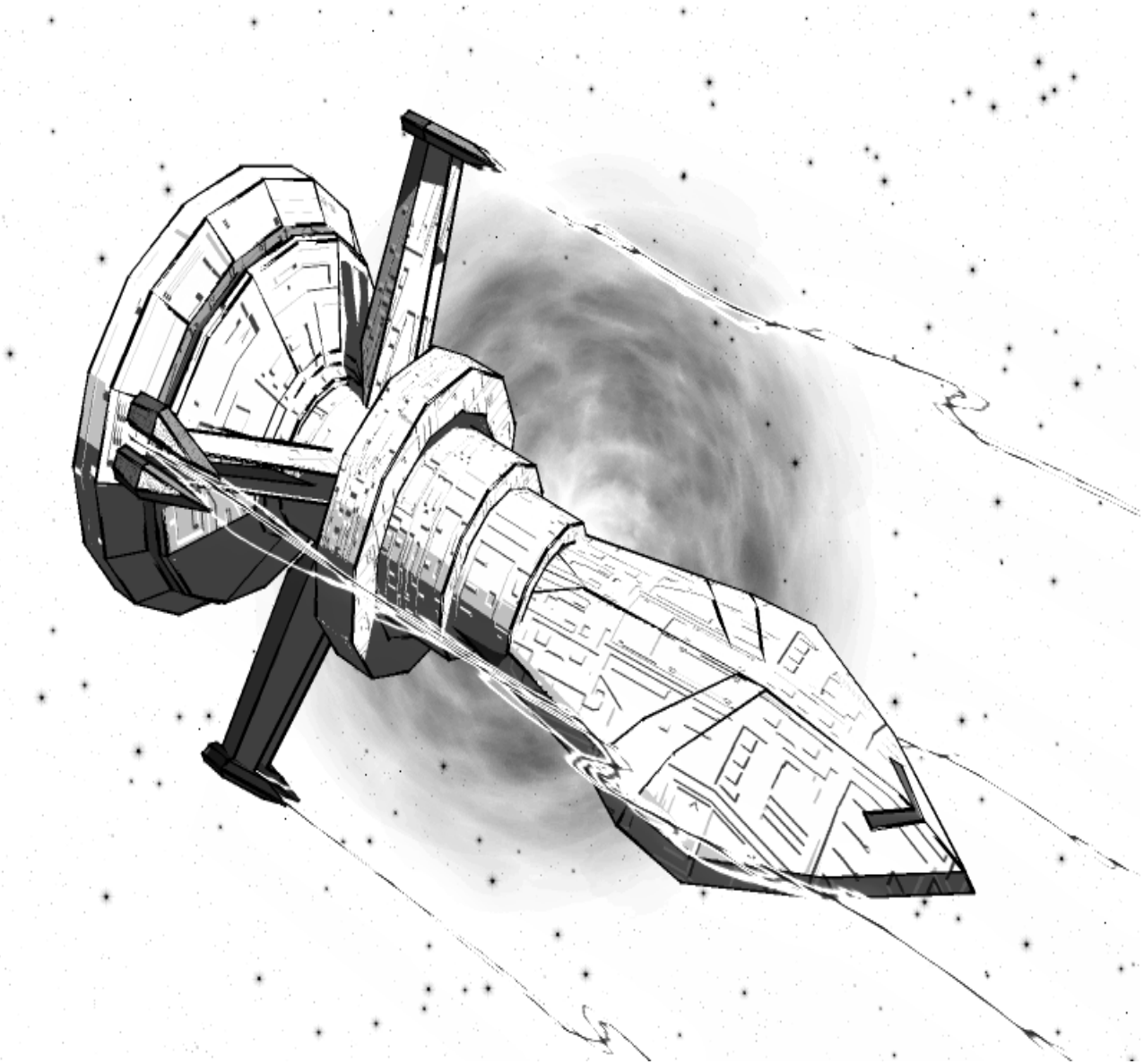

CLUSTER WAR

Created by
Todd A. Zircher

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1.0 Introduction

What is Cluster War? It's a set of rules and guidelines for a running a space empire game. Players assume the role of government leaders for their alien race and try to survive and prosper in a hostile star cluster. The players can expand the influence of their empire by exploring stars, establishing colonies, exterminating their rivals, forging alliances, researching technology, and discovering strange artifacts.

Unlike most space empire games out there, Cluster War is intended to be moderated by a game master and play like a hybrid of board gaming and traditional role playing games. An eye is also kept to also allow for a single player to run a campaign.

The primary combat system for Cluster War is the Tactical Command game engine. While playing out each battle at the tactical level is not required, units are described in TCOM terms in order to provide a 'common language' for unit designs, capabilities and costs. For those players that want to design their own units and understand the combat system in more detail, reading TCOM is encouraged. GMs and solo players will need a copy of the TCOM rules since the basic ship design systems, combat rules, and other details are covered there.

The standard game uses a flat hexagon grid map to represent the star cluster in which the game is set in. Each standard cluster is 70 columns wide and 70 rows deep. Smaller or larger maps are possible. Each hexagon (hex for short) is about five light years across. The hexagon grid is used to regulate movement and simplify task force placement. There are programs available to speed star map creation if a custom map is desired.

The cluster that the players begin the game in is distant from the spiral arms where most of the stars are located. This isolation means that there are no off-map star systems that the players can easily visit. There are a limited number of worlds to explore and exploit.

Cluster War is played in monthly "turns". Each standard month is 28 days long. Some smaller actions might be broken down into weekly time periods. These standard values help to regulate movement and construction.

Each turn, the players need to give the GM a set of orders that relate to what that player is attempting to accomplish. In the back of the rules you can find simple forms that detail the player's resources and production. After the GM receives the orders for each player, the orders are checked and processed. Most events such as ship building and R&D happen at the end of the month while ship movement and other actions can happen over the course of the turn. In the case of conflict, the GM moderates the results, sets up proxy battles, or asks the players if they want to slug it out at the tactical level. Cluster War lends itself well to PBEM (play by e-mail) gaming while any battles can be resolved on the weekend either via the internet or the game table.

2.0 The Game Map

The strategic map is a hexagon grid 70 columns wide and 70 hexes deep. A 100x100 map would have roughly twice as many star systems while a 50x50 would have half the number. The number system is composed of four digits. The first two digits represent the column and the third and fourth digits the row. So, hex 0902 would be the 2nd hex in the 9th column.

The most common feature shown on the strategic map is the position of stars that might possess habitable systems.

Spectral Classes:

- O Blue: young, hot, brightly luminous stars
- B Blue-white: slightly older than type O stars
- A White: stars entering the main sequence
- F Yellow-white: stars younger than our sun
- G Yellow: main sequence stars like our sun
- K Orange: middle aged stars
- M Red: stars which are becoming elderly and have burned most of their nuclear fuels

In general, the map that most players will be concerned with is the strategic map. This map shows the position and type of all known objects detectable from a great distance. Most of these objects will be individual stars, but other points of interest will also be shown. Exploration of these places can lead to new discoveries and dangers.

2.1 STEP Codes

The next level of detail used in Cluster War is the solar system detail view. This view lists details on the primary star and the number of planets. Under that is a listing of each planet or other bodies which includes their type, climate, and max Construction Point (CP) value as a colony. Additional data, such as special resources, alien civilizations, or unusual objects is also listed. The level of information in the detail view depends on the GM and the settings used in the CW Map Generator. At a minimum, a planet will list its STEP code and max CP value. At the max, scientific data for each major planetary body is generated down to such details as orbital period, day/night temperature, and escape velocity.

The STEP code is a four digit value that concisely determines a planet's suitability for colonization. STEP stands for size, temperature, environment, and planetary surface.

Size refers to the mass, density, and surface gravity of the planet. It can range from 0 to 9 with an X for extremely large planets.

Temperature refers to the average temps of the planet and can range from 0 (very cold) to 9 with an X for extremely hot planets.

Environment refers to the planet's atmosphere and relates to air pressure, composition, contaminants, and storm activity. It can range from 0 (vacuum) to 9 with an X for extremely hostile conditions.

Planet codes measure the volatility of the surface and core, the hydrographic percentages, and other surface conditions. A rating 0 is a dead planet while a 9 would represent a world riddled with volcanoes and earthquakes. A planet surface with a rating of X would be something really intense such as a sea of molten rock.

The STEP code mainly consists of numbers with 5555 being a very Earth-like planet. The extremes are 0000 (a small, cold, vacuum, dead rock like Luna) and XXXX (a giant, molten, stormy blast furnace of a planet.) Any planet with an X in its STEP code is automatically uninhabitable to life as we know it. To determine the colonization multiple, just count up the difference between the home world's and the colony's STEP values:

Multiplier	Steps	Comments
x1	zero	perfect match with home
x1.5	1-2	close match
x2	3-4	diverse planet
x3	5-6	harsh planet
x4	7-8	hostile planet
x5	9+	uninhabitable

Colony cost multiplier represents the amount of extra equipment required to keep the colonists alive and productive. Uninhabitable worlds require extreme measures to keep the people alive and working.

For example, a race born on a desert world (5655) would consider that STEP code to be their home world type. They would treat an Earth-like world with a STEP code of 5555 as a close match even if it is a bit chilly for them.

Here's another example that might be a GM special. The planet Eden has a step code of 55X5. It has the appearance of a perfectly Earth-like world, but there is a substance in the atmosphere that devours the flesh of any alien that is exposed to it. Even though X is only five steps away from 5555, the world defaults to uninhabitable due to the X code. Any humans would have to live in sealed cities and wear environmental suits to just to survive there.

3.0 Pre-Game Setup

All players will begin a game of Cluster War with a copy of the strategic map. In regular games, this map represents detailed stellar surveys that your astronomers have developed via radio and optical telescopes over that last few decades.

Additionally, all players begin a standard game with one home world, survey data of nearby systems, and perhaps some colony worlds depending on the race design for that player. The setup also includes a short list of starship, base, station, and facility designs (created either by the GM or player.) Add to that a budget of construction points (CPs) used to build starting units and facilities. The exact amounts depend on the GM and the type of campaign that he or she wants to run.

All of the setup information should be treated as confidential information. The survival of your people depends on it. Revealing the location of your home world too early could lead to a strike that could destroy your home world and cripple your economy.

All things being equal, each player starts with: a race that has just recently discovered some form of FTL travel (also know as a first generation culture), five hundred CPs of colonies, one thousand CPs for pre-built facilities (factories, shipyards, ground bases, defense forces, etc.), one thousand CPs worth of starships, and one size 24 training base on their home world. They also began with three templates for constructing bases (usually a small, medium, and large bases with a mix of either orbital or ground layouts) and two templates for ships (usually a medium cruiser hull and a smaller destroyer hull.) From those templates, they can build three base designs, five ship designs (including at least one command freighter design for colonization), as well as two fighter and two gunboat designs.

In the standard campaign, the players customize or design their own races. So, the actual starting resources are based on the campaign plus any additional racial bonuses. One thing that is fixed is your Advantage Point (APs) budget. See the race design section for more information.

3.1 Race Design

The race design system is based around a point system. These Advantage Points are used to 'purchase' benefits for a player's race design. Most advantages range in cost from 1 to 10 AP depending on the power and scope of the advantage. Players that start out as 1st Gen FTL races have 30 APs to spend on their race. GMs and referees can also use these rules to design higher or lower tech races. As a starting point, each tech level has the following numbers of advantage points to spend:

Pre-FTL	15 APs
1st Gen FTL	30 APs
2nd Gen FTL	50 APs

Players can also pick up disadvantages for their race that increases their pool of APs. Several advantages have prerequisite technologies or abilities that need to be purchased first.

The following Race Creation Checklist allows players to make their own races and for GMs to design new races for their games. This is not a definitive list. New abilities and technologies are possible, if the GM approves them. It is the job of the GM to assign an AP cost to any new ability or technology and they reserve the right to simply say no if a suggestion is unbalanced or difficult to implement within the scope of the game.

Race Creation Checklist

Home World Ecosystem
Size
___ Asteroids and zero gravity, size 0 (2 AP)
___ Planetoids and moons, size 1 or 2 (1 AP)
___ Small worlds, size 3 or 4 (0 AP)
___ Normal terrestrial planets, size 5 (0 AP)
___ Above average worlds, size 6 (0 AP)
___ Large planets, size 7 or 8 (1 AP)
___ Huge planets, size 9 (2 AP)
___ Extreme or gas giants, size X (10 AP)

Temperature
___ Plutonian worlds, temperature 0 (2 AP)
___ Cold worlds, temperature 1 or 2 (1 AP)
___ Freezing climate, temperature 3 or 4 (0 AP)
___ Normal climate, temperature 5 (0 AP)
___ Desert climate, temperature 6 (0 AP)
___ Hot worlds, temperature 7 or 8 (1 AP)
___ Inferno worlds, temperature 9 (2 AP)
___ Extreme heat, temperature X (10 AP)

Environment
___ Vacuum, environment 0 (2 AP, very common)
___ Trace atmosphere, environment 1 or 2 (1 AP)
___ Low pressure, environment 3 or 4 (0 AP)
___ Normal conditions, environment 5 (0 AP)
___ Contaminated, environment 6 (0 AP)
___ Hostile atmosphere, environment 7 or 8 (1 AP)
___ Violent atmosphere, environment 9 (2 AP)
___ Extreme or exotic, environment X (10 AP)

Planetary Conditions
___ Dead world, planet 0 (2 AP)
___ Depleted world, planet 1 or 2 (1 AP)
___ Barren world, planet 3 or 4 (0 AP)
___ Living planet, planet 5 (0 AP)
___ Water world, planet 6 (0 AP)
___ Frequent seismic activity, planet 7 or 8 (1 AP)
___ Frequent volcanic activity, planet 9 (2 AP)
___ Extreme volcanism, planet X (10 AP)

Some combinations are highly unlikely and do not occur naturally. You will not find asteroids with dense atmospheres or watery inferno worlds.

Biology/Physiology
___ Aquatic biology
___ Terrestrial biology
___ Mechanized metabolism
___ Methane-based biology
___ Silicon-based biology

Diet and body type can vary significantly. While such choices rarely have an impact on game play, they do offer some additional information to help describe your race.

Racial Abilities

___ Chameleon (1 AP) grants an offensive and defensive bonus to light troops depending on the combat situation. *
___ Combat reflexes (10 AP, +10 to accuracy) Note: This ability can't be purchased multiple times or combined with Battle Computer tech.
___ Environmental resistance (8 AP) can colonize worlds as if they were one step less. For example, a colony that is three steps away from a race's home climate would pay colonization costs as if it was two steps.
___ Extra Agility (2 AP) grants a +5 defense for gunboats and fighters.
___ Extra Durability (2 AP) adds a free +1 defense rating to crew and troops.
___ Extra Intelligence (5 AP) allows +10% bonus to CPs spent on R&D, maximum of four levels.
___ Extra Strength (1 AP) adds a free +1 attack rating to crew and troops. *
___ Flight (1 AP) wide spread natural or artificial flight or swimming capability depending on the race's native environment. This is not strategic fight capability, but improved 'ground' speed. *
___ Group Mind I (10 AP) grants exceptional racial unity and +30% against hostile espionage rolls.
___ Group Mind II (10 AP) requires GM-I and allows integration of conquered populations into the group mind society after several months.
___ Group Mind III (10 AP) requires GM-II and lets the assimilating race to take over a conquered population within a week.
___ Natural armor (1 AP) adds a free +1 to the defense rating of crew and troops. *
___ Natural weapons (1 AP) add a free +1 to the attack rating of crew and troops. *
___ Psionic Ability (5 AP) the first level of this ability always grants short range telepathy or empathy. Additional levels will either allow for advanced forms of telepathy or other psi abilities.
___ Shape shifting (2 AP) gives the race the ability to shift into a single form. This trait should also be bought for races that have radically different gender types. The alternate form can have different abilities and requires GM approval.

* This trait can' be used with mechanized combat units such as tanks or aircraft.

Racial Attitudes

___Pacifism (-5 AP), may not research weapons technology, conquer anyone, or initiate hostile activities. Pacifists must always attempt diplomatic solutions to conflict and retreat from or surrender to hostile action.
___Peaceful (-2 AP), may not conquer anyone or initiate hostile activities. Peaceful races must always attempt diplomatic solutions to conflict and retreat from or surrender to hostile action.
___Neutral (0 AP) races have no restrictions. This is the default attitude for most player races.
___Hostile (-2 AP) races must arm most of their units. They will usually fire first and rarely attempt peaceful diplomacy unless facing a superior force.
___Very Hostile (-5 AP) races must arm all of their units and will shoot first and ask questions later even in first contact situations. They will elect to conquer or perform genocide before seeking peaceful diplomatic situations.
___Xenophobic (-10 AP) races have an irrational fear of anything different or strange. Peaceful and pacifistic races will always flee from other aliens. Neutrals will be belligerent, territorial, and resistant to any diplomatic actions. Hostile races will always seek to destroy other races and never submit to any diplomatic action.

While you can get more CPs in the long run by setting up extra colonies, there are times when the extra unit can come in handy. This is especially true in campaigns with small maps where hostile powers are right next door. Ships and bases from converted APs are considered pre-built and are available for immediate use.

Racial Starting Bonus

___Convert APs to CPs (allows +100 CPs in ships, bases, or ground forces per AP spent)
___Extra Colonies (allows additional colonies up to +250 CPs value per 10 AP spent)
___Sector survey performed (10 AP per sector) Starting with your home sector, surveyed sectors give your race a significant head start in finding and utilizing resources.

Technological Achievements (10 AP each)

___ Armor Technology: This tech allows for the construction of ultra-dense armor that can absorb additional damage before being destroyed. Each level adds 2 points.
___Battle Computers I allows +10 to accuracy. Additional levels can be researched.
___Battle Computers II: Artificial Intelligence. The player can build autonomous units and crewless ships. BC-I is required.
___Battle Computers III: Androids. This tech allows for android crewed ships which do not need crew quarters, but can perform damage control and internal security. Combat androids are possible. BC-II required.
___Beam Rider System: a tractor beam variant that is useful for deploying small craft and mines.
___Beam Weapons Technology allows for high power weaponry that inflicts an additional point of damage per component per level.
___Beam Weapons: Disabling Weapons
___Beam Weapons: Heat Weapons
___Beam Weapons: Long-Range Weapons
___Beam Weapons: Meson Weapons
___Beam Weapons: Penetrating Weapons
___Beam Weapons: Selectable Systems allows the attacking player to choose between two existing damage modes before rolling to hit.
___Beam Weapons: Shield Disruptor weapons inflict double damage versus shields but zero damage versus components.
___Beam Weapons: Vibrational Weapons
___Cloaking Technology allows the player to buy cloaking systems for +15%. If psionic abilityhas been bought, this is true psi cloaking, otherwise this is stealth & ECM systems.
___ECM Systems reduce enemy accuracy by 10 points. Additional levels can be researched.
___Fighter FTL Technology allows fighters to use second stage drives or other FTL tech, range is still limited due to life support restrictions.
___Fighter Shield Technology allows fighters to use partial shield generators. Buying an additional level of this tech allows for full shields
___Ground Forces Technology adds +1 to attack and defense ratings of combat troops.
___Ground Forces: Continental Siege Units allows for starship scale ground combat units.
___Ground Forces: Intruder Defense Systems adds +1 to attack & defense ratings for crews.
___ Ground Forces: Personal Shields adds +1 defense rating for combat troops and crew.
___Improved Point Defense Batteries (point defense gains a +1 bonus to intercept)
___Long-Range Scanners: Cloaked ship detection
___Long-Range Scanners: Warp Point detection
___Mass Driver Technology allows ships to hurl rocks from extreme range at stationary targets.
___Missile Engine Technology allows for longer ranged missiles.
___Missile/Railgun Warhead Technology adds one to the damage rating of missiles or rounds.
___Missile/Railgun Warhead: Disabling Weapons
___Missile/Railgun Warhead: MIRV warhead (missile/round uses the scatter damage pattern)
___Missile/Railgun Warhead: Heat Weapons
___Missile/Railgun Warhead: Meson Weapons
___Missile Warhead: Penetrating
___Missile Warhead: Vibrational Weapons
___Modular Construction allows the building of hull modules which can then be assembled in next turn. Effects vary with the specific design.
___Regenerating Armor allows for the slow repair of biological armor that is not totally destroyed.
___Regenerating Shields allow for regeneration of burned out (but not destroyed) shields.
___Resistant Armor does not ablate, but it is very expensive. Neutronium strategic resources are required so this is rarely a starting tech.
___Shield Amplification Technology allows for high power shields that can stop an additional point of damage per level before burning out.
___Torpedo Weapons Technology allows for high power weaponry that inflicts one additional point of damage per component per level.
___Torpedo Weapons: Disabling Weapons
___Torpedo Weapons: Selectable Systems allows the attacker to choose between explosive and scatter firing modes.
___Torpedo Weapons: Heat Weapons
___Torpedo Weapons: Long-Range Weapons
___Torpedo Weapons: Meson Weapons
___Torpedo Weapons: Penetrating Weapons
___Torpedo Weapons: Shield Disruptor
___Torpedo Weapons: Vibrational Weapons

Alternate FTL Drives

The standard FTL drive for Tactical Command is the second stage drive. Based on Heim Quantum Theory, the second stage drive translates a ship into N dimensional space. The FTL speed is directly related to your current velocity when the second stage drive is engaged. Depending on the GM's ruling, players may have the option of using alternate drive technologies. Some of these drives require additional work for the GM to implement.

Alternate FTL drive technologies have a base cost of zero. This reflects that loss of second stage drive technology as part of the change. Some drive types have an additional cost or discount because they have advantages or disadvantages inherent to that technology compared to HQT based drive systems.

___Foldspace drive (10 AP) - a stealthy version of the Jump drive. It takes one or more combat rounds to create the fold.
___Jump drive (0 AP) - operates by ripping a hole in the fabric of space time and jumping through it. While travel time appears to be very short, several weeks can pass between entry and exit. The temporary rift created is easy to detect and takes one or more combat rounds to create.
___Skip drive (10 AP) - instead of making large jumps, skip drive ships make thousands of smaller jumps.
___String drive (10 AP) - any ship can enter a mapped warp point and appear at the distant end. Survey ships that have the LRS: Warp Point detection can quickly find new warp points otherwise a lengthy survey is required.
___Void Jammer drive (5 AP) - a fast warp drive that is vulnerable to storms and nebulae.
___Warp drive (0 AP) - cruise speed increases by 1 hex per additional 10 AP spend.
___Wormhole drive (50 AP) - Not usually allowed for players (easy to abuse as a weapon system.)

Alternate STL Drives

The standard slower than light drive in Tactical Command is the gravity drive. Also based on Heim Quantum Theory, the gravity drive is a field effect propulsion system that is based on 'real' physics. Taking one of these alternate drives gives you that drive instead of the default. All these drive types are optional and require the GM's permission.

Normally, a new STL drive technology has no cost since it replaces the gravity drive. But, some drive systems have an additional cost or discount based on the advantages or disadvantages inherent to that technology. It costs an additional 10 AP if you want to keep gravity drives and have a second drive.

___Micro jump drive (0 AP) - excellent turning, but limited top speed. Skip drives can jump up to ten hexes in length and the player chooses their faces upon exiting the jump. Leaping drives can jump up to 30 hexes, but must they spend one round charging their energy storage systems.
___Reaction drive, Anti-matter (-5 AP) - high thrust drive that uses anti-matter and cheap reaction mass. Cargo bays can hold 20 points of fuel. Drives burn 1 point per drive component used.
___Reaction drive, Chemical (-8 AP) – low thrust drive that requires a large amount of expensive fuel. Cargo bays can hold 20 points of fuel. Drives burn 3 points per drive component used.
___Shuttle warp drive (0 AP) - better acceleration, but limited turning compared to STL warp drive.
___STL warp drive (0 AP) - your basic power boats in space field propulsion drive.
___Tesseract local space drive (20 AP) - large, fast jumps makes this drive difficult to out flank. They have all the benefits of micro jump drives with few limitations.
___Turbo-warp STL drive (5 AP) – this drive has much better acceleration (starts at +3 to acc/dec, but the ship can't fire heavy energy draining weapons and boost in the same round.

FTL and STL drive technology needs to be compatible. For example, if you choose a jump based STL drive, you would be unable to use a Second Stage drive which has a velocity requirement.

During the species creation process players may choose to give their races additional disadvantages for an AP bonus. There are two major categories of disadvantages, racial and technological. Racial disadvantages change either the starting setup or alter the race's capabilities. A race can also sell off technology they would normally own. Most of these disadvantages can be negated with the research and development of new technologies over time.

While all race design is subject to GM approval, disadvantages can make it very easy to create a seriously unbalanced race. It is strongly suggested that these disadvantages be used in moderation.

Racial Disadvantages

___Free Society: susceptible to spying, labor strikes, political unrest, etc. (+5 AP)
___Low Industry: reduce empire output by 250 CP (+10 AP)
___Non-academic: -10% to research rolls (+5 AP)
___Weak: -2 to attack rating for crew and combat troops (+2 AP)
___Smaller fleet: (+1 AP per 100 CPs of pre-builds lost, maximum of three

star ships at start*)
___Smaller ground forces: (+1 AP per 100 CPs of pre-builds lost, maximum of three battalions at start*)

* These are default values for a standard CW setup. The GM can raise or lower these values for on the campaign that he or she is running.

Technological Disadvantages
___No Armor: Race does not possess ablative, regenerating, or resistant armor (+2 AP)
___No Multi-targeting: Race does not possess Multi-targeting Technology and must focus weapons fire on only one target per combat round. This includes missiles but not point defense batteries (+2 AP)
___No Point Defense Batteries: Race does not possess standard or improved Point Defense Batteries (+2 AP)
___No Beam Weapons (+2 AP)
___No Minefields: Race does not possess mines, mine launchers, or Mine Warfare technology (+2 AP)
___No Missile Technology: Race does not possess probes, missiles, missile launchers, or advanced missile systems (+5 AP).
___No Railguns/Mass Drivers: Race does not possess Railgun/Mass Driver Technology (+2 AP)
___Limited Designs: Bases (+1 AP per base design removed from unit roster setup)
___Limited Designs: Ships (+1 AP per ship design removed from unit roster setup)

These are not the only disadvantages that can be taken. Examples of other custom disadvantages include religious intolerance, psychic feedback versus a given race, or bizarre cultural values like all other races are considered food. Basically, anything that places a burden on the empire.

3.2 Race Design Examples

Humans
Home world: 5555 (Earth-like)
Biology: Terrestrial Humanoid Omnivores
Racial Abilities: None
Racial Attitude: Neutral
Starting Bonus: Extra Colonies (20 AP),
Extra ship and base designs (5 AP)
Technology: Missile Engine Tech (10 AP)
Disadvantages: Free Society (-5 AP, susceptible to spying and social disorder)

Vermin
Home world: 5654 (Dry and Barren world)
Biology: Terrestrial Insectoid Omnivore
Racial Abilities: Environmental-resistant (8 AP),
Extra Durability +1 (2 AP),
Natural Armor +1 (1 AP),
Chameleon (1 AP),
Extra Strength +2 (2 AP),
Combat Reflexes (10 AP)
Racial Attitude: Hostile (-2 AP)
Starting Bonus: Extra Colonies (20 AP),
Stealth Technology (10 AP)
Disadvantages: Xenophobic (-10 AP),
Non-academic (-5 AP),
Fewer ship designs at start (-1 AP),
Fewer base designs at start (-1 AP),
Dispersed Colonies (-5 AP)

The Dominators
Home world: 6565 (Heavy Moldy Swamp)
Biology: Terrestrial Amoeboid Herbivore
Racial Abilities: Group Mind I (10 AP),
Group Mind II (10 AP),
Group Mind III (10 AP),
Extra Durability (2 AP), Environmental Resistance (8 AP)
Racial Attitude: Neutral (0 AP)
Starting Bonus: None (0 AP)
Technology: Unconventional Weapons: Space Monsters (10 AP)
Disadvantages: Low Industry (-10 AP)
Feared by others (-5 AP)
Diplomatically Naïve (-5 AP)

Oolab
Home world: 5346 (Distant Ice World)
Biology: Aquatic Crustacean Carnivore
Racial Abilities: Natural Armor (1 AP),
Natural Weapons (1 AP)
Environmental Resistance (8 AP)
Advanced Sonar (1 AP)
Racial Attitude: Neutral (0 AP)
Starting Bonus: Sector Survey (10 AP),
Technology: Ground Forces Technology (10 AP)
Disadvantages: Blind (-1 AP)

4.0 Movement

Movement of ships or fleets on the strategic map is conducted using faster than light drive. These drives are rated in weeks per hex traveled. Second stage drives rely on high speed before making their translation to FTL space. This makes calculating travel time a little quirky since you have to figure in the acceleration phase, the FTL phase, and the deceleration phase. Warp drives tend to have similar performance, but with restrictions like hostile terrain and possible intercept by other fleets.

To determine the total travel time, cross reference the gravity drive rating of the slowest vessel in the fleet with the distance that needs to be traveled. Once SS drives translate to FTL space, they can not be recalled until they reach their destination.

Second Stage Drive Table: (weeks)

Hexes	1G	2G	3G	4G	5G	6G	7G
1	10	7	6	5	5	4	4
2	14	10	8	7	6	6	5
3	18	12	10	9	8	7	7
4	20	14	12	10	9	8	8
5	23	16	13	11	10	9	9
6	25	18	14	12	11	10	9

Alternate drives have different movement rules and characteristics that can have an impact on the strategic game. Here are some guidelines:

Foldspace and jump drives are displacement drives. Default displacement drives can jump one hex per month. This makes them faster on the low end but caps their top speed without investment in additional levels of foldspace or jump drive technology. Foldspace drives are the stealthy cousin of the Jump drive. Due to the intense mathematics required, it is harder to research new levels of foldspace drives. Pushing a foldspace drive is suicidal since a failure in the math can result in total destruction of the fleet. Jump drives create a detectable rift at the entry and exit points and this makes them easier to anticipate.

Depending on the GM's campaign settings, jump drives may require access to the magnetic monopole special resource. Races that start with this drive tech usually have a small colony with this resource.

Skip drives, warp drives, and void jammer drives are linear drives and travel from hex to hex. Their base speed is also one hex per month. Alternate drive tech races can design ships with twice the number of FTL drive components in order to double their movement rate. Skip drives are related to jump drives, but they make thousands of small jumps rather than one large jump. This is an on-demand FTL drive and any skip drive craft can easily flee a battle. Void jammer drives move faster than warp drive (one hex per month more), but they are restricted from entering nebula and storm hexes. Asteroid systems can be entered, but there is usually a week delay if they want to pass straight through. Booby traps such as ion storm generators severely damage or destroy void jammer ships that are in motion.

String drives depend on a network of interconnected warp points. Warp point travel is very fast, but the individual warp points are spread out so it takes time to travel in-system from point to point. The required transit gear allows a ship to detect and enter these naturally occurring warp points. While this can allow for ships to move quickly on defense, the warp point system creates natural choke points that can leave a race at a tactical disadvantage once discovered.

Wormhole drives function similar to string drives in that they use external phenomena for travel, but they have the ability to create their own entry and exit points. This drive technology is usually not allowed for players because its use as a weapon system is simply too powerful. The drive system opens up worm holes that (hopefully) go where you want. Due to the possible gravitic and radiation side effects, this drive technology qualifies as a weapon system. While most vessels can avoid a slowly forming wormhole, bases and colonies are extremely vulnerable. It takes a week to form a wormhole with the ship or base constantly pumping power into it. An orbital base can benefit from this drive type because the player can keep a wormhole constantly open and act as a sentry, supply point, and gateway for commerce. The maximum range of these artificial wormholes is only three hexes. Pushing a wormhole drive beyond its rated capabilities is possible, but they become unstable and hazardous.

Depending on your campaign settings, natural wormholes can be a terrain feature as well. They can lead to an important bolt hole for an empire or perhaps be the doorway to invasion. Of course, if your campaign setting does not have Hollywood style wormholes, they can only be used for strategic communications and not as a movement or weapon system (reduce cost to 20 AP.)

4.1 Starship Movement

Cluster War originated as a double blind play by e-mail game. Players would send their orders to the GM and he or she processes them and replies with the turn results. CW can still be played that way, but it is possible to run it as a conventional war game with counters and a map. The nature of the game makes it a lengthy campaign that is normally played out over multiple sessions.

In order to move your ships and fleets around in PBEM mode, you need to write movement orders. Each movement order consists of several parts, some are mandatory and others are optional. If a ship remains in the same hex for operations such as patrols or a survey, no movement designation is necessary. Here's an example of how to write a movement order:

Name: 1st Fleet
Units: Survey Cruiser, 2x Destroyers +
light powered armor btn each
Start Hex: 0101
Start Time: turn 4
Orders: Move to 0104 (12 weeks, ETA turn 7),
Pick up Freighter 129 at 0104
End Hex: 0104

Name refers to the fleet designation or taskforce name. This is usually chosen by the player, but during pre-game setup the GM may assign some fleet names. Units refer to the names and number of ships, gunboats, and fighters in the fleet. Start Hex is the starting location for that fleet. With second stage drives, it is possible for a fleet to be in transit and not exist at either the start or end hex. For example, on turn five and six the fleet is in FTL space between hex 0101 and hex 0104. Start Time is used to determine when the orders were issued and are used as a reference to when ships exit FTL space. Orders can also include actions besides movement such as when the 1st Fleet meets a command freighter and adds it the fleet. The End Hex field is a reminder for what the destination is.

If players need to, they may add waypoints to their routing orders in order for the fleets to travel exactly where they want them to go. It's important for players to use this format so that GMs can clearly determine where ships are going and at what speed. Orders that are not presented in this format will slow down the GM and may not be processed.

Beyond ship IDs and hex numbers, Cluster War does not have a set of specific orders or codes that players need to use or memorize. Instead, orders may be given for individual ships, groups of ships (squadrons or task forces), or for entire fleets. Orders should be written out in plain English. Contingency orders and standing orders can also be written for any ship, squadron, task force, or fleet. Depending on the size of the empire, it might be more practical to abbreviations and an ID number for all ships.

Name: 1st Fleet
Units: SCA01, DD01, DD02, FF129
Start Hex: 0109
Star Time: turn 1
Orders: Move to 0112 (12 weeks, ETA turn 4.)
Move to 0311 (10 weeks, ETA turn 6, week two.)
Always place the survey cruiser and freighter in the reserve.
End Hex: 0311

4.2 Small Craft Movement

Small craft includes all one tenth scale units such as fighters, bombers, gunboats, torpedo boats, or missile boats. FTL-capable craft move in much the same manner as starships. These units follow the same supply rules as starships and their typical endurance is only one turn. This can create a problem depending on the drive technologies used in the campaign. Typical HQT travel times are several months in duration. Gunboats on FTL missions will need to bring a gunboat tender or carry enough supplies for a round trip.

Non-FTL small craft are limited to in system strikes and mostly operate from carriers or bases. Fighters and shuttles have very limited endurance compared to gunboats or other small craft that have a bridge. They can not be deployed away from their base or carrier for even one strategic turn (one month.) Of course, there are technologies that could change how these short haul units are deployed; robotic fighters, androids, automated tugs, or orbital combat stations are just a few of the possibilities.

The orders for most small craft movement and deployment should be included with the orders for a player's carrier or base (when they will strike, at what range, are they on offense or defense? etc.)

4.3 Starship Endurance & Maintenance

There are no fixed maintenance cost requirements for ships, bases, or ground forces in Cluster War. Units that are inside a colony's invisible infrastructure do not accrue stress. However, ships, fleets, bases, or ground forces which have been out of contact or unsupplied for a length of time will start to degrade. Components will fail, morale will drop, and actual crew and combat troop losses can occur. Ships without the required number of crew quarters also accrue stress when outside of the supply grid.

Most in game units have supply requirements. These may be food, parts, fuel, replacement personnel, and other raw materials. For game use, all these items are lumped together. Starships may also require a supply of munitions such as missiles, rail gun shells, and mines. Smaller vehicles like fighters are not considered munitions and have to be picked up or ferried to their destination.

Units inside friendly territory get the supplies they need automatically. Available munitions also get routed to ships that need them as long as the player is building and paying for them. A ship is in friendly territory for supply purposes if it is within the same hex or adjacent hex to one of the empire's colonies or over a friendly empire's colony that has granted supply rights. Note that this does not apply to munitions for allied player colonies unless the allied player builds compatible missiles and has granted re-arming rights. If not, the ammo needs to be hauled in from the owning empire's colonies.

For missiles to flow freely to a unit, an unbroken path must be traced back to the missile factory or some supply depot with a stock of missiles (including other ships which carry a surplus of missiles.) It is possible for a ship to be in supply, but cut off from missile reloads. The most common example would be a remote colony not connected to the main supply grid. Units can not be supplied during combat except as outlined for fighters and gunboats landing on carriers and tenders.

Ships that are not within friendly space at the end of a turn are out of supply. There are several ways to avoid this condition, the most common method is carrying extra supplies in a cargo bay or on board a freighter or supply ship that is part of the fleet. Ships that are out of supply do not automatically get ammo reloads from the supply grid and will eventually suffer additional effects due to the lack of food, parts, fuel, and other consumables.

A cargo bay can normally hold 20 CPs of goods. When filled with supplies, that same cargo bay can hold 20 supply points. A ship or fleet that needs supplies requires one supply point for every 10 hull or fraction there of. This is the same ratio as crew quarters needed for a long haul vessel. There is no CP cost for these supplies themselves; that is figured into the empire's economy already. Under normal circumstances, gunboats and fighters that are kept in hangers do not require extra supplies. These are factored in with the carrier, tender, or base getting supplied. In the case of external fighters and gunboats, every 10 starship sized hull spaces worth of small craft requires an additional supply point. For example, a 30 hull destroyer is being used as a GB tender and has six gunboats in maglocks (external units.) When out of supply, the tender and its gunboats would need 4 supply points, three for the DD and one for the six GBs. Remember, gunboats and space fighters are 1/10th scale units, their cargo bays can only carry two supply points.

Cluster War uses a single game mechanic to deal with being out of supply. It is called the stress check. The stress check combines all factors such as fuel, food, morale, and equipment break down. When a ship or fleet is out of supply, it gains a stress tag.

This value starts at 10% and increases by 10% for each turn that the unit is out of supplies. At the end of the turn, any ship with a stress tag must roll to see if it follows orders or not. [Roll 1d100 and if the result is equal to or lower than the stress tag value, the unit has failed.] Failure results can be mild to severe. It is up to the GM to decide what happens depending on the situation that the unit finds itself in. A unit might simply return to friendly space if they're loyal and not under a large amount of stress. Or, the ship could have an equipment malfunction and a random component takes a point of damage. Even more dire results are possible such as surrendering to the enemy, going rogue, mutiny, or retiring to a neutral planet so they can sit out the war. Such extreme reactions usually happen only when a unit repeatedly fails their checks.

Missiles, rail gun shells, mines, and other munitions must also be accounted for by magazines, cargo bays, or supply depots. Ammunition is not free. The player must still pay for them and build them at a factory or light industrial complex (factory ships are possible.) Ammunition stored in cargo bays is not immediately available for units in combat. The only effect of being out of ammo is that the unit cannot fire those weapons that require ammunition.

The general rule is that fleets operating outside of your territory will either require command freighters (player controlled freighters), designs that include more cargo/magazine space, or some built-in ability to generate supplies and ammo such as agro stations and light industry components.

5.0 Resources and Economics

Construction Points (CPs) are the universal unit of wealth, work, and resources used in Cluster War. Construction points come from three sources; standard CPs are generated by population and colony resources, strategic resources are naturally abundant and easy to process resources, and special resources which command a high price and may offer other advantages. Standard construction points are automatically generated by any colonized planet based on the size of the colony and the maximum CP limit for that planet.

The strategic resources list includes:

- Abrasive Materials
- Acidic Materials
- Agricultural Products
- Animal Resources
- Construction Materials
- Heavy Metals
- Light Metals
- Lubricant Materials
- Natural Crystals
- Natural Medicines
- Petroleum Sources
- Radioactives
- Semi-precious Gems
- Strategic Metals

Any world that is a source for strategic resources doubles the standard CP value that the colony generates. For example, a planet producing 100 CPs and has Heavy Metals as a strategic resource would produce 200 CPs. This value can exceed the maximum colony size. So, a planet with a maximum CP value of 136 could produce 272 CPs when fully colonized.

There are also several types of special resources. Special resources are even more valuable. Some special strategic CPs may be required for certain technologies and enable the research of new technologies. For example, neutronium is necessary to research or develop resistant armor.

The special resources list includes:

- Antimatter Sources
- Exotic Gasses
- Exotic Crystals
- Naturally Explosive Materials
- Neutronium
- Precious Gems
- Special Abrasive Materials
- Special Acidic Materials
- Special Lubricant Materials
- Special Magnetic Materials
- Superconducting Materials

Special resources make for wealthy colonies and more than quadruple their value. For example, a 100 CP colony with special resources will generate 500 CP per turn. Like strategic resource colonies, the colony size is still limited by the planet's maximum CP value. A planet with a max of 150 would be limited to generating 750 CP when fully populated.

Economics, taxation, and most social factors are abstracted in Cluster War. Players do not have to normally transport CPs between locations in order to build things. All the CPs generated for a turn are accumulated into one or more pools which may be used to build units on any inhabited world that has the appropriate facilities for such construction. Usually, a player will only have one pool of CPs. But, if a colony is cut off from the supply grid due to enemy action or distance, multiple CP pools are possible. Additionally, if a player wishes to colonize a new planet, build a base in deep space or at some remote location, or send foreign aid (in the form of CPs or technology), a command freighter must be used that can transport the CPs necessary to build the new units.

Each turn, each player will be expected to submit a report of his empire's expenses, expressed in CPs. The order sheet includes areas for ship construction, base construction, new colonies, ground and naval forces, research, unit repairs, refits, and any other activity that the player wishes to expend CPs on. Following a tally of these expenses, the GM will report back to the player his total production in CPs for the next turn as well as the results of repair, construction, research, and intelligence operations.

Expenses should be reported in this format (Excel order sheets are available for the players to use):

Production:
This is the total number of CPs available this turn. It is based on colony production plus last turn's treasury.

Ship Construction:
This is the number of CPs that a player wants to use for ship construction during the current turn. It should also include what ships the player wants continued from the previous turn, if they were not paid in full.

Infrastructure:
This is the number of CPs that a player wants to use for the purpose of building his infrastructure; this would include such items as factories, mining stations, colony expansion, etc.

Base Construction:
This is the number of CPs that a player wants to use to build shipyards and bases this turn.

Ground Forces:
This is the number of CPs that a player wants to use to build ground forces for the turn.

New Colonies:
This is the number of CPs the player allocates to freighters for new colonies.

R & D Programs:
This is the number of CPs that a player devotes to conducting research projects during a turn. This entry should also include what projects the player wants funded as well as the location of all projects and the number of science stations involved in the research project. If R&D grows too large to be easily displayed here, it is usually moved off to a separate sheet and only the CPs spent are listed.

Treasury:
Total CPs (if any) left over. They automatically go into the empire's treasury for use next turn.

Is it possible to have a negative treasury by over spending? No, there is no such thing as negative work or negative resources. If you want more CPs, you need to build more colonies or collect resources from other sources such as trade or piracy. Since CPs represent work and resources, they are not directly impacted by government taxation, inflation, or cooking the books.

Only those technologies that affect CP generation can actually increase the CPs that you can extract from a planet or other resource. CPs are not lost when the turn is finished (although they may be destroyed or stolen.) They accumulate from turn to turn in a player's treasury. This treasury is assumed to be a part of the empire's economic "pool". Conquered or destroyed colonies will deduct points from the turn-to-turn pool of CPs available to a player. By the same token, if a player conquers an enemy's planet, it's possible that he or she will gain CPs from it through occupation of the planet. Social disorder such as general strikes can limit production. Enemy actions such as blockades or destroying of relay stations can limit the distribution of CPs while commerce raiding can steal or destroy them.
The down side to having your colonies captured or destroyed is that you lose future CP production. When this happens unexpectedly, it is possible for an empire to run short of CPs. The first thing hit is the treasury, if a player has a large enough war chest to cover the loss of the colony, the CPs are pulled from the treasury. If there is still a short fall, what usually happens is the GM starts aborting actions that the player had allocated resources to: R&D budgets are slashed, construction is aborted, and factories go idle. The exact impact of the loss depends on a lot of situational variables. For example, if the colony lost was the only source of magnetic monopoles in the empire, the production of jump drives would grind to a halt. Players can write contingency orders that prioritize spending and help the GM to decide where and how shortfalls should be allocated.

5.1 Freighters

Freighters are necessary for supply, re-arming, and some types of repairs. They are also needed to move CPs from one location to another for activities that happen outside of the supply grid, such as colonization or foreign trade. Freighters are not required for regular commerce between planets; this is handled by civilian traffic. Command Freighters are specialized ships configured for colonization, long haul trade, or military operations.

Command freighters are not required for the ordinary accumulation of CPs or the regular conduct of its economy. These freighters are required for:

1) Transport of material (in the form of CPs) required for repairs performed outside of the supply grid,
2) Transport of crated fighters and smart mines (they can not be launched in this state) from factories to distant carriers and remote bases,
3) Transport of foreign aid (in the form of CPs) to other empires,
4) Transport of missiles, shells, and mini-mines from factories to vessels and bases that are outside the supply grid,
5) Transport of component parts (in the form of CPs) to any installation being constructed in deep space (i.e. not on or in orbit around a colony),
6) Transport of supplies and material (in the form of CPs) for the establishment of new installations on uncolonized worlds and/or the establishment of new colonies in uncolonized areas (i.e. new worlds)
7) Transport of ground force vehicles (troops require separate barracks) to distant bases and colonies.
8) Transport of consumable supplies (in the form of supply points) to units that are out of supply.

The cost for constructing command freighters is calculated as per the normal cost of a starship.

Cargo bay storage capacity is 20 CPs, 20 supply points, or 10 hull spaces of crated fighters, smart mines, or gunboats. One cargo bay can normally carry all the hardware of a mechanized ground forces unit (i.e. tanks, IFVs, artillery pieces, etc.) Exceptionally large ground vehicles and navy vessels (gunboat scaled) are treated as crated fighters. Starship scale ground and navy units require special starship designs to ferry them. Freighters may be constructed from any type of hull that the player can currently build.

Multiple freighters may be used to meet the cargo bay requirements for repairs, supplies, colonists, etc. These "convoys" must move together as a single fleet. Individual freighters and convoys may be attacked and destroyed by enemy starships that encounter them. Some empires begin the game with a few freighters already attached to their fleets. Any additional freighters needed by the empire must be constructed during the game at a shipyard.

Sometimes, an object is too large and can not be broken up for placement in cargo bays. Examples would be asteroids intended for asteroid base construction, an alien artifact, or bases intended for deployment in deep space (early warning stations and way stations for expanding the supply grid fall into this category.) These objects would need to be towed. Tactical Command has specific rules and drive requirements for towing objects.

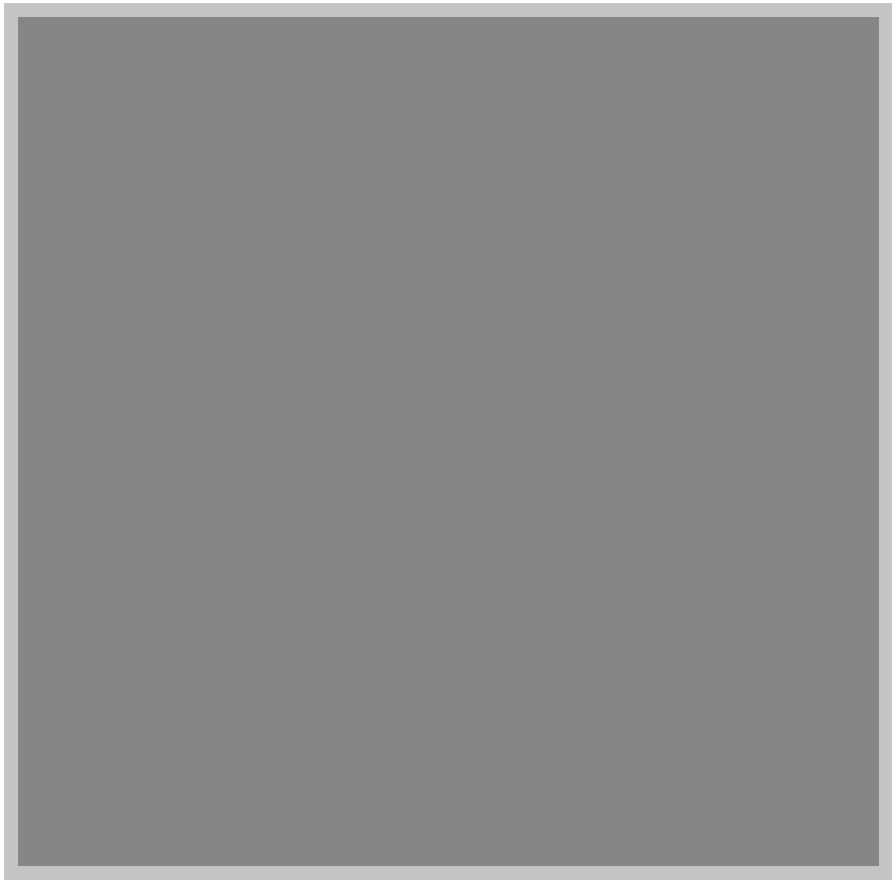
Specialized freighters may be constructed for hauling special cargo. In particular, missile colliers and troops ships can be constructed by using above average numbers of magazines and troop barracks. Clever players will note that a cargo bay can carry more cheap missiles than a magazine (200 versus 100). Of course, the risk of a massive chain reaction will have to be weighed against the relative safety of missiles stowed in a magazine. Also, missiles in a cargo bay can not be used in combat. They are crated, just like fighters and gunboats that are transported via cargo bays instead of hangers.

5.2 Living in the Wilderness

Sometimes, a base needs to function far from an empire's supply grid. The way to achieve this goal without a stream of freighters is to make the base self sufficient. There are several components that can help: agricultural stations, light industry, and mining stations. Each agro station can generate one supply point of food. Each light industry (when not building fighters or gunboats) can be tasked to provide one supply point of spare parts. And, one mining station can extract one CP to fuel the light industry if it is near a source of CPs that is not being tapped by a colony. So, these three components together can keep a hull 10 ship or base in good repair indefinitely.

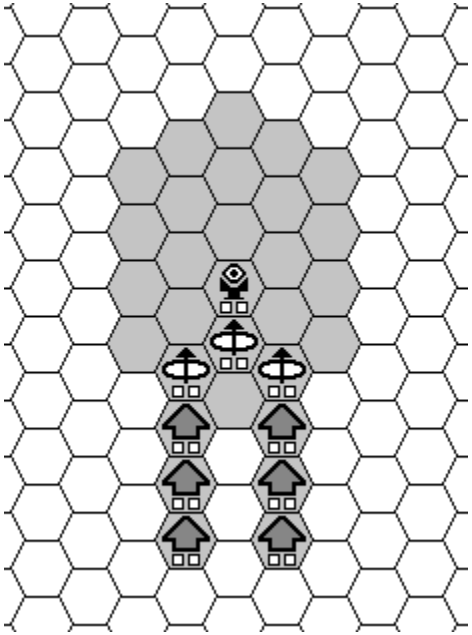
The down side for ships is that they can't move while mining. It's not a very efficient way to provision a fleet, but it is possible. A large base or factory ship dedicated to generating supplies can keep itself and a number of combat vessels provisioned if planned for properly. For example, a 50-hull base with ten agricultural stations, ten light industry bays, and ten mining stations can generate 10 supply points of food and parts. This will keep itself and 50 hull spaces of other units in supply. Add in cargo bays and it can act as a supply depot.

Given that the same ship or base with 30 cargo bays can hold 600 points of resources and/or supplies, self supplying units are not very practical. Research into agriculture, industry, and mining components can improve the effectiveness of support tech.



6.0 Construction

During a game of Cluster War, players will want to build new units to expand their fleets and defend their empires. Each player starts with a list of starship hull types and bases that he can build. These hulls appear as a grayed out template with some equipment predefined. For example, a DD template would have a fixed silhouette with a few components already fixed in place such as the engines and bridge. As the game continues, this list of hull types can be expanded through Research & Development. Researching new hull types is an easy R&D task and most designs can be completed in a few turns.



All starship construction is handled through the use of a limited number of shipyards. Each shipyard is rated according to its capacity (the number of hull spaces that a shipyard can assemble in one turn.) Once constructed, shipyards may not be moved while operating. Like a base, they can be shut down, disassembled, and then moved via command freighters. Shipyards are usually large civilian orbital or ground facilities. While most shipyards are open structures, some races choose to build heavily defended yards and create dedicated bases with shipyard bays. In order to operate, shipyard bays need a source of CPs to work with. This is usually supplied by colonies via the invisible network of commerce freighters, but a remote base would require an alternate source such as mining stations, a cache of CPs in a cargo bay, or supply via command freighters.

The costs for construction are always calculated in CPs. The size of the ship in hull spaces determines the time necessary to build that ship or installation. Figuring construction time is fairly simple:

Construction Time (in turns) = Hull Size of ship to build/Number of Shipyard Bays dedicated to it

Construction time is normally calculated and rounded up to the next whole number. If the GM is willing to do the extra work, fractional parts of a turn can be broken down to weekly increments. For example, a shipyard with forty bays is building a 50 hull freighter. This takes two whole turns, but if the GM allows for fractional build times, it can be determined that the shipyard actually builds ten hull per week (40 yards / 4 weeks = 10 hull per week.) So, the GM can rule that the ship is available after five weeks rather than at the end of the second turn. This would allow the player to actually write orders for that ship on the second, third, and fourth weeks of the second month.

Construction costs may be decreased for ships by crash building. Crash building should be considered carefully since it can does have dire consequences on unit quality and survivability. The pros and cons of crash building are covered in section 6.7.

6.1 The Role of Shipyards & Factories

Shipyards may be placed in orbit, deep space or on a planetary surface. Once placed, a shipyard cannot be moved unless it is completely disassembled. Starbases, fortresses, and space stations all have the ability to act as shipyards as long as they are constructed with shipyard bays as part of their equipment spaces. One shipyard bay can construct one hull space worth of starship per turn. All shipyards require a steady flow of CPs in order to build units. Normally, this cost is paid up front in CPs from the empire's CP pool. If a shipyard is cut off from the empire's communication/supply grid, it can only use local CPs from a near by colony or from CPs shipped in via freighter.

Light industry components function in a similar manner to shipyard bays and must follow the same supply rules. Light industry is commonly used to build small craft such as gunboats and fighters. A factory with a 20 hull rating would cost 40 CPs to build. The factory gets a price break for being totally defenseless and dependent on the local colony for power and crew housing. Light industry built into orbital bases or as part of a factory ship would require their normal compliment of power systems and crew quarters. Factories are used to provide many of the smaller units in Cluster War. Missiles, tanks, aircraft, submarines, power armor, and mecha can also be produced at factories. But, factories are not magic CP converters. They

have to be tooled and programmed to do a specific job. It takes one turn to re-tool a factory and re-program the robots to create a new line of products. So, a factory devoted to missile production could produce several types of missiles each turn. But, changing to something like tanks or fighters would incur a one turn delay. Advances in factory technology could lead to more agile factories. It would take several technological advances before a player could develop omni-factories or nano-lathes.

The only time heavy industry is needed planet side is for the construction of starship grade ground vehicles and wet navy ships. A heavy industrial plant costs 120 CPs due to power and infrastructure costs. It is capable of building 20 hull worth of starship scale components. Heavy industrial plants function as shipyard bays for construction purposes.

6.2 Starship Design & Construction

All players begin Cluster War with a list of the types of ship hulls that they are capable of constructing. Ship building is simply a matter of adding up the components and applying any system multipliers. Ship design is covered in the Tactical Command rules. Players that do not have these rules or the DAT Builder software are limited to the designs provided by the GM during setup.

Ships may be constructed to any size hull that a player's empire is capable of building. Ships may not be constructed using asteroids or planetoids unless the player has discovered a method of doing this through R&D efforts.

6.3 Small Craft Construction

All players begin with several gunboat and fighter templates depending on their starting technology level. Small craft building is simply a matter of adding up the components and applying any system multipliers. Fighters and shuttles are generally from 2 to 5 hull spaces in size with one of those hull spaces being devoted to a cockpit component. Larger small craft such as gunboats and missile boats are 6 to 10 hull spaces in size with one space dedicated to a bridge component.

Players that do not have these rules or the DAT Builder software are limited to the designs provided by the GM during setup. Small craft are usually built at a factory facility. The default factory is a cluster of 20 light industry components and is capable of producing 20 tenth scale hull spaces per turn.

It is important to remember that all small craft are $1/10^{th}$ scale units. While they can pack starship grade weapons and gear, it only takes a single point of internal damage to destroy them. Armor is a waste for these units. When large numbers of gunboats and fighters appear in a fleet, they are usually grouped into squads or flights and moved as a single unit.

6.4 Base Design & Construction

Bases are constructed in similar manner to starships, but do not require shipyard bays or heavy industry to construct. Bases are considered stand alone installations, and once constructed, can not be moved in any manner unless taken apart, moved via freighter, and then reassembled again. Ground bases are normally laid out for overhead attack while orbital bases are designed for 360 degree attack and defense like a starship.

Bases are useful for extending an empire's communications, detection, and supply grid. To that end, most bases use long range sensors and comm. gear to detect invaders, coordinate defenses, and monitor civilian traffic. Any number of bases may be constructed in a planetary hex, orbital ring, or in deep space hex. There are practical command and control limits, but planets and deep space are rather large and difficult to fill up.

It is possible to 'harvest' asteroids if the system has an asteroid belt present. The primary advantage to asteroid bases is that they provide cheap armor. Due to the requirements for life support and heat dissipation, most asteroid bases are not considered stealthy or camouflaged without additional effort.

6.5 Construction of Ground Forces

Ground forces are recruited, trained, and armed at special planet side military facilities. The facilities for building ground forces and space forces are generically called military bases. One military base may house a combined number of ground forces up to its size rating. Training bases cost 125 CPs and have a size rating of 25. A military base, as far as the rules are concerned, is not a single hardened building. It is a collection of lightly constructed administration, training, and support buildings.

Many training bases have factories located near by to construct heavy equipment for the combat units trained there. The home world of each player is considered to possess a single size 50 base. If the planet does not have a dedicated command post to assume the role, this large base is also the headquarters for ground force commanders.

Wet navy forces tend to employ fighter and gunboat scaled units. These ships and submarines can be constructed at a factory that is adjacent to water (or whatever passes for water depending on how alien the planet is.).

Aerospace forces, power armor, and other small weapon systems are also built in factories. For exceptionally large wet navy ships and super tanks, a heavy industrial plant is required.

Ground forces require time to recruit and train just as starships and bases require time to construct. Training time is equal to the size of the unit in

turns. This simulates the additional need for learning the hardware that the ground forces are operating.

Defense Forces	AR	DR	CPs	Size	Notes
Crew Members	0/0	0/0	-	-	non-combat personnel
Militia	2/2	1/1	6	1	
Infantry	3/3	2/2	10	1	
Marines	4/4	2/2	12	1	
Mechanized Infantry	4/2	3/1	12	1+1	mobile
Space Marines	4/4	3/3	16	1	drop capable
Light Power Armor	6/6	3/3	18	1+1	first gen or higher
Light Power Marine	6/6	3/3	20	1+1	drop capable, first gen or higher
Heavy Power Armor	7/7	5/5	22	1+1	second gen or higher
Heavy Power Marine	7/7	5/5	25	1+1	drop capable, second gen or higher
Light Tank	7/1	5/1	16	1+1	mobile
Medium Tank	8/1	7/1	19	1+1	mobile
Heavy Tank	11/1	10/1	25	1+2	mobile
Missile Tank	7/1	7/1	18	1+1	mobile
Heavy Missile Tank	10/1	7/1	24	1+2	mobile, orbital fire
Light Artillery	4/1	3/1	9	1+1	
Light Artillery	4/1	3/1	10	1+1	mobile
Medium Artillery	6/1	4/1	12	1+1	
Medium Artillery	6/1	4/1	14	1+1	mobile
Heavy Artillery	12/1	5/1	23	1+2	orbital fire
Heavy Artillery	12/1	5/1	25	1+2	mobile, orbital fire
Grav Tank	8/1	7/1	21	1+1	air mobile, second gen or higher
Drop Tank	8/1	7/1	23	1+1	drop capable, air mobile, second gen or higher
Light Fighter	6/0	3/0	11	1+1	air mobile
Heavy Fighter	10/0	4/0	17	1+2	air mobile
Heavy Fighter ASAT	10/0	4/0	20	1+2	air mobile, orbital fire

Special Abilities	Multiplier	Notes
Air Mobile	x0.2	These combat units can move rapidly over a planet's surface.
Chameleon	x0.1	The ground unit can use the chameleon special ability.
Cloaking	x0.2	First strike attack capability (requires cloaking technology)
Drop Capable	x0.1	Combat units designed for space and planetary invasion.
Orbital Fire	x0.2	These combat units have weapons that can strike orbital targets.
Mobile	x0.1	Combat units can move quickly, but are limited to land or water.
Suicidal Fanatic	x0.0	+2 to close combat AR, but -1 to both ranged and close combat DR.
Wild	x-0.1	Units are cheaper to make, but very difficult to organize and control.

AR is the attack rating for the combat unit. It is split into two values: ranged combat and close combat. Races with extra strength and natural weapons

can add one to a unit's close combat AR rating. Most combat vehicle crews only have small arms and minimal personal armor in close combat. DR is the defense rating for the combat unit. It is also split into two values: ranged combat and close combat. Races with extra durability and natural armor can add one to a unit's close combat DR rating. Racial bonuses are not factored into the cost of a unit.

CPs refers to the cost of the unit plus multipliers for special abilities such a drop capable units. Size determines the transport and housing requirements for the unit. The first value is the number of troop barracks required for the combatants and their support personnel. The second value is the number of cargo bays required to hold their combat fighting gear. Normally, combat units can not use their fighting gear in boarding party or close combat situations. Power Armor and Power Marines are the exception to the rule.

Basic Cost = AR for ground combat + AR for close combat + DR for ground combat + DR for close combat

Some combat units have special capabilities. These capabilities are factored in as cost multipliers. Cost multipliers are added to a base multiplier of 1.0 to determine the total cost of the unit.

CP Cost = (Total AR + Total DR) x (1 + Total Multipliers) round up

All ground and space forces are battalion-sized units of 250-300 men (combatants and support personnel) and perhaps 15 to 30 vehicles. Ground forces personnel are recruited from planetary populations. The training time required for any type of ground force is one turn. Light units like militia, infantry, and marines only require an investment in CPs and a military base to house them. Heavier units (those with cargo requirements) need factory production be devoted to their construction.

For example, a player has spent 40 CP for a factory and 125 CPs for a training base last turn. He specified that the factory was programmed to build tanks. Next turn, the player buys 10 medium tank battalions and 4 marine battalions. This is close to the max holding capacity of the base (size 25.) It costs 190 CPs for the tanks and 48 CPs for the marines. The player also had to devote 10 hull of the factory's production capability to building those tanks.

Let's build a battalion of Khaos Light Power Armor. It has an AR of 6/7 since Khaos Lords have extra strength as a racial ability. It has a DR of 3/3. The base cost is 18 CPs. Since the strength is a racial ability, it doesn't not cost extra. The player decides that it would be cool to make them a bunch of super ninjas and gives them the chameleon special ability. Since the Khaos Lords are not natural chameleons (and you can not use chameleon abilities in power armor anyway), the player needs to buy it. This will bring the cost up to 20 CPs (18 x 1.1 = 19.8 or 20 CPs.) The LPA battalion is a size two unit and requires only one hull of factory production (light industry) to manufacture the suits needed.

If a player has android technology, they can skip the local population requirement for ground units. But, one additional point of factory production would be required for each combat unit in order to make the troops themselves. Since normal factories can not mix product lines on the same turn, the player will normally want to have two factories: one for making combat gear and the other for producing android troopers. A second strategy would be to use the refit rules in section 6.7. A player could build up to 20 android militia units on turn one, re-tool the factory to make tanks or power armor on turn two, and then upgrade some or all of the androids on turn three. Androids still need a military base to stay at.

How are unit sizes determined? The first rule is that any combat unit that requires vehicles or power suits is going to need room for their gear. The second rule is that can unit with a rating (AR or DR) of 10 or more is a heavy unit and requires even more stuff. In theory, units with an AR or DR of 20 or more would be a very heavy unit and require three cargo bays to hold their equipment and require three hull of factory space to build. Anything larger should be built as a fighter scaled ground vehicle or naval unit.

Ground and space forces require one troop barracks space aboard a ship per battalion for transport. Mechanized units require an additional cargo bays depending on their size. Aerospace fighters have to be transported as cargo unless stored in a hanger bay. Of course, the transport ship has to be in a compatible atmosphere for fighters to successfully launch from a hanger bay. One hanger bay can launch one light fighter battalion. Two hanger bays are required to launch a heavy fighter battalion. Wet navy units may only be transported as cargo and require a turn to reassemble once they reach their destination. In theory, wet hanger bays could be developed for the combat unloading of wet navy units. But, this is not a starting technology.

Players will begin the game with a variety of ground forces scattered throughout their empire, but concentrated primarily on their home worlds and in some outlying areas. Any additional ground forces will have to be recruited and equipped as the game progresses.

There is no limit to the number of ground forces a player may have on any single populated planet. Battalions constitute a small percentage of colony's population. However, the establishment of military bases to train and house troops tends to limit them to manageable numbers.

Wild units do not require military bases beyond the one needed to create them. Climate permitting, they are better suited to living off the land. Of course, trying to coordinate an army of wild units is like herding cats. Wild

units are normally deployed to make a colony resistant to invasion or they are dropped off on enemy colonies to harass the colonists. Wild units should be used with care since they could easily turn on their creators.

6.6 Other Types of Construction

New designs and modifications of starships, bases, ground forces and other units are part of the game process. Each player will begin the game with a listing of the current values for all of his starships, bases, and ground forces. These values may be enhanced through Research & Development or by the introduction of new hull designs as the game progresses.

Players may shift the components around on any ship they possess in any fashion they desire as long as it fits within the provided hull templates. This is called refitting. All refits cost the difference between the new cost of the ship being refit and its original cost, negative values are treated as positive costs for the refit. The hull size of a ship may not be changed once the ship is completed. Refits require half of the shipyard bays that new construction does. For example, upgrading five or six beams with new technology would only require three shipyard bays, plus the cost difference between the price for the old and new beam components.

As the game progresses and as players succeed in their Research and Development programs, new components will become available. Beam, torpedo, and shield values may increase (probably will, in fact) and the players may develop new capabilities to add to their starships and bases. As these new systems are added to existing vessels, the cost for these vessels in CPs will most likely change. The addition of these new systems and technologies is considered to be a refit to an existing starship and must be paid for individually. Refits may only take place in a shipyard and the full CP value of any such refit must be paid in full on the turn the refit is conducted.

The other side of refitting is scrapping a unit. Most units can be scrapped and converted back into CPs at a two to one ratio (rounding down.) Scrapping has the same shipyard requirements as a refit (one bay per two hull spaces.) It is possible to build a unit that is designed to be scrapped without the need for a shipyard, an example of that would be a one-way colonization ship. The ship would cost more to build (generally a 10% surcharge), but it could be disassembled without a facility.

New starships designs, which differ radically from existing designs or incorporate new technology, must be developed via an R&D program. New hull designs are considered easy R&D projects since they use existing technology.

While these rules assume you're using conventional technology to build units, nearly all component types are available to the alternate technology bases such as bio tech, crystal tech, psionic constructs, or other exotic techs (as determined by the GM.) If your race starts with one of these alternate technologies, it's the GMs responsibility will provide a list of available components, multipliers, and prices.

6.7 Crash Building Starships and Bases

Any project can be described by three things; time, cost, and quality. If you want to reduce the time, you either have to sacrifice quality or increase the cost. In CW, to cut the construction time by half, you can either double the cost in CPs or reduce the quality of the built object. Note that reducing quality does not reduce the cost. Expensive units function as normal so we'll focus on what happens if you sacrifice quality.

These low quality crash built units tend to be flawed in that materials are poorly inspected and their assembly techniques are rushed. Each time a crash built unit is stressed; it has a 10% chance of failing. Beam weapons overheat and go off line, missile launchers jam, shields buckle, armor shatters rather than ablates, and engines can burn out. Failed systems are knocked off line or destroyed until repaired. Given time and yard space, crash built units can be refitted and brought up to standard construction but this is wasteful of shipyard space since the whole ship would have to be refitted. A good example of crash building is a Liberty ship program. These are cheap freighters that haul troops, missiles, and replacement fighters to an ally. They are constructed in half the time, but they're prone to terrible losses when attacked.

For crash built units, a stress check needs to be made once each combat round whenever the unit is damaged (by weapons fire or collisions) or when it has gone for a month while being out of supplies. For example, the USN Cardboard Crusader has been operating on deep recon for three months without supplies. A normal ship would make one stress check roll at 30%, but since the Crusader is a crash built low quality vessel, it has to make the 30% roll for normal stress and a second 10% roll due to its inferior construction. The second stress roll, when it fails, usually results in a mechanical failure rather than a loss of morale by the crew.

7.0 Colonization of New Planets

The colonization of new planets is the only way in which a player can expand his economy other than conquering another player's planets. Each player begins with a large number of unexplored and potentially habitable planets within their reach.

Cluster War uses a four character STEP code to describe the various locations within a solar system. The code consists of four values: size, temperature, environment, and planet surface. The possibility of finding any of these planets orbiting a particular type of star depends upon the star's spectral type and relative temperature. Main sequence stars like our sun (spectral type G2) have a higher chance of hosting earth-like worlds. Web based and stand alone tools are available for GMs and solo players that will generate systems and sectors within seconds. See Appendix B for the population tables if you want to roll dice and manually tweak your system generation process.

The STEP code centers around 5555 for a normal terrestrial planet. The greater the difference between a race's home world and a colony's STEP code determines the relative cost to colonize that planet. It can get very expensive to colonize hostile planets. Uninhabitable worlds can only grow if colonists from other worlds are shipped there. This is not a big deal if the uninhabitable colony is part of the supply grid. Remote colonies would need to bring in new colonists via command freighter.

Planet Type	**Colonization Multiple**
Matches home world	1.0
Habitable, one or two steps away	1.5
Habitable, three or four steps	2.0
Harsh, five or six steps different	3.0
Hostile, seven or eight steps	4.0
Uninhabitable, 9+ and X worlds	5.0

All planets have a STEP code and a maximum CP value assigned to them. Even gas giants have mining and colonization potential. However, the construction of floating cities and mining facilities is not cheap and is a reason that most races that are not native to a gas giant eco-system ignore them.

Building a new colony requires the expenditure of CPs equivalent to the total CP output of the planet being colonized. The total CP value is multiplied by the colonization multiple. For example, a 5465 planet is two steps removed from our 5555 home world. That gives it a colonization multiple of 1.5. If that planet had a maximum CP Potential of 200, it would cost 300 CPs to fully colonize it. If that planet also had strategic resource like Heavy Metals, the cost would still be 300 CPs even though the planet produces 400 CPs due to the resources present. Grabbing resource rich planets is a standard empire expansion tactic.

Colonization does not happen magically. New colonies require command freighters to transport the necessary CPs (which includes the colonists, their equipment, etc.) to the colony site.

Once established, a new colony is tied into an empire's economic support network automatically so long as it is within range of the supply grid established by other colonies and bases. In other words, there is no delay after establishment for a colony to function as a colony for detection, communication, and supply purposes. The default range of the supply grid for each colony is a one hex radius (or a sphere with a 5 light year radius.) If any of these hexes touch another part of the empire's supply grid it is connected. Empires, using alternate drive technologies, usually have a supply grid radius of one jump.

Sometimes, a colony will be too far away to connect to the grid. Either the player has to spend the CPs locally, storing them for transport via freighter, or build a way station to connect the distant colony to the grid. A way station is a small base with long range sensors and communications equipment intended to connect the colony to the grid. Such a base must be built at a nearby colony world, dismantled, hauled to a location designed to bridge the gap, and then re-assembled in order to connect the distant colony.

7.1 Mining & Strip-mining of Planets

As an alternative to colonizing a planet, all empires have the ability to set up mining stations on a planet. Mining stations come in two forms, mining bases and mining ships. Ships are more expensive than bases, but they are more mobile and do not require the dismantling, hauling, and re-assembly steps that a base does. As mentioned in section 5.2, the maximum rate of CP production is determined by the number of mining station components built into the design.

One disadvantage to mining ships and bases is that they do not get the free extension of the supply grid that a colony does. Either the mining installation has to extend the grid by including LRS and long range communication gear or they rely on freighters to deliver supply points and pick up CPs. Mining ships can also be designed with cargo bays so that they act as their own freighter.

Mining stations and colonists also have the ability to strip-mine planets. Strip-mining a planet will result in the production of twice the maximum output of CPs from the planet being strip-mined. For example, a planet that

produces 200 CPs per turn normally would produce 400 CPs per turn when strip-mined. The mining stations would be collecting 2 CPs each.

Strip-mining is bad for the environment, real bad. Each turn that a planet is strip-mined, it gets 10% added to a stress check. If a planet fails a stress check, very bad things happen to the world. Its STEP code can change as temperatures can raise or drop, atmospheres can turn to sulfur or acid, or the planetary surface can become pitted and dangerous. If the planet's STEP code changes, the stress value gets reset to 0% as this becomes the planet's new state.

If a planet is left fallow (no mining at all), it has a 1% chance of reverting to its previous values. Active environmental action can increase the chance for repair. The actual effects of the repair depend on the technologies that are researched and used.

Let's walk through an example. The Digger is a mining ship with 30 mining stations on board. The maximum CP it can recover is 30 per turn. But, there are multiples that it can apply. If strategic or special resources are being mined, the value of the operation is 200% or 500% higher. Additionally, the ship can strip mine the resources and double its rate of recovery. Under the best of conditions, it could strip mine 300 CP worth of special resources per turn. Mining ships and bases are most effective when mining planets that would normally be too expensive to colonize.

8.0 Research & Development

While it is not required, most players will be eager to conduct R&D programs in order to boost their technologies. In order to conduct any type of R&D program, the player first must define the program, specify its location, and spend CPs on it. Location is important since laboratories and gifted scientists can increase the effectiveness of any R&D program. Also, if your nifty project explodes in your face, the GM needs to know where to place the crater.

The R&D system uses a step based success model. Some research projects are easy and others are brutally complex. For example, researching a new vehicle design based on existing technologies is easy and only requires a single success. While trying to create resistant armor from scratch is a very difficult task with a dozen steps that might be broken down into three or four smaller projects (i.e. gravitic forge, artificial neutronium, advanced armor, and finally resistant armor with each tech requiring two or three successes.)

Part of the R&D process is scientific discovery. You generally can not research technologies that are not part of your tech base. If your race does not have any psi-ability, researching a psionic shield or other device requires an additional success where your people learn the basics of psi-ability. A player can often earn free discovery successes by sending out scouts to explore space. Booby traps, alien critters, derelict ships, etc. all offer the possibly of the GM awarding you a free R&D success. Here are some of the conditions that could result in a free discovery:

1. The player's race witnesses an example of a new technology in action, either as a result of its use in combat, as the result of espionage, or as a friendly demonstration.
2. A scientist accidentally discovers an insight while doing some other sort of research.
3. A survey mission uncovers something unknown that may lead to a new discovery.

The bulk of research and development requires developing the sciences behind a technology and creating a means to deploy it. Depending on the complexity of the task, this may require several successes before the technology becomes available.

Easy tasks are all about deployment. Any discovery and research has already been done and a single success is all that is needed to use that technology in a new way. Creating new hull templates or designing new types of ground forces are examples of easy R&D task that require only a single success.

Moderately complex tasks require two successes. The discovery is already assumed (i.e. advanced beams assumes that you already have discovered beam weapons.) And, the two successes reflect the research and development required. Complex or alien technologies require more R&D successes.

Difficult R&D projects reflect alien technologies that might not even have an industrial base in existence. Seeing a growth vat in action might give you a discovery, but without the basics of DNA templates and forced growth technology, developing your own growth vats would take a lot of successes. Most uber techs in the game require four or more successes.

Once all the required steps of a project have been achieved, only then can the item be constructed.

Example: A player wants to research Jump Drives. Jump Drives have a magnetic monopole resource requirement. The first step is to acquire some material by either mining some from a colony or by getting a gift of magnetic monopole resources from an ally. The player must then establish the R&D program and spend the CPs to discover Jump Drives. Once the player has achieved a success, they can spend CPs to research Jump Drives. Once they achieve a success there, they can spend CPs to develop Jump Drives

construction techniques. Only after a final success can the player start building ships that have Jump Drive engines at the shipyard.

Example: A player wants to build battleship sized vessels. Since the player already has starship construction, it isn't something he needs to discover or research. The player can establish an R&D program and start development of a hull template. Once he gets a single success, the player can begin construction of ships using the new template at any of the shipyards under his control.

Many technologies are incremental. For example, the player spends thousands of CPs on improving their missile warhead technology. After many turns, they have achieved 10 successes (one success for each research stage and once success for each development stage.) Their missile warhead tech has advanced five times. This increases their potential damage from a base of one point of damage per missile to six points per missile.

R&D is conducted by allotting CPs to each project. The table is built on a curve, small amounts invested return small chances of success. As the total CPs invested in a project increases, the probably of success also increases.

Science stations assigned to a project will yield a +1 increase to the chance of success for a project per science station onboard an assigned research station or science ship. Gifted scientists function like super labs and can add even more to the R&D bonus. But, the maximum bonus to any R&D project is equal to the base chance of success.

The R&D table begins with the expenditure of 25 CP yielding a 1% chance for success each turn the project is funded. The curve ends with a total expenditure of 31,500 CPs yielding a 99% chance of success in a project. Each turn, the GM will cross reference the total CPs spent, add any assigned bonus, and then roll 1d100 roll to determine the success or failure of a project. Each success resets the amount of CPs expended for a given step to zero and if that was not the final success required, the process begins again for the next step needed.

For example, if a project has a 10% chance of success, the largest bonus you could assign to that project is +10, which would increase the probability of success that turn to 20%. The maximum success percentage is 99%. Rolling higher than the research success chance (for that R&D project step) results in no progress. Normally, the construction points that are spent get rolled over into a running total of CPs expended for that step. But, rolling a 100 on 1d100 always results in a catastrophic failure.

When there is a catastrophic failure, all CPs spent on that step are lost. Sometimes the failure can be as simple as the scientists exploring a dead end path, other times the failure can result in a disastrous loss of men and equipment. This is why all projects include location. If you're developing bio-weapons on your home world and get an R&D failure, you may have just earned yourself an unexpected field test. The severity of the failure is relative to the danger of the research and the presence of saboteurs. Weapons research is always riskier.

R&D Success Chance Table

CPs Spent	% Chance to Succeed	CPs Spent	% Chance to Succeed	CPs Spent	% Chance to Succeed
25	1	850	34	2150	67
50	2	875	35	2200	68
75	3	900	36	2250	69
100	4	925	37	2300	70
125	5	950	38	2350	71
150	6	975	39	2400	72
175	7	1000	40	2500	73
200	8	1025	41	2600	74
225	9	1050	42	2700	75
250	10	1075	43	2800	76
275	11	1100	44	2900	77
300	12	1125	45	3000	78
325	13	1150	46	3100	79
350	14	1175	47	3200	80
375	15	1200	48	3300	81
400	16	1250	49	3400	82
425	17	1300	50	3500	83
450	18	1350	51	3600	84
475	19	1400	52	3800	85
500	20	1450	53	4000	86
525	21	1500	54	4200	87
550	22	1550	55	4400	88
575	23	1600	56	4600	89
600	24	1650	57	4800	90
625	25	1700	58	5200	91
650	26	1750	59	5600	92
675	27	1800	60	6000	93
700	28	1850	61	6800	94
725	29	1900	62	7600	95
750	30	1950	63	9200	96
775	31	2000	64	12400	97
800	32	2050	65	18800	98
825	33	2100	66	31500	99

Scientists must eat and labs consume resources voraciously. Projects which go unfunded for one turn have the CPs expended for that stage reset to zero. Projects may require many turns to yield results depending on the random die roll made by the GM. CPs spent towards a project accumulate each turn for as long as CPs are spent on the project without success. Any success in a project resets the CP balance to zero for the next stage.

In most cases, R&D in advanced areas requires prerequisite technologies or materials. A player should not hesitate to ask the GM what is required for a given technological advance.

8.1 Technology Transfers

While players can exchange some technological data for free (discoveries and research data), the wholesale delivery of technology is called a technology transfer. The transfer consists of one player providing the other with all the data necessary for the player to construct the new technology for himself. There is a CP cost incurred by the transfer of technology. This fee is 250 CPs for each transfer and represents the one time cost of upgrading factories and shipyards. Under normal R&D projects, this is paid for as part of the development stage. The receiving player must pay for the transfer, although the sending player may include a 'gift' of CPs to cover the costs. Failure to pay the fee for a transfer of technology means that the player to whom the data is being transferred did not receive quite everything he needed to make the technology work for his race. They can open a new R&D project to put all the pieces together, but they have not developed the technology just yet.

Players with radically different technologies (such as bio-ships trying to integrate mechanical systems) or significant differences in technology level will require additional R&D investment in order to integrate the new technology. Your GM will let you know if there is a problem with new tech.

9.0 Combat

Combat, between starships, fleets, ground forces, and planetary defenses is intended to be a common occurrence in Cluster War. The basic nature of the game is empire building and expansion. Eventually, you're going to run into hostile neighbors. Combat can occur at several levels, the most common battles are starship duels and fleet action, but planetary invasion, ground combat, and even hand-to-hand boarding party combat is possible.

When conflict happens, the GM needs to decide how he wants to resolve it. The GM has several ways to handle the situation. The first option is narrative resolution. This is in essence storytelling. It is used when the battle is so one sided that going through the steps to set up the battle are not worth the hassle. The GM can simply write up the results and send them to the player(s) involved. Examples of one-sided battles would include power marines versus a pre-industrial army or a poor scout ship that accidentally awakens an ancient planet-killer.

The second method for resolving battles involves slugging it out at the tactical level. This includes ship to ship battle, boarding party combat, planetary invasions, and ground battles. Details for starship combat, boarding parties, and establishing a planetary beachhead are covered in the Tactical Command rules. There are a wide variety of tactical space combat games available. While TCOM is recommended, Cluster War is flexible enough to be used other rule sets as well.

Another option leaves the player sitting in the admiral's chair. They can call the shots, but they don't have direct control over individual units. This can be done playing out a proxy battles locally.

The players need to work with the GM on how they want to handle the fight. The preferred method is that the players control their own forces and the GM referees the battle and runs any non-player units. This generally offers the most fun for everyone involved. But, due to location and scheduling problems, this is not always easy to set up. The GM has the option to assign proxies for one or both sides and run the battle either on-line or off-line. While that is not the best solution, it prevents players from dragging their feet and does reinforce the illusion that the player is the leader of an empire and not an omni-potent micro-manager. The GM should assign a deadline for when the battle needs to be resolved by the players. If that deadline can not be met, the GM should call in a proxy player to fight the battler for the absent player.

Players should write down some general rules of engagement based on their culture and racial attitude. The default behavior is that any unknown ship should be treated as a potential hostile contact.

The end result of any combat is the battle report, this free form report states what happened, any possible discoveries made, casualty counts, resources expended, etc. The results of any battle action should be treated as final. No appeals should be permitted, although GMs should attempt to correct any obvious mistakes due to human error.

Careful writing of orders can go a long way towards getting the results that you want. For example, retreating forces or ships may be pursued only if the pursuing force has specific orders to pursue or contingency orders that permit pursuit. Some players like to give their fleet commanders an open letter of wartime powers; others prefer to keep a tight rein on their fleets. Orders can include reaction movement, patrols, repair and rescue operations, self destruct commands, and more.

9.1 Deep Space Battles

The mechanics of battle also represent the designer's viewpoint that combat at this level will undoubtedly be deadly. Once a ship has lost any shielding and armor, weapons fire will start digging large chunks out of the hull.

Tactical Command uses a flat hexagon map. The general assumption is that units are going to be move in the equatorial plane. While we could have used a three dimensional navigation system, I don't think that level of detail is required to resolve most combat scenarios. Each hex is large enough to hold a whole task force with room to spare. TCOM provides some guidelines for setting up scenarios. The most important element is to have the damage allocation templates (DATs) ready for all the forces in the battle. The DATs are essential for tracking damage and running a battle.

Another part of setup is the placement of units, normally ships enter contested space from the edge of the map and duke it out. But, there are situations that can result in different placements of units. Your typical planet and its defenders will be positioned at the center of the map. Or, if your ship is trapped by a mine field, it might start in the middle of the minefield and not the edge.

9.2 Planetary Invasions

The only way to capture a planet is to land ground forces on it. Starships may blockade the planet from orbit, but only ground forces can impose a player's will upon an enemy population (starships can try to bomb the planet into submission, but it is rarely effective and tends to make a mess of things). Invading a planet is a two part process. The invaders must first establish a beachhead and possible space superiority. After that, they can conduct ground combat for control of the various hexes on the planetary map.

The troop landing or beachhead phase can be a cake walk or a bitterly fought space battle. The mission involves escorting troop ships to one of the planet's orbital rings without getting them blown to bits by enemy ships and bases. Once the troop ships are in orbit, they can begin unloading their troops. What they can actually deploy depends on the type of troops and the capability of the troop ship. Just like boarding parties, the number of barracks, assault bays, and transcaster stations determine how many teams can be sent down to the surface. Only drop capable troops can jump out of a sally port on a barracks component and make planet fall from orbit. Most vehicles can not be dropped from orbit. The exception to this are drop capable grav tanks, if they are in a hanger space and not stowed as cargo.

Conventional ground vehicles can not be unloaded from orbit and deployed. The ship must land on the surface or use gunboat scaled landers to ferry

cargo. The general rule is that it takes ten combat rounds to deploy one battalion. In a hostile landing, that's a long time. But, it is even worse for vehicles that have to be moved from cargo. It takes 20 rounds to be un-stowed and moved to unloading ramps or landing craft. Landing craft are also know as dropships and can carry troops or vehicles to the surface depending on their design. They're not very cheap or effective, but they keep the starship in the relative safety of orbit. Some races don't even bother to send in troop ships but instead launch small waves of drop ships while the carrier stays out of the range of the planet's defenses.

The choice of landing zone can also have an impact on the invasion. Ground forces are very slow in comparison to starships. Landing in an uncontested surface hex will mean that most of your troops will make it down intact. But, it might take a week to move from one hex to the next. Arriving in a hot landing zone immediately places the troops in harm's way but can result in the capture of key buildings and even whole cities.

Ground forces may be ordered to engage enemy ground forces, attack civilian populations, or capture/destroy production facilities (factories, etc.). Each ground combat round lasts about one week.

9.3 Ground Warfare

First off, ground warfare covers all forms of planetary combat units: aerospace fighters, wet navy ships, and conventional ground troops. Some units are limited in their mobility due to environment. Ground troops and tanks can only move on land and ice. Naval units are limited to the ocean surface unless submersible. Air mobile units can move across water, but must stop on land (or a carrier) at the end of their turn.

There are four basic movement speeds: stationary, walking, mobile, and air mobile. Stationary units include bases, fixed artillery, cities, factories, and minefields. Walking units can only move one hex per week. This group includes infantry, slow combat beasts, missile crawlers, etc. Mobile units can move three hexes per week and includes most vehicles and fast combat beasts. Air mobile units are flyers and can travel through any uncontested surface hex, but they must land at the end of the week, assuming they survive combat. Usually this means a surface hex with land masses, ice, or islands. But, it can also include friendly carriers or bases - if these units have the hanger space.

Each surface hex on a colony DAT is a pretty large area. When feasible, the exact locations of forces should be cited. For example, the player has three minefields in the same hex as a colony city. The player decides to place one minefield around the colony, another around a nearby factory, and the third one in a narrow strait between two land masses. Since minefields are stealthy units, only the deploying player and the GM know where they are exactly located.

With the exception of being dropped into a hot LZ (landing zone), combat is executed in one week rounds. All units move their forces from least to most mobile. Enemy units can not move past each other but, they can stop in an enemy occupied hex. After all units have moved, any contested hex will result in combat.

Unit Scale	**Notes**
Starship/Base	Starship scale space craft, large wet navy ships, and mega tanks are tough customers. They usually need to be ripped apart one component at a time.
Gunboat/ Fighter	These $1/10^{th}$ scale units include medium wet navy ships and subs as well as super tanks. They are the size of one starship hull space and take one point to destroy.
Ground Unit	This is a battalion sized unit and is roughly one starship component is size when bunched up. When dispersed, it takes ten points of damage to eradicate them. As they take damage, their attack rating decreases, but it can not go below zero.
Combat Team	Each team is $1/10^{th}$ of a battalion in size. Normally, they can only harm other team sized units. In boarding party combat, they can sabotage equipment and place satchel charges that will disable or destroy a component.

Star fighters and ground units are similar in CP costs but they behave differently in combat. An individual fighter is fragile and is taken out with a single hit, but it is capable of carrying multiple starship grade weapons. Ground units are a bit like cockroaches and require ten hits from fighter and starship weapons to take out, but they can only concentrate their fire power against a single target. If their starting AR is less than 10, they can only harm gunboats, fighters, and other ground units. If their AR is 10 or more, they can inflict one point of starship scale damage. Finally, ground troops can destroy other group troops in a single attack. All that dispersed firepower can be concentrated on a dispersed target. The best weapon against infantry is more infantry.

For ground troops, combat is a matter of selecting targets in the same hex and rolling 1d10 + AR versus the enemy's defense of 1d10 + DR. If the modified attack roll is higher than the enemy's modified defense roll, the enemy unit is usually destroyed. It is entirely possible for two units to wipe each other out or for neither side to gain an upper hand.

Each unit can only attack once per round, but it can defend itself several times.

For example, three medium tank battalions rumble into a hex defended by an infantry unit. The tank commander can make three attack rolls at 1d10+8 versus the infantry's defense roll of 1d10+2. The infantry unit gets one attack at 10+3 versus the defense roll of 1d10+7 for the tank battalion. There are situational modifiers that might give the infantry a chance, but on open ground they are doomed. To continue the example, the tanks roll 7, 2, and 5 with attack totals of 15, 10, and 13. The infantry defense rolls a 10, 8, and 5. Unless the infantry is dug in or in difficult terrain, there is no way it can survive the first attack. For its return fire, the infantry unit rolls a 7, +3 gives it a 10. The enemy tank battalion rolls a 3, +7 for armor. The defending infantry failed to harm the tanks.

The infantry don't always have it this bad. If they can survive to get to close range, they're much more dangerous to tank crews. Also, some units such as chameleon skin commandos or burrowing insects can strike at the vehicles from close range. The combat situation table shows some modifiers that can be applied to a ground unit:

Combat Situation	Modifier
Unit ambushes target.	Unit can attack at range without return fire. Only units that can conceal themselves can attack in close combat
Unit is surprised	Unit can not attack this combat round.
Defenders are dug in.	Defenders gain a +2 to their ranged combat DR. They lose this ability if they move from their prepared positions.
Open/Clear terrain	No modifiers to AR or DR.
Cluttered terrain	In forests, cities, and badlands, units on both sides have –1 to ranged AR and +1 to ranged DR.
Obscured terrain	In dense swamps, jungles, or subterranean combat, units on both have –2 to ranged AR and a +2 to ranged DR.
Crossing layers of atmosphere & water	See TCOM for more details.

A planet is considered conquered when all the defending forces have been captured, beaten, or driven off. A little common sense needs to be applied here. If all the enemy has left are minefields in remote locations, they are not going to stop the enemy from taking over the planet.

There is an old saying that goes, "Amateurs talk tactics, professional talk logistics." Based on the starship supply system, an army can fight for four weeks before running out of supplies. If the army can not get supplies from freighters or captured cities, it will begin accruing stress just like a ship that is out of supply. Every four week period without supplies and the stress value increases by 10%.

Ground forces and combat teams represented by the AR/DR system are intended to be abstract. The exact capability of troops and vehicles is subject to wide variations in training and technology. This is something of a contrast to the design system of starships, gunboats, and star fighters where each component is listed and each shell or missile is accounted for.

The dispersed nature of a ground unit gives it survivability beyond its material strength. Combat between starship grade units and ground forces is deadly, whatever they hit is toast. There is no defense roll to save you. Each side has a base accuracy of 50%. The base accuracy can be modified by combat situation modifiers. A -1 to ranged AR is a -5% to hit penalty. A +1 to ranged DR is a +5% defense bonus. Each hit by a starship grade weapon on a ground unit destroys one of its combat teams. Each time a ground unit loses a team combat, its AR goes down by one. The AR of a unit can not go below zero. [Note: Each team retains it AR rating at the combat team level. But, when consolidated into a damaged battalion they lose that effectiveness when scaling up.]

Ground bases are vulnerable to ground forces since their primary weapons (energy beams and torpedoes) are normally set up to attack orbital targets. Missiles, being all aspect weapons, can target ground units. Many bases have their own barracks and house troops to defend against boarding party attacks and ground forces. Troops in a base get the prepared defenses bonus against ground forces trying to attack a base from the outside.

Due to the volume of fire that a ground unit can generate against a base, there are no near misses. Re-roll any near misses. Similarly, since ground units are spread out, any hit against them is going to hit something. Ground forces do not have facings like starships, the can attack in any direction and they can envelope a target and attack from any facing.

For large tanks or wet navy ships, roll 1d6 to determine the attack direction.

For most ground bases roll 1d6;
1 or 2, the attack comes in from the left side
3 or 4, the attack comes in from above
5 or 6, the attack comes in from the right side.

For strafing starships, gunboats, and star fighters, roll 1d10 to determine the direction of the attack relative to the target's DAT;
1 or 2, frontal strike from direction one
3 or 4, glancing blow from direction six
5 or 6, glancing blow from direction two
on a 7, flanking attack from direction five
on an 8, flanking attack from direction three
9 or 10, parting shot from direction four.

Besides damage allocation, angle of attack can be important to gunboats and fighters with partial shields.

For example, three heavy tank battalions (AR 11/DR 10) are dug in at New Helios City. Prepared defenses plus the cluttered terrain of a city gives them a -1 AR but a +3 DR. versus ranged attacks. They're sitting pretty until the enemy moves the battleship Atom Smasher into range. The Smasher is a starship scaled wet navy ship. It's big and tough and doesn't care if it takes out a city block to nail a puny battalion of tanks. The Atom Smasher is a fairly standard design with a well protected bridge section. Round one, the shelling begins – to keep the battle interesting, we didn't put any long range weapons onboard the battleship. If the defenders had an AR less than 10, they would not have been able to hurt the Smasher at all. The base accuracy for the tanks is 45% (50-5 for the AR penalty.) The base accuracy for the Atom Smasher is 35% (50 – 15 for the city and prepared positions of the tanks.) The tanks roll 1d100 and get 22, 67, and 45. That's two hits on the battle ship which drops its shields to one. The Smasher rolls for each of its energy torps and targets the first tank battalion, 01, 37, and 77. That kills one combat team and drops the base AR of the unit down to 10. Round two, the tanks roll 11, 78, and 49. They only score one hit and drop the last shield point. The Smasher continues to attack the first battalion and rolls, 51, 20, and 92. It scores another hit on the first battalion and drops them to AR 9. That's bad since that means they can no longer have the fire power to hurt a starship scale unit. Round three, the captain of the Atom Smasher has a choice; he can either continue the battle or retire for repairs. Since the tanks can not follow, he opts to move back to a waiting fleet repair ship and get his shields repaired so that he can come back and fight at full strength. The first tank battalion is not so lucky. Dead men and twisted vehicles can not be repaired as easily as burned out shield generators.

At the end of a turn (every four rounds/weeks), a player can reshuffle his combat teams into new battalions assuming that they are of the same type. To continue the example, let's say the Atom Smasher returns and kills off three more combat teams by the end of the turn. The defenders of New Helios are now AR 9, AR 9, and AR 10. The defending player decides to pull combat teams from the first battalion to replenish the second and third battalions. The first battalion is now down 5 combat teams and has a current AR of 6 (11-5.) The player orders the first tank battalion to return to a training base where it can be brought back up to full strength.

Once a world is taken, the native racial attitude comes into play. If they are belligerent or less in hostility, they know how to play the game, bide their time, and work with their new masters. It's far too easy to destroy a colony and they consider their survival to be more important than their policies. Of course, if the current ruling regime starts killing off the locals, their racial attitude will worsen until they do take up arms.

Then, there are the hostile and xenophobic races that never learn. A conquering player needs to place one or more garrison units in each city to avoid rebellion. The rule is simple. Any city large enough to build a rebel army (10 CPs or more) needs a garrison. Hostile races need one garrison per city. Hostile xenophobic races need two garrison units per city.

Each turn, a rebellious city can build a militia unit to battle other garrisons in other cities. While a city is rebelling, it generates no CPs for the conquering player. For garrison purposes, even crew members count as a military unit. So, a wet navy ship can use its crew to control a coastal city. For every ten crewed hull spaces of a starship scale tank or ship, the unit counts as one battalion of crew for garrison purposes.

9.4 Destroying Worlds

The weapons carried by starships are fully capable of ravaging any planetary surface given time and ammunition. Any ship firing on a planet may target civilian populations, production facilities, or any other surface installation including the planet itself.

Destroying a colony requires the application of damage equal to the colony's total output in CPs, (not counting any production multipliers such as strip mining or strategic/special resources.) For example, a colony on a planet that produces 250 CPs would require 250 points of damage to destroy. If is also produced strategic resources, it would still only take 250 points of damage to level the colony. This level of destruction does not have a permanent effect on the planet's climate.

Devastating a planet's biosphere (also know as 'glazing' a planet) requires the application of 100 times the world's total CP potential in damage.

Continuing the example, our colony has a CP potential of 250 would require 25,000 points of damage to devastate it. A devastated planet takes centuries to recover from the damage and has its climate code permanent changed.

Destroying a planet (a process which leaves only asteroids and planetary debris behind) requires a titanic application of energy. Ship to ship weapons can not practically deliver this level of energy. If your setting uses gravity drives, it is possible to create relativistic planet killing weapons. Planet busting is serious business and no planet will be destroyed without direct orders from the player. Known destruction of planets is usually frowned upon by friend and foe alike and can cause a negative turn in racial attitudes. Reducing a planet to rubble is cheap terraforming. Many space borne races deliberately crack up planets to get at the insides. Destroyed planets permanently lose half of their CP potential. So, a 120 CP planet with a STEP code of 5555 planet can be turned into a 60 CP asteroid field with a step code of 0500.

9.5 Commerce Raiding

While deep space battles and planetary invasions are fairly straight up battles, a player can also call upon their navy to attack the economic fabric of the enemy. Commerce raiding is the practice of seizing or destroying the civilian ships that ply the supply grid of your enemy.

Commerce raiding involves a bit of planning. Speed is essential since standing still gives your enemy a chance to bring in enough defenders to crush your raiders. The player plots a course through enemy territory and the GM compares that with the enemy's orders to see where funds are flowing from colony to colony. If the raider fleet intercepts a trade route there is a 10% chance per hex traveled that they can catch some civilian vessels.

If the raider fleet dares to enter a star system where CPs are being moved (most star systems since they are either spending or generating CPs), they have a 30% of intercepting a ship. But, there is also a much greater risk of running into of the enemy's navy. Not only can raiders attack the civilian shipping, but they can intercept command freighters as well. This intercept chance drops to 1% and 3% respectively, if the raiders do not have LRS or they lose that capability due to battle damage.

Certain drive types are harder to intercept than others. Most ships with jump drives or dimensional drives like the Second Stage drive can only be raided in their starting and ending hexes. FTL drive techs that have strategic limitations like string drives, jump gates, or ley lines, are easier to intercept, but they carry a greater risk of running into the local defenders.

Raiders with cloaking or stealth technology are difficult for the defending navy to intercept. Often, the defenders will resort to using Q-ships (armed merchants or disguised warships) to lure the raiders into a trap. Another defensive tactic is to assign a defending fleet to escort duty.

The general rule is that civilian vessels will have CPs equal to 1/4th of the colony's resource traffic in CPs. Civilian freighters are easy targets. Destroying them will deny CPs to the enemy. Often, a freighter crew is quite willing to dump its CPs or surrender to a raider in order to avoid destruction. While this can be easy money, it has to be balanced against the cargo capacity of the raiders and the danger of hanging around to transfer CPs.

Here's a detailed example of a commerce raid where both races have FTL drives that can be intercepted:

The Jural Combine is at war with the Great Star Republic. Part of the Combine war plan involves commerce raiding. This should at least draw off some GSR fleets and perhaps harm their economy. The GSR has colonies at 4743 M, 4943 M, and 5041 K. The Jural Combine have a fleet at hex 4740 and decide this would be a good chance to hurt the GSR without risking the Jural ships too much. The Corsair and Scout DDs have stealth technology so they do not automatically show up in the GSR's communications grid. The Jural player writes up his ship/fleet order like this:

Name:	Hengrade's Raiders
Units:	4x Corsair Class DDs, 1x Scout
Start Hex:	4740
Orders:	Invade GSR space and attack GSR shipping at will. Move to 4841, 4941*, 5042*, 5043*, 4942*, 4843*, 4742, and 4741
End Hex:	4741

The Jural player figures that he has a 50% chance of disrupting the flow of CPs between the GSR colonies.

The GM (after reading the GSR orders) knows that there are no active patrols or Q-ships in the area. So, he rolls for each hex that could possibly be a trade route between the colonies. He doesn't roll for hex 4742 even though it is in the enemy supply grid because no civilian ships would be traveling in that section of space. The rolls are 45, 51, 99, 05, and 08. The raiders are lucky and catch two groups of civilian freighters. The GM looks over the orders for the GSR and sees that all three of these worlds are sending CPs to other parts of the Republic. So, he decides that the CPs are flowing away from the colonies. The intercept in hex 4942 is probably CPs from the colony at 5041 K (122 CPs per turn.) Divided by four, that's 30 CPs that the Republic loses. Since the destroyers totally overwhelm the civilian freighters, the GM decides to use the narrative method of combat resolution.

The intercept at 4843 is probably from the colony at 4743 M. This colony is a well defended supplier of medicines and generates 660 CPs per turn. The raiders destroy 165 CPs meant for the Republic. If the GSR can not absorb the 195 CPs lost via their treasury, then somewhere a ship is not being built, a base is getting delayed, or perhaps an R&D project is being under funded.

This following example is a commerce raid on the fringe of an enemy empire. If the Jural player is more daring and strikes deeper, there is a domino effect where hundreds or even thousands of CPs can be lost due to raiding. Of course, the risks are significantly higher that anti-raider fleets will be deployed to put an end to Jural plundering. In this example, the Jural and the GSR are not xenophobic or genocidal towards each other. Most likely, the Jural ordered the civilian cargo ships to dump their CPs and the raiders simply blew up the cargo

9.6 Repairing Battle Damage

Ships and other units will require repair when damaged. The repairs needed may include armor damage, shield burnouts, or the replacement of destroyed components. A ship will require a facility with repair bays or shipyard bays in order to be repair or replace damaged components. Gunboats and fighters are usually destroyed by battle damage, but they can use their hangars to repair any burned out shield generators that they have. Ground troops require the services of a training base and perhaps a factory to replace lost combat teams and their gear.

Repair bays are for field repairs and can not repair destroyed components. Their primary job is to rebuild burnt-out shield generators, repair damaged components, and salvage components from one ship to repair another. Each repair bay team can restore/rebuild four shield generators per day, repair one damaged component (if CPs are present), or remove a destroyed component and replace it with an identical salvaged component. The parts have to match. You can't replace a destroyed beam with a missile launcher or even replace a beam with a beam that has different capabilities. That would require the refit capabilities of a shipyard.

Repair bays require CPs from a cargo bay in order to perform their repairs. They are limited in their ability to create parts from scratch, but they have the ability to upgrade software and execute small enhancements. Repair bays can be used to repair damage on other ships as long as both vessels stay together for the duration of the repairs.

Restoring off-line shield generators does not cost any CPs. But, the CP cost to repair damaged components on a ship is half the CPs it would cost to build a new one. For example, a first gen ship loses 3 shields (they're damaged, but not destroyed.) Costing 6 CPs each (18 CPs total), the repair cost would be 9 CPs and it would take three days if there was only one repair bay available. If the shield generators were destroyed and not just damaged, it would take 18 CPs to replace them at a shipyard.

9.7 Strategy

The preservation of the fleet in being has always been a strategic consideration for admirals in our world. It should also be a consideration for the admirals in this game.

Battle tactics are usually formulated around some knowledge of the enemy. Players will not possess this knowledge until after they have contacted the enemy in battle or conducted several intelligence gathering missions. One important source of tactical intelligence is the battle reports and enemy ship DATs that your survivors have revealed. Careful analysis of this data will let you know what the enemy is capable of. Does he possess technology that you do not? Does he have a long-range weapon advantage? Are his ships vulnerable at certain angles of attack? How is their firepower arranged? Which arcs are dangerous to approach? How can you reduce your opponent's advantages?

One tactic that is possible in the game, but which is difficult to obtain, is the advantage of surprise. How do you gain tactical surprise over an enemy? Many times it is only through luck although officers with high levels of strategy using headquarters or flag bridges can sometimes make their own luck. Having the right technologies and terrain on your side can help. There is no single strategy that will guarantee surprise. Many ships that thought they were invisible have been lead into a trap.

Another tactic that can be used to a player's advantage is the establishment of a reserve force. Do you want to keep those carriers safe? Place them in the reserve (but make sure you protect the reserve too). Do you need to safeguard this fleet? Give it orders to evade combat. There are a number of leadership, technological, and situational modifiers that goes into the success or failure of any operation. If you ever feel that the GM is jerking you around, it is mostly likely that you don't know the big picture. Perhaps the enemy has new sensors or there is a spy in your command staff.

The list of secret weapons, tech advantages, special weapons, wildcard technologies, and other things that give a player an advantage over an opponent in combat is only limited by the player's imagination. New weapons and technologies are not always a guarantee of victory, but they can go a long way towards keeping the enemy off balance.

A good player will study the tactics used by admirals in real-world situations and then find ways to apply them to the game situations. My personal favorite is the Art of War by Sun Tzu (Shambhala Dragon Edition by Thomas

Cleary.) Surprisingly enough, I do not suggest most science fiction books for tactics. They are often geared to a specific technology or lack of knowledge on they enemy's part. Some novels do offer good suggestions on technology, but that's covered under research and development.

10.0 Intel & Counter Intelligence

Intelligence operations and counter intelligence (COIN) may be conducted by any empire as a way to gather information, perform espionage, or defend against such special operations. Intelligence ops follow the same model as R&D projects. There are planning, recon, and execution steps similar to R&D's discovery, research, and deployment steps. Intelligence operations are not intended for speedy attacks against an unknown enemy. Any operation must have a specific goal and must be funded. The success of any specific intelligence operation will be determined by the GM based on the situation.

Virtually any type of operation is permissible under these rules. Certain types of operations have no chance of success. You can't see into an enemy's future orders nor can you eliminate a player. Well, you could kill off a few leaders and create some chaos, but a new leader will rise and that one will also be under the player's control.

Due to the extreme physical and cultural differences, intelligence operations against some races might be very difficult or nearly impossible. For example, if humans wanted to execute some black ops versus a race of methane breathers, it would be more effective to recruit some locals rather than plant your own people.

11.0 Trade

Trade agreements may sound like easy money, but they carry risks as well. There are three levels of trade: no trade, limited trade, and full trade.

No Trade - This is the default as no empire is ever required to trade.

Limited Trade - Gain 5% of your partner's gross production per turn.

Full Trade - Gain 10% of your partner's gross production per turn.

There are certain disadvantages to forming trade relationships between empires. Players will be able to judge the "pulse" of their partner's economies. They will be able to indirectly determine when new colonies are established, conquered, or lost due to conflict. Trade also means that parasites, disease, and biological weapons might jump from one empire to the next.

There are also major bonuses to intel operations against a trade partner due to the free access to their worlds. This works both ways. Limited trade gives each side a +10% bonus to intel ops. Full trade doubles that modifier.

Finally, there is a trade cap. If your partner's market is too small, trade will not offer as much of a reward. The rule is that a trade partner can not gain more that a 25% of its GNP from trade. For example, the Taurians have a small empire that generates 1,000 CPs per turn. They establish a limited trade deal with the much larger Solar Alliance (10,000 CPs per turn.) While the Taurians could receive as much as 500 CPs from the Solarians, the most their economy can handle is 250 CPs. On the other hand, the Solarians barely notice the 50 CPs they get from Taurian market.

There's also the risk that the smaller trade partner's race may become too closely tied to the larger empire's culture. When 20% of your income comes for an external source, this can color the social, political, and economic factors that go into a GM's situational modifiers.

12.0 Observation & Detection

Players can automatically track their own ships as they move on the game map. If one of your ships disappears, most likely it has been taken over by enemy action, has failed a stress check, or been destroyed in some manner that was undetectable until it was too late.

Ships must enter a star system in order to survey its planets. Even the most advanced long-range sensors can not conduct a survey mission from light years away. This means that the ship must physically enter the star system in order to see what number and kind of planets the system possesses. Ships with long-range scanners are able to detect the presence of other ships within range. Survey bays are required to conduct timely surveys.

A player will not detect any cloaked ships anywhere (other than his own) unless they have a sensor advantage relative to the level of cloaking tech. Players normally can see what's going on in their supply grid or where they have ships and bases. Most FTL and STL drives are automatically detected within any star system owned by any player. Bases and ships with LRS can detect ships at greater distances.

The general rule is that a cloaking system can spoof up to its own level in LRS technology. So, basic cloaks can hide from starting LRS systems. If a player invests in LRS tech and gets an advance, they would have a sensor advantage and could see through the basic cloak. Of course, the other player can also invest in advanced cloaks to counter the advanced sensors. The advantage system also has situational modifiers. For example, a cloaked ship moving through a nebula would have its level of cloaking reduced by one. Some drive technologies are noisier than others and would be more

difficult to hide. Commerce raiders prefer stealth hulls or cloaking in order to avoid reaction forces.

Here is a short list of active systems and actions that would be easily detectable within LRS range:

Colonies and life bearing planets
Most starship combat weaponry while in use
Most STL/FTL drives when in use
Active sensors from other ships and early warning stations
Active Electronic counter measures (ECM)

12.1 Scouting & Surveying

At the start of the game, all players receive a copy of the cluster map. This represents early data collection that has been going on for centuries. Even if some race found a way to cloak, move, or destroy a star, its position would still be 'visible' for decades or even centuries as light travels outward from that system.

There are two basic methods of learning about stars and the planets that might surround them. You can either drive on over and take a look or send a ship equipped with survey bays (and the survey teams that go with the bays) for a detailed examination.

Scouting is easy, but it can be perilous. Most space monsters, booby traps, and hostile natives turn up when you first enter a system. Scouting requires LRS gear to reveal the presence of space creatures, civilizations, some devices and derelicts, and the number and types of planets within the system.

Survey missions are much more complicated than simple long range scouting. They require more time to conduct as well as specialized survey teams and equipment. Survey missions may be conducted only by ships or task forces equipped with both LRS and survey bays. A survey will reveal details that the scouting mission might have missed and it will reveal the maximum CP potential of the worlds located within that system. Colonization and remote mining can not begin until a survey has finished.

Survey missions require a ship to move inside a star system and remain on-station until all scans and analysis have been completed. Exiting a star system before the survey is complete results in a mission failure and the survey will have to be restarted. The basic amount of time for a system survey is one month; however, additional LRS or survey bays over the first ones required reduce the time with a minimum of one week. Every two extra LRS or one extra survey bay will cut the time in half.

Survey Time	Survey Gear
One month	one LRS plus one survey bay
Two weeks	three LRS plus one survey bay or one LRS & two survey
One week	5x LRS + 1x SB, or 3x LRS + 2x SB, or 1x LRS + 3x SB

It would first seem that buying extra LRS would be not as cost effective, but one should note that additional LRS gear has uses beyond survey missions while survey bays can only do surveys.

13.0 Communications

In the Cluster War universe, FTL communication does not exist. This limits most signals to radio and laser communications which move at the speed of light. There are some short cuts; wormholes might be used as relay stations while any faster than light ship could be used as a message courier. Under normal circumstances, this is not an issue. Most units have local commanders or civilian leaders that provide local control. From the player's perspective, units are capable of receiving orders immediately. In reality, they're acting on their own in a manner consistent with the player's preferences.

The communication barrier becomes apparent when dealing with the outside world: A ship that is lost with all hands does not return valuable data. Commerce raiders can strike within your borders and you're always one step behind them.

And, to establish regular communications with other empires you need to have a unit in their space and establish an embassy or assign a military liaison.

Advances in communication technology can increase the options available to a player and perhaps even offer a strategic advantage in battle.

Diplomatic exchanges are also considered to be instantaneous communications. This is to preserve game play convenience. The reality is that the communication is between the ambassadors and the local empire's staff. The player is basically assuming the role of ambassador as well as an empire's leadership. Extensive diplomatic communication can not begin until two races have exchanged ambassadors or other personnel.

14.0 Weather & Terrain

Space is big, really big. In a hard sci-fi setting, you could have some interesting stars and planets, but not much in the way of any intervening terrain. That's acceptable if it is the type of campaign that you want to run. If you want to add more variety, there are some additional terrain types you use.

Asteroid Fields: AST

Asteroid fields on the strategic map are the debris fields of planetary collisions that have escaped a solar system or a proto system that has not fully developed into a solar system. Asteroid fields may be extremely hazardous to ships that travel through them at high speeds. Drive systems that use alternate dimensions can ignore the possibility of collision. Other types of ships moving through an asteroid system should roll on the following table:

Asteroid Field Intercept:

Die Roll	Result
1-80	No effect
81-95	Near C grain of sand: Ship subjected to a 15 point drill attack. Shields can be applied if they are all on-line. Roll 2d10 for the point of impact. Normal point defense can not stop this attack.
96-100	Near C rock: Ship gets slammed by a 60 point explosion. Roll 2d6 + 4 for the point of impact. Normal point defense can not stop this attack, but shields can be used to absorb some of the damage.

Gravitic Storms: GRV

Gravitic storms are areas of intense gravimetric activity experienced as wave after wave of gravitic force battering against a ship's hull. The causes for gravitic storms are unknown, but it is theorized that they are worm holes that have collapsed. Gravitic storms often project their effects into alternate dimensions and can affect ships there.

Storms are measured by degrees or levels of force. The GM will determine the force level of a storm by rolling 1d6-1. Each level of force above F0 adds 10% to the die roll. Most storms will vary in intensity from turn to turn.

Gravitic Storm Effects:

Die Roll	Result
1-50	No effect, the ship is battered but makes it through intact.
51-70	Gravitic shear: roll for each cargo and hanger bay to see if anything broke loss and was damaged or destroyed (10% chance per bay)
71-90	A random component overloads and takes 1d6 damage.
91-100	A gravitic ripple runs through the ship apply 2d6 points of random damage.
101+	The ship is caught between to massive waves and is crushed.

Hypermasses & Black Holes: HYP

Stellar hypermasses (aka black holes) are also called quantum singularities. By themselves, black holes are very small, but they are surrounded by much more noticeable effects such as radiation zones, asteroid fields, nebulae, magnetic storms, and gravimetric storms. All of these effects could easily coincide in the vicinity of a hypermass. They are not a nice place to visit or anything anybody would want to fight over. They are a hazard to almost all forms of FTL navigation.

Ion Storms: ION

Ion storms are another weather effect possible on the Cluster War map. Ion storms are characterized by intense waves of high energy ionized particles sleeting through space at high velocities. Any ship entering an ion storm will suffer effects similar to a constant bombardment by high-energy particle beam weapons of varying intensities. Drive systems that use alternate dimensions can ignore ion storms. All storms drop weapon ranges to short range due to the interference and background noise.

Ion Storm Effects:

Die	RollResult
01-50	No effect, the ship is battered but makes it through intact.
51-70	All the shields on the ship are burned out by particle bombardment. If the ship was unshielded, roll 1d6 for facing and apply one point of damage to each hex row from that direction to the ship's hull
71-90	A random drive/power component overloads and is destroyed. Being stranded in an ion storm is usually fatal.
91-100	A huge surge of particles flails the ship. Same as the particle attack above, but the shields automatically burn out and the strength of the attack is two points of damage down each hex row. Roll 1d6 for facing.
101+	A massive ion burst fries all electronics and crew members.

Magnetic Storms: MAG

Also known as electro-magnetic storms, they are dangerous to both ships and crews due to the waves of intense magnetic force and electrical arcs within the storm.

Magnetic Storm Effects:

Die Roll	Result
01-50	No effect, the ship is battered but makes it through intact.
51-70	All the shields on the ship are burned out by an electrical arc.
71-90	A random drive/power component overloads and is destroyed.
91-100	An electromagnetic bolt flashes through the ship (treat as 30pt drill attack.) Roll 1d6 to determine a random facing and 2d6 +4 for the point of impact.
101+	A massive magnetic pulse fries all electronics and crew members.

Nebulae: NEB
Nebulae are immense clouds of gas and dust. Nebulae are often light years in size. A nebula will encompass an entire tactical game map. Nebulae are known as the birthplaces of stars and many have been formed by the death of a star. Nebulae can harbor radiation zones, asteroid fields, and they are often the home of space monsters, pirates, and artifacts. Contrary to Hollywood, a nebula is not a dense raging beast like an Ion Storm. Most nebulae are a high grade vacuum and they do not have an impact on weapon ranges. Some ships are vulnerable at FTL and can not move them.

Neutron Stars: NEU
A neutron star is the remains of a star which has exploded in a nova and has then collapsed back to a highly-compressed mass. Neutron stars are characterized by intense gravities and high radiation. Any ship entering the vicinity will suffer the same effects as if it had entered a radiation zone.

Pulsars: PUL
Pulsars are neutron stars which are spinning. The rotation is often measured in hundreds of revolutions per second. Any ship entering the vicinity will suffer the same effects as if it had entered a radiation zone. Pulsars often 'sweep' the battle field with a wave of radiation that will kill the crew of any unshielded gunboat, or fighter and inflict damage to larger vessels. See below for more details.

Radiation Zones: RAD
Radiation zones are typically found around very active stars such as pulsars and flare stars. Rad zones can also be found quite near to any normal star and a fair number of gas giants. For example, Jupiter's rad zone extends out for hundreds of hexes in all directions and it covers the orbit of Io in radiation intense enough to damage unshielded electronics.

The crews of ships suffer most from radiation, but ship electronics can also be seriously affected if a ship loses its shields (or doesn't have them repaired yet). Any ship without shields that passes through a radiation zone will suffer 2 immediate effects. The first of these is 5% crew casualties. The other effect is a random Meson critical hit due to the scrambling of electronics and other systems.

Each week that a ship remains in a radiation zone without its shields it will suffer another 5% crew casualties and another random critical hit. Fighters and gunboats that enter radiation zones are crew kills unless they have full (360 degree) shielding. Weapons operate normally within radiation zones (subject to any damage they may have taken from critical hits.) The TCOM rules have more detailed information on radiation levels and their effect in tactical combat situations.

Stars: O, B, A, Adw, F, G, K, M, MSg, Mg, MVa
Probably the most common type of terrain type encountered on the cluster map, stars are typically large structures and are surrounded by radiation zones that extend some distance away from the star. Impact with a star's surface is instantly fatal to any starship, gunboat, or fighter. (Assuming they survived the exposure to the radiation zones.) The first character of a star's code is its spectral class. The suffixes are: dw for dwarf, Sg for super giant, g for giant, and Va for a variable star.

Worm holes: WRM
The fabric of the universe is not as smooth and consistent as most people think. In some places, the barriers of space/time are weak or they are distorted due to intense gravity. Depending on the nature of the campaign, worm holes can be points of communication that seem to defy the speed of light, natural gateways to remote locations, or spectacular vortexes of light and radiation.

If the GM allows worm holes to be used for travel, they can be classified as either open or closed worm holes. Open worm holes are a matched pair. They are linked together. A closed worm hole has one visible entry point, but the other end is unknown until it is traveled. Most closed worm holes can only be used in one direction.

15.0 Psionics [optional]

Races in the cluster may be psionic. For some races, this is a natural ability just like seeing in color. For others, it requires years of mental training and intense concentration. All psionics stem from the ability to access higher dimensions and manipulate the energies there. It is even possible that some drive and weapon technologies that can tap into this phenomenon.

Most psionic abilities appear to ignore the laws of physics. What is really happening is that energies are being manipulated in a place where the laws of physics are different. For example, psionic cloaking, allows a unit to blend in with these alternate dimensions.

In order to build a psionic race under the design rules, you must first spend 5 Attribute Points (AP) on the racial trait of Psionic Ability. This is required before any psionic discipline can be purchased. It represents the race's innate ability to tap into higher dimensions through mental power.

Psionic powers are not flawless, some races and monsters are immune to direct psionic influence. Also, there appears to be some parallels between psionic ability and hyperspace. Psychics can not travel via hyperspace because the physics of that domain drives them mad. They must either drug themselves into senselessness or use cryogenic stasis to weather the trip. In either case, a psionic that has traveled via hyperspace is either insane or incapacitated for a week while they recover.

Research into Psionics can be pursued as any other technology, but it is a generally process of learning to expand existing skills and channeling existing abilities. This makes it more like a system upgrade rather than the development of new equipment.

A non-psionic race may bioengineer psi-users by pursuing research into both psionic and biological technologies. This usually requires access to members of a psionic race or psi capable space monster. Any research into psionics is difficult and will require multiple successes. A non-psionic race may develop technological means of countering particular psi abilities. This will also require access to members of a psionic race or monster.

For game purposes, psionic abilities are divided into three scales: racial, unit, or individual. Racial psionic abilities are those that are a part of the society as a whole. They are purchased with advantage points during race creation. Unit-based psionic abilities are those that tend to affect the functioning of whole combat units. The ability can be paid for with AP, but there is also a cost multiplier is added to units which have been selected and trained to use that psi ability. Ground units with psionic abilities require an additional turn of training. Many psionic abilities may be combined in the same combat unit. For example, it is possible to create a Screaming/ Combat Precognition Powered Armor battalion. It wouldn't be cheap, but it would be pretty effective in combat. Players are encouraged to suggest different combinations and research entirely new disciplines. Of course, GM approval is required.

Machine races may never develop psi abilities, although they may develop similar abilities via nanotechnology and other mechanical means.

15.1 Psionic Abilities

Level 1 abilities are the psi abilities that are most commonly found when a race that has recently developed psionic expertise. Most races will focus only on one or two abilities. A psi heavy race may have a larger portfolio or advance to level 2 abilities.

Combat Precognition: Combat precogs can sense danger and have an enhanced situational awareness. This ability gives ships, fighters, and gunboats, a 5% defense bonus. The few seconds of warning that this ability provides can negate surprise attacks by enemy units. Any ground unit may also be built as a combat precog unit. Such ground forces would have +1 added to ranged and close combat DR. This is a unit-based ability.

Dowsing: Dowsers are inexplicably drawn to spatial anomalies as well as their ability to sense buried items and structure. This is the psionic equivalent to transit gear required for string drive technology. Dowsers need to be formed into units and assigned to ships for this to work.

Postcognition: This ability is hard to make practical use of, but creative players will find innumerable applications. This is the ability to recover knowledge about the history of an object merely by physical contact and concentration. For example, a player can assign a science team to work on a recovered derelict or archaeological site. The team could then gain a CP bonus or perhaps a free discovery on that R&D project. Postcognition is a racial ability.

Precognition: The ability to gain impressions or glimpses of the future. This is the most unreliable of the psi disciplines. The player will be unable to use it on demand. It is a device for the GM to use to move the plot(s) along, with hints and suggestions of what will occur. It might also give you warnings about particularly dangerous locations before you visit them. If you believe that forewarned is forearmed, you will want this discipline. Precognition is a racial ability.

Telepathy: At level 1 ability, telepathy is only a short ranged talent used for communication. It rarely works on alien species since their thought processes are too different. Telepathic societies are more resistant to enemy intelligence ops and reduce the chances of success by 10%. This ability is a racial trait, but strong telepaths can be formed into counter intelligence and first contact teams and assigned to specific projects or vessels.

Level 2 abilities require stronger control and a deeper understanding of psychic phenomena.

Advanced Telepathy: This ability allows a race to break the FTL communications barrier. A ship with an AT unit onboard always responds to orders and can relay vital information regardless of distance. AT units can also maintain communications silence. That reduces their chances of being detected and improves their ability to achieve tactical surprise. There must be an AT enabled unit or officer at your home world for this to work. Telepaths can also attempt to intercept psionic communication from other races. Advanced telepathy is a unit level ability.

Cloaking: This racial ability allows units to bend light and other forms of electromagnetic energy. This can range in skill and scope from blurry primitive ambushers to perfectly invisible starships. Cloaking is a unit-based ability.

Delusion: Units with this ability can create illusory duplicates in the minds of the enemy. The result is a ghost ship that will take 'damage' and maneuver like a real ship. A secondary function of the delusion is the ability to mask a ship and disguise its true nature. Delusion is a unit-based ability.

Harmonizing: Allows the members of the race to truly understand each other's thoughts and feelings with little effort. People can work on projects with common goals and a minimum of friction. Such races tend to be more productive and unified, with greatly reduced chances of civil war and civil strife. This ability also makes it easy for anyone to identify non-members of the race and grants a 30% resistance versus some enemy intelligence operations. Harmonizing is a societal ability.

Screaming: This is the general psionic ability to project mental "noise", causing headaches, loss of concentration, and even short term madness in some individuals. The end result is similar to ECM technology. Screaming can be applied at the racial or the unit level. The racial version of screaming generally makes a race mentally repulsive to other aliens. At the unit level, it can be used to defend against hostile ships and ground forces.

Shadow: This ability causes other minds to "blank out" and subconsciously ignore all signs of the shadow unit, both with their natural senses and when viewing sensor displays. Shadowing can be represented in a number of ways. It can operate just like cloaking or it can be a permanent defense modifier. The primary limitation to shadowing is that it does not affect machines. Shadowing is a unit-based ability.

Translating: This ability is a subtle blend of postcognition, telepathy, and empathy. It gives the race an innate ability to understand nearly any form of communication. The player can gain CP bonuses to an R&D project or even full successes when researching derelict ships and ancient ruins, alien

languages, as well as getting positive modifiers in first contact situations. Translating is a racial ability.

Level 3 psionic abilities require GM approval since they can give a race a significant advantage in the game. Often, these abilities are limited only to space monsters, hostile alien encounters, and non-player "bad guy" races.

Slaver: Slavers can disrupt thoughts, alter memories, and given time rebuild personalities. It is an extremely effective power for creating deep cover agents, double agents, loyal servant races, or in taking over a world without a fight. Slavers can be unit or racially based at the GM's discretion.

Vampire: Vampires establish a psionic link to their victim and start feeding. The effects vary from race to race as the victims can be stunned, soothed, or savagely attacked and their life energy drained away. Psionic vampires can be unit or racially based at the GM's discretion.

Witch: Witches can open portals to alternate dimensions. This enables them to deflect or bleed off the damage of incoming attacks, project torrents of energy (by opening portals), and even summon eldritch combat creatures from the depths of some alien hell. Witches can be formed into combat units usually with each unit specializing in some seemingly arcane power. Witchcraft can also be the source for an FTL drive technology.

Zombie: Zombie masters are capable of quickly and brutally hijacking living creatures. Once they have established control, the victims are generally powerless to stop them. The psionic ability varies from race to race. Sometimes the victim's personally is totally destroyed and the body is just a meat puppet for the zombie master to control. With others, the zombie master actually moves in and inhabits the victim's body. This can be a horrific experience especially if the victim is still conscious but unable to stop the invasion. If the victim is zombified, further attempts to exert psionic control are useless since there is no mind left to effect. Players could even zombify their own units to create psi-immune combat zombies. Such troops ignore the combat effects of all mental disciplines, but the moral impact of doing that to your own people needs to be factored in. Zombie masters can be unit or racially based at the GM's discretion.

16.0 Governments & Society

I'll keep this short and sweet. Construction points are a measure of work and material goods. No matter how your government works or how you tax the people, the amount of goods available to your empire will remain about the same. At the level that Cluster War is played at, these details are window dressing that provides some interesting color about your race. Feel free to pick and choose from the lists below at the beginning of the game in order to better describe your race.

Economic Policy
___ Communist
___ Socialist
___ Moderate Economic Control
___ Free Market
___ Radical Free Market

General Civil Rights
___ Despotic
___ Limited Civil Rights
___ Moderate Civil Rights
___ Generous Civil Rights

Political Structure
___ Empire
___ Benevolent Empire
___ Monarch
___ Constitutional Monarch
___ Parliament
___ Representative Democracy
___ Democracy
___ Theocracy

Penal System
___ Labor/Reeducation Camps
___ No penal system
___ Lax penal system
___ Moderate penal system
___ Heavy penal system

Police
___ Secret Police and informants
___ No Security/Police Forces
___ Light Security/Police Forces
___ Moderate Security/Police Forces
___ Heavy Security/Police Forces

Media
___ Controlled Media
___ Restricted Media
___ Uncontrolled media

Conscription
___ Universal Conscription
___ Massive Conscription
___ Heavy Conscription
___ Conscripted Forces
___ Volunteer Forces

Academic Freedom
___ Mandatory Academics
___ Academic Freedom
___ Academic Restrictions
___ Limited Academics

Personal Weapons Access
___ Unrestricted Personal Weapons Access
___ Private Personal Weapons Access
___ Restricted Personal Weapons Access
___ Personal Weapons Outlawed

General Welfare
___ Massive communal support
___ Considerable general welfare support
___ Moderate general welfare support
___ Limited general welfare support
___ Negligible general welfare support

While these values for government and society have no direct effect on the game, they do form the core for situational modifiers that might apply to special actions such as espionage and other intelligence programs. Each project or program should be handled on a case by case basic by the GM.

17.0 Officers & Graded Crews [optional]

Flag officers are the closest thing to "personalities" in Cluster War. They allow ships to perform better and allow the GM and players to introduce new factors into the game. Graded crews are simply a realistic effect due to training. A well-trained crew under an experienced officer can be far more effective than a crew right out of the academy.

Flag officers and graded crews are not required for any ship or fleet. It is assumed that all ships and crews are well trained already as part of the ship construction process. This is simply a method of allowing a little "extra" for players and GMs who are willing to pay more attention to detail and track training and experience.

17.1 Flag Officers [optional]

Officers can not be bought as part of the ship design system like a graded crew. They have to be put through academies or other training facilities. For most players, the large military base on their home world is their headquarters and their only starting location for creating officers.

Flag officers are recruited and trained in much the same manner as ground forces are purchased. The base cost for an officer is 30 CPs plus 10 CPs for each talent. After the CPs are spent, the GM rolls up the officer and assigns him or her to the officer pool for the player to use. Officers in Cluster War bear some resemblance to characters in a role playing game. They have skills that they can apply based on the job they hold.

Each officer has six ratings: rank, strategy, command, attack, defense, and possibility a talent. As officers progress in their careers, they can gain in each of these areas. In rare circumstances, these values can go down due to demotion or injury.

Ratings	Purpose
Rank	Your rank affects your duty location and which skills you can use.
Strategy	Acting admirals uses Strategy to affect the starting conditions of a battle.
Command	Acting task force commanders uses Command to modify initiative rolls.
Attack	A unit's captain uses this as a positive modifier to the Attack roll.
Defense	Similarly, this as a negative modifier to the enemy's Attack roll.
Talent	Special skills or abilities (Examples include leader, healer, psionics, etc.)

Rank	all new officers start at rank 1
Strategy	roll 1d10
Command	roll 1d10
Attack	roll 1d10
Defense	roll 1d10
Talent	+10 CPs each

Talents
Exceptional diplomat, the officer gets positive modifiers in first contact situations.
Exceptional engineer, the officer acts as a repair bay and sometimes performs miracle repairs.
Exceptional healer can recover some crew casualties without returning to colony world.
Exceptional leader, add 1d10+1 to command.
Exceptional scientist, the officer acts as a one man survey bay.
Exceptional soldier, officer adds +2 to the close combat AR & DR of the bridge crew or a combat team that they are assigned to.
Exceptional strategist, add 1d10+1 to strategy.
Exceptional tactician, add 1d10+1 to either the attack or defense roll.
Psionic Adept, the actual ability is based on the race's write-up although wildcard talents are possible.
Lucky, this officer is forbidden to play cards in the officer's mess. Only the GM knows when this ability will kick in.
Other talents are possible with GM approval.

A fleet can only have one Admiral in charge, a task force only one Commander in command, a ship only one Captain on the bridge. For Admirals to affect strategy die rolls, they need command and control facilities such as a flag bridge or headquarters component. For Commanders to affect initiative die rolls, they need command and control facilities such as a combat information center. Captains sit the bridge or command post and affect the attack and defense ratings of their ship or base only.

When Admirals match wits, the one that can out fox the other has an advantage. They can pick the battlefield, arrange for reinforcements or other strategic advantages, or possibly put the enemy Admiral at a disadvantage. In a campaign game, this battle of wits is simulated with a 1d100 roll plus any points in the admiral's strategy rating plus any points that may have been gained through intel operations. The higher roll has an advantage. The larger the difference between the two rolls, the greater the advantage. Since fleet actions happen at the strategic level, the GM will determine the actual effects based on those hidden die rolls.

The effects of command skills are covered in the initiative rules in TCOM, and the effect of attack and defense skills are covered in the combat resolution section.

While multiple officers can be present, their skills are not cumulative and the ranking officer on station is the only one that can apply their skills to a die roll.

For example, sub leader Talon (rank 2, command 4) is in the CIC and grand leader Eater of Enemies (rank 5, command 12) is on the bridge. Even though Eater of Enemies out ranks Talon, he can not apply his command skill to the task force since he is assigned to the bridge and not the CIC. As an additional example, on Eater's sister ship, the Pain of Living, leader Red Claw (rank 4, command 7) is in the CIC. There can only be one commander to a task force, Red Claw out ranks Talon and is on station. So, only his command skill is applied to any initiative rolls. If the Pain of Living were destroyed in combat, Talon would assume command.

Given time and experience, officers improve in their skills and ship crews can improve in quality. The actual probabilities and amount of increase are determined by the GM. There is one rating that the player can change. Each turn, the player can increase or decrease the rank of an officer by one. This allows the player to 'fast track' gifted officers or stall the careers of the less worthy. Please note that there is no such thing as a bad officer in CW. Some officers are better than others, but there are no useless officers.

17.2 Crew Grade [optional]

When crews are assigned to a combat unit such as a starship, they are assumed to be regulars. Their costs are generally included with the cost of the unit. Players can optionally (with the GM's approval) elect to use and track different levels of crew skill. Green crews represent raw cadets while veteran and elite crews have been assigned to a given unit for years and have had some combat experience. The unit cost modifiers reflect savings in lack of training or expenses incurred in training, ammunition, battle damage, etc. Normally, veteran and elites can only be purchased at the beginning of the game. After the game start, veterans and elites have to be earned by normal crew advancement.

Ship crew grades are determined as follows:

Green	-10% to Attack, -10% to unit cost
Regular	No effect upon Attack/Defense ratings
Veteran	+10% to Attack, +15% to unit cost
Elite	+20% to Attack, +30% to unit cost

If the crew begins as green, they can be drilled to become regular. It requires four turns of drilling (usually accomplished during a ship's "shakedown" cruise) for a Green crew to become Regulars. It requires 4 more turns of drilling and at least one battle survived for a crew to become Veteran. It requires 4 more turns of drilling and at least 2 battles survived for a crew to become Elite. Thus, for a Green crew to become an Elite crew requires 12 turns of drilling and surviving at least 2 battles.

As can be seen, losing a ship with an Elite crew can be a serious loss considering their potential value in combat as well as the time it takes to train them. If an experienced crew is transferred to a new ship, they temporarily lose one level until they train for two turns.

18.0 Turn Examples

Most game play is handled as monthly turns. A turn's activity is divided into two groups of actions: players writing up their orders and the GM collecting and executing all the player and NPC orders.

In the turn orders, the player provides directions for on how they want to spend their construction points and what your units are doing. The CPs are spent primarily in the following activities:

1) Building ships, troops, bases, fighters, etc;
2) Establishing or expanding colonies;
3) Conducting research into new technologies.
4) Issuing orders and moving units;

Those are not all the things to do with CPs, but they're the basics. Ships, fighters, and troops get built at dedicated facilities - for example, ships are built at shipyards, small craft are built at factories, and ground troops are raised at training bases. Facilities like bases, factories, and research labs are built by the local population on their home world or colonies. The cost in construction points for all such units is determined by their design. A huge high-tech battleship will cost far more in CPs and use more shipyard space than a low-tech corvette.

Colony development requires sufficient CPs and cargo capacity (if the target colony is not inside of the communication/supply grid.) The cost of a colony is determined by the income potential of the world and the colony world's suitability for colonization.

Research into additional technologies requires an investment in construction points. The amount spent, plus any modifiers, determines the chance of making a research breakthrough that turn. If you do not succeed with a given line of research, the CPs invested are carried over to the next turn so long as the project is funded. For example, if you put in 400 CPs in turn 6 and don't get a success, you could put in an additional 200 CPs on turn 7 and your roll for a success will be based on the total 600 CP spent.

Units can be ordered to perform various missions: scouting, surveying, patrolling, blockading, cargo hauling, and movement can be combined together.

That's more or less what happens in turn orders.

Here's some info on HOW to do that. While CW could be played as a conventional board game, it functions best as a double blind play by-e-mail game. Orders and turn results are usually handled via simple spread sheets. The player starts off with a sheet that describes their empire from several view points. The first sheet is the economics sheet. This lists your colonies and the CPs that they generate. To that total is added any income from trade, your treasury from last turn, plus any unusual income such raiding, planet eating machines on your payroll, or bribes and extortion that your intel ops may have earned.

Beneath that is a section where you write in your expenses, ship building, bases, ground forces, CPs set aside for new colonies, etc. These items are subtracted from your total CPs for that turn.

In the next section, you write down your R&D projects as well as your intelligence operations you wish to start or continue funding. The CPs spent on R&D are also subtracted from your current total of CPs produced. Anything left over is placed into your treasury for next turn. Remember, you can not have a negative balance. Even if the enemy blew up several of your colonies or raided your transports, you will not end up with a negative balance. Projects may be impacted or building aborted, but there is no such thing as negative work or resources.

The next sheet is the fleet sheet. This describes your fleets and planetary defense. The movement section of the rules tells you how to fill this out. The GM will update this sheet for your turn results when you build new units as well as when you engage in battle. You update this sheet during your orders to say where you're going. A skilled player will also update the map sheet with arrows to indicate fleet movement. These arrows are an excellent way for the GM to solve problems with typos and get a feel for the big picture. Also, the fleet sheet is where you write orders for scouting, surveying, hauling cargo, patrols, etc.

The starship construction sheet is used to manage your ship building resources. This sheet lists the locations and yard space for each of your shipyards and heavy industrial centers (ground based ship yards for mega tanks and naval units.) You can use this sheet like a timeline to schedule construction and determine if especially large units will take several turns to build or not.

The technology sheet has two purposes. It records your racial description and starting technologies. And, it is used to log all the technologies that you have learned, bought, traded or stolen. A player will rarely need to update this sheet. But, the GM will record your R&D successes here.

Next is the unit roster sheet. This sheet is used as a price guide for all the units that you can build. As you develop new designs or acquire then from

partners and intel ops, the GM will update this page. New technologies can also result in new ship design capabilities. Some players build units which will incorporate those new technologies into a new design. Other players will research the baseline technology and then refit their existing units. There are advantages to each method.

The survey sheet starts as one of the smallest pages, but as the game progresses it can become quite lengthy. Knowing how to do a text search can become useful as well as applying a little color coding for interesting results. This sheet is where the GM places all of your scouting and survey results. It is important to review this sheet regularly for information. As a GM, I like to place a yellow bar where new text starts and stops. This helps players to find what's new quickly and easily. I will also place comments and observations to mysteries here as well. For example, a geologist might note signs of energy weapon usage at an archeological dig.

The next sheet is the treaty sheet. This is usually a free form scratch pad used by the players to record alliances, trade deals, and other miscellaneous notes. Some players will cut and paste their chat and e-mail text into this area to remind them of encounters and unusual events.

CW uses a hexagonal grid for its map. Each hexagon is labeled with a four digit ID number and most objects on the map are color coded to easily stand out. At a glance, you will be able to identify supply grids, colony and fleet locations, movement orders, battle sites, and other objects as you explore your region of the cluster.

The final sheet is the ship status sheet. To save space when writing fleet orders and to help organize resources, refits, etc. each ship will be assigned an ID number. You can look up this number up on the ship status sheet and use it to determine what troops, ammo, and other objects a ship is carrying.

This might sound like a lot of effort, but each sheet is designed to reduce work and improve understanding of the data presented. In between sending in your orders and getting your turn results back, there's a lot going on. The GM is essentially advancing the state of the game universe. He or she is moving fleets, looking for intercepts, and detection. The GM resolves encounters, executes orders, and handles any non-player races that are also competing for limited resources in the cluster.

Scouting and research are a bit like gambling in that you'll eventually win or lose, but you're never sure how much it will cost you to find out. Depending on the GM's style, battles and first contact situations can take on role playing game qualities. Some players like it short and sweet while others prefer long narratives and interactive dialogs. I consider it the GM's job to cater to the players and hopefully make their game more enjoyable for all. Compared to Fire on the Suns, the smaller map and fewer players in a Cluster War game makes it easier for the GM to customize the player experience

A lot of diplomacy can go on between turns. You can form various types of alliances with other nations (player or non-player races), conduct differing levels of trade to generate more CPs for you both, declare wars, strive for peace, discover unwanted wars, find unwanted peace, exchange information, exchange technologies, and lay claims or bragging rights to who knows what else.

CW diplomacy is a very free-form thing. It can be conducted completely in public (the GM will usually set up a forum or an e-mail list), which is good for grandstanding and plain fun. Diplomacy also can be conducted among a limited number of players, such as when a group of allies are attempting coordinated military and/or diplomatic action. Or, it can be conducted with just the GM and one player. In any case, the GM needs to get a copy of any message. Otherwise, the GM is free to declare that the diplomatic exchange did not occur.

You also need to be able to establish some sort of communications link with your diplomatic contact. You can do this by sending a ship to their worlds, connecting supply grids, or building embassies.

The following is a stripped-down turn example. Call this Turn 7 for the Bland Star Empire, a modest state with 2000 CPs in colonies.

The BSE has colonies that provide it with 2000 CPs to spend in T7. It has, let's say, 400 CPs in the treasury leftover from T6. It also has a full trade agreement with 3 partners, providing 2500 (capped at 500), 300, and 200 CPs respectively. It's a small power making a good amount in trade from much larger economies.

So, the BSE has 2000 (gross CP production) + 400 (treasury) + 500 + 300 + 200 (trade with three partners) to spend in T7, for 3400 CPs available total. Unspent funds become next turn's treasury; spending over this amount is not allowed in Cluster War.

The player decides to build; one 233 CP cruiser which will probably take several turns to finish building depending on shipyard capacity, forty 10 CP fighters which should be finished in a single turn if enough factories are available, eight 23 CP space marine battalions, again probably a one turn affair, and one 900 CP base. That's a huge base, but since it can be constructed in parallel, it can be finished in one turn. That's 1717 CPs spent on building things, leaving 1683 CPs.

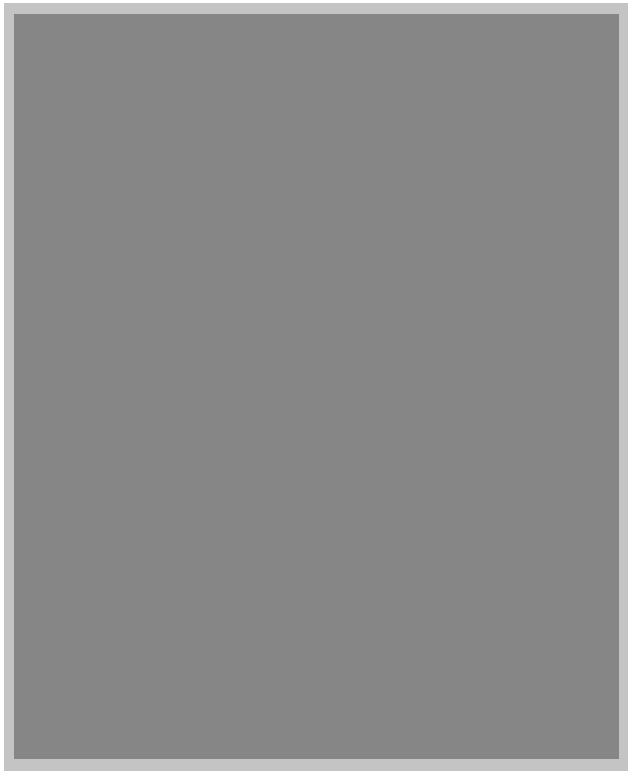
The BSE only has survey information on two worlds they are willing to colonize. One has a CP potential of 73 CPs, and has a STEP code of 5555 perfectly normal by Earth standards. Let's assume the BSE home world is

also 5555 so they have the same taste in planets as humans do: Earth-like worlds are great, molten rocks are terrible, and gas giants are rarely worth the effort. The multiplier for an exact match is 1.0, so 73 CPs of potential costs 73 CPs to colonize. The other candidate colony world is 4455 – lower gravity and a bit cooler, but still Earthlike. Think of a whole planet that's like Norway, with large polar ice caps and it even snows at the equator. This world happens to have a max CP potential of 389 CPs, which is fairly large as worlds go. Being two steps away from what the BSE prefer, the multiplier is 1.5. That's going to make the colony more expensive to develop, 389 x 1.5 CPs or 584 total CPs. The BSE's colonization total comes to 657 CPs. These colonies will begin to produce next turn, but only if the BSE can get the CPs hauled to their destination via freighter. That leaves 1026 CPs remaining.

On the research front, let's assume the BSE has no projects going on for simplicity's sake. They would like to pursue 4 different avenues of research. The player is a fan of nice even numbers, and decides to put 200 CPs into each of the projects. The base chance of success for each project is only 8%, but that can be doubled if there are available scientists and labs that the player can assign on a project by project basis. That's 800 CPs spent with 226 CPs remaining.

At this point, the player might decide to go back and put some of those CPs to immediate use. Perhaps the player will open a new R&D project or send CPs to colonize a third planet. The easiest option is to keep the treasury stocked in case a trouble.

On the fleet sheet the BSE needs to write in their orders to move freighters from a colonized world to one of the worlds that they want to colonize. Hopefully, the player has the cargo lift capacity to do the job otherwise there could be some delays in getting a colony established. Remember, each cargo bay can carry 20 CPs. A small freighter with 4 cargo bays can handle the first colony. For the second planet, the BSE will need 30 cargo bays, probably spread out over several large freighters or perhaps a convoy of eight small freighters. He's also got some ships to move about as well. It would be sensible to move some warships to escort that convoy as well as setting up some defensive fleets on the home world and other important locations. Finally, the BSE might have a dozen scouts and survey ships exploring the map and performing survey missions. That sums up the BSE's turn 7 orders.



19.0 Game Mastering

Running a CW game is a lot like running a role playing game. Sure, there are some number crunchy bits and all kinds of science fiction chrome. But at the core, the GM is still a storyteller. You may have two to four player-controlled races. But, there can also be half dozen non-player races that are a functioning part of the cluster's setting. Your job is to maintain the big picture and fill in the details as the player expand, explore, and encounter new races, monsters, traps, and perhaps discover some of the mysteries that await them.

First some advice, each player is running a single race and you might be running six or seven NPRs. Don't even try to run them at the same level of detail as a player. You will get swamped. When that happens, the game drags and everyone starts to lose interest. Once everything is set up, a GM should be able to run weekly turns without difficulty.

The key is focus and level of detail. The focus is at the player's scouts and survey vessels to start with. These are their eyes and ears. When a scout enters a system, the GM has to know everything about that system, the number of planets, the location of resources, the presence of indigenous or visiting aliens, etc. The further you move away from a player's scouts, the less you need to have prepared in advance.

Here is my checklist for starting a campaign:

1) Recruit players, sometimes this is easy, sometimes it is rather difficult. Right now there is a deficit of strategic space empire GMs. If a GM were to announce that a new game was opening, he or she could easily get swamped with requests. Since CW works best with a small number of players, I usually invite players or let some players suggest people that they would like to game with. Hopefully, the lack of GMs will be a temporary problem. But like a role playing game, a GM has to be selective if they want to have a manageable workload and still have fun.
2) Establish the basic setup for the players: This includes empire size in CPs, starting budget (usually two and half times their starting CPs), number of templates and designs, plus any other starting infra-structure such as training bases, etc. You also need to determine the technology level for the player races and any tech limitations. The default for most games is 1st gen FTL technology.
3) Help the players to design their races. Note that the GM has done nothing about maps, NPRs, and other game details. This helps to establish an impartial relationship since neither the GM nor the players know anything about the cluster. The focus should be on making well designed races that the players will have fun with. While the GM's word is law, the tweak is more helpful than the veto. Players move at different speeds, it is possible to start on step four before three is done.
4) Time to start forging the universe. You can build the cluster map one sector at a time using tools like the MapGen Lite web toy on VirMin.com or you can fire up the stand alone Cluster War MapGen program and build the entire cluster with just a few mouse clicks. The stand alone program as some features that the web toy does not. One of those is the ability to change the density of each 'sector'. In the 7x7 grid that is provided, you can edit the probability that a given hex will have a system. Low numbers create sparse sectors while high numbers create rich and dense sectors. You can also use this grid to create custom shapes such as rings, crosses, or disks with thin edges and a richer center. The default cluster that MapGen will create is a disk shape with thin edges and a thicker center. All a beginning GM needs to do is run the program and click on the Make Cluster button. One of the features of this program is the ability to place all map data into individual master files.
5) Next, you need to get the map and starting data out to the players. One of the files that MapGen creates is the master.csv file. This plain text file contains all the hex coordinates and system labels for the whole cluster. Any observatory or radio telescope rig can collect this data since it has been 'broadcasting' for millions of years. Start by double clicking on master.csv. Most computer configurations will automatically load your favorite spreadsheet program and read in this file. What you should see is a plain Jane checker board pattern of hex coordinates with some system labels mixed in. Click on the select all button (the empty cell in the headers above the '1' and to the left of 'A'. From the Edit menu, select copy. Now, open the blank_orders.xls file and click on the Map tab. (If Excel asks you to Enable Macros, please do so. The blank_order.xls has a macro that will automatically color the map for you.) You should see an empty grid of hexagons. Click on cell 'A1' and select Paste Special from the edit menu. The Paste Special wizard should give you an option to paste values only. Select that and continue. This will dump all the values into the existing hexes. To enable auto coloring, go to cell 'BT2' and type in ON. [I place the word AUTOCOLOR in cell 'BT1' to label it, but that is optional.] Every time a cell is selected on the Map sheet, the auto color macro will kick off. If this slows your machine down too much, change the value in cell "BT2' to OFF. Save this file under a different name. I make one copy for each player and a keep a master copy for myself so that I can track the NPRs.
6) You're almost done with the basic setup. You can add the player racial descriptions and starting values to each of their respective sheets. You

still have not placed their colonies and home worlds. There are two approaches to doing this. One technique is the board game style. Just plop the players in the corners and let them fend for themselves. The second approach requires a little research and planning, but it is something that the GM needs to do anyway. What I like to do is identify all the races that have the potential to develop empires and place them on the master map. I then look for 'holes' in the map and place the players in then. By starting the players away from NPRs and each other, it gives them a little time to expand and explore and get a handle on playing the game. Once you know which system the players are starting in, you can assign colonies and adjust STEP codes to make it fit their race.

7) You can stop right here and you have enough to play and referee a game of Cluster War. What I like to do at this point is examine each of the races, maybe fill in some of their culture and ship designs. Many times, interesting patterns will emerge such as two NPRs that would become allies or bitter enemies. Or, perhaps one race will discover something nearby that will make their race unique such as an ancient artifact. I suggest taking the time to write up a racial profile on each NPR and include which worlds are their home, what their base technologies are, where they are likely to establish colonies, etc. Looking at the map can also suggest stories and plot lines to develop. Feel free to borrow ideas from other sci-fi stories, but remember not to overpower the real players of the game. After all, it's their decisions and the consequences of those decisions that should provide the entertainment value. One advantage of spreading out players and NPRs is that the GM has several turns to flesh out races and encounters before the players can reach them.

Running turns in CW is a fairly straight forward process. You need to check out their spending, make any rolls for R&D and intel, and insure that they are not over building at a given yard or factory. From there, you can place new facilities, update fleet locations, and return any scouting or surveying that they have done. Of course, if they run into aliens, artifacts, and other critters, you need to resolve the outcome. I like to use a combination of storytelling, role playing, and TCOM combat, but I tailor that to each player's preferences.

After I have processed the player turns, I run a pseudo turn for the NPRs. I usually do not track each CP spent, but I do chart the growth of empires, the movement of scouts, the trading and research of new technologies, and details such as relationships between each other. This gets back to game focus, I only generate the amount of detail that the player needs plus about 10%. This gives the GM freedom to focus on several areas and the flexibility to keep the game interesting. Keeping an up to date master map is important, the map is the quick and easy way to track fleets, the growth of empires, the locations of specials, etc. For example, the GM can plot the path of scouts and fleets several turns in advance. This can really help the GM to determine when and if two fleets will intercept.

Acknowledgements:

One of my goals is to keep Cluster War and Tactical Command as fresh and up to date as possible. If you have any questions, comments, or feedback, please let me know and I'll strive to help.

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– Todd A. Zircher

Appendix A - Glossary and Technology Definitions

For the most part, these are standard technologies that the players can use. Of course, differing technology bases can change how some of these technologies operate.

Ablative Armor: Ablative armor is a damage resistant material placed on the hull of a starship for absorbing damage. It's fairly bulky and only protects the areas that it covers, but it is cheap. Some bases are built inside of asteroids or partially underground so they can use rock as armor. Armor quality varies in toughness; low values represent materials like biomass or ice, medium values include rock and light weight metals, high values reflect bulky amounts of heavy armor or advanced materials.

Aerospace Fighters: These are lightweight aircraft and should not be confused with space fighters. They are considered air mobile ground forces. As such, the have an attack rating and defense rating rather than a DAT template. They are not capable of leaving a planet's atmosphere although drop-capable aerospace fighters are possible. They can be transported in hanger bays. A flight of light fighters uses one hanger space, a flight of heavy fighters use two hanger bays. Aerospace fighter units require one troop barracks when stationed aboard a ship since they have a significant number of support personnel as well as pilots.

Agricultural Stations: Agricultural Stations generate supply points above and beyond those provided for by being in the supply grid. They are often used in conjunction light industry at remote locations to meet the supply needs for a fleet or base.

Anti-fighter Missiles: These are missiles that trade agility for warhead strength. This gives them a bonus to hit versus gunboats and fighters, but they can not damage starships or shields, if present.

Anti-minefield Missiles: These are missiles with a smaller warhead, improved sensors, and extended combat range (16 hexes.) Their low yield warheads will not harm starship grade components and they can not lock on to moving targets like fighters and gunboats. But, they are well suited to their job of hunting down mines and defense satellites.

Assault Bays: Assault bays hold shuttles, ramships, or other small craft used for boarding party attacks. They increase the number of boarding party attacks a ship can make and improve the safety of the marines attacking an enemy ship that has point defense batteries.

Autonomous Combat Vehicles: Because many races are concerned with sending pilots into battle, ACVs were developed as replacements for fighters. An ACV is treated as any other fighter but does not have a pilot aboard. Cost is as per a normal fighter. Surviving ACVs may be recovered and reused following combat. ACVs require either an AI cockpit component or the installation of additional control spaces on the hosting ship or carrier. Remote controlled ACVs are potentially vulnerable to signal jamming or hostile takeover.

Barracks: Troop barracks are designed to house or transport combat and support personnel attached to a ground combat unit. Each ground unit battalion requires one barracks. Depending on the type of unit, they may also need cargo bays to haul their vehicles and equipment. Each barracks component has an external airlock or sally port for loading and unloading of troops. In boarding combat, this enables a ship to launch one EVA capable combat team.

Bases: Bases are immobile facilities that can range in size from small listening stations to gigantic forts or orbital installations. They can be built in orbit, on the surface of a planet, underwater, or even inside of an asteroid. See section 6.5 for more information.

Base Survey Time: The base survey time for most races is one month (1 turn) for a detailed system survey. One long-range scanner and one survey bay are required before a ship can conduct a survey mission. The use of additional LRS and survey bays can reduce the time required. Survey information can be found in section 14.2.

Battle Computers: A battle computer is a sophisticated fire control system that allows better targeting of enemy ships. Battle computers are system level upgrades and do not take up component space.

Beam Weapons: All beam weapons are rated according to the number of points of damage that each beam emitter is capable of producing (i.e. 1, 2, or 3 pts of damage per component). Most emitters are size-1 components and are paid for "by rating" (i.e., a ship equipped with 5x3-pt beam emitters would cost 5x3 x 3 CPs or 45 CPs) plus the addition of any special effects.

Cargo Bays: Each cargo bay represents an environmentally protected cargo hold. Cargo bays onboard starships are capable of handling 20 CPs worth of material, 20 hull of crated fighters, 20 supply points, or any number of other items adding up to 20 CPs worth of materials. Cargo bays on fighters and gunboats are capable of handling 1/10th of what starship cargo bays can carry.

Cloaking Devices: A cloaking device is a generic term for a component that allows a unit to hide itself via cloaking technology. For electromagnetic and optical cloaking systems this is usually a single component on the DAT. For races with psionic cloaking, this is a specialized version of a crew component designed for the cloaking combat unit and the psionic amplification gear needed to cover the entire ship. The tactical effect of the system is to give starships the 1st strike in combat.

Combat Information Centers (CICs): Combat Information Centers are specialized systems designed for command and control of a taskforce. If a graded officer is present, they can add their command rating to the initiative roll for the whole taskforce. Only the highest ranked commander gets to add their bonus. The ground forces version of a CIC is called a command post.

Communications centers: Comm-centers are devices that allow for extended communication ranges. They are used in conjunction with long range scanners to form nodes in the supply grid. The basic long range comm-center costs 10 CPs. The standard version can only be used while the unit is not in motion. The rules for communications are in section 14.4.

Early Warning Stations: These small bases are not a technology as much as a design goal. The EWS mission is to form a picket line of LRS bases that can detect intruding spacecraft. Advanced EWS designs might employ stealth systems or enhanced passive sensor arrays. Ships can be built to perform the early warning mission, but they are not the most cost effective solution.

Electronic Counter-Measures: ECM is a defensive system designed to make it harder for the enemy to lock its weapons on to your vessel. ECCM is designed to burn though this and is part of the battle computer's bag of tricks. ECM is a size-0 system for starship scaled units. Pod based ECM generators for fighters and gunboats exist.

Energy Torpedo Launchers: Energy torpedoes are heavy hitting alternates to beam weapons. While beams sweep across a target inflicting surface damage, energy torps are designed to dump all their energy into a smaller area and smash their way in. Concentration does have its disadvantages. Narrow targets are more likely to evade an energy torpedo. But, it is most gratifying when a well placed torp kills or cripples a ship.

External Components: This represents of class of small external devices that are attached to the outer hull of any unit. XO racks, docking arms, towing links, and external gun pods are examples of external components.

External Ordinance Racks: XO racks are external components attached to a spacecraft hull that allows it to carry additional ordinance. XO racks normally carry a single missile or anti-ship torpedo. Other items, such as long-range sensor pods, rail gun pods, or single shot beam emitters, can be developed to enhance and extend the functionality and flexibility of starships, gunboats, and fighters without the need of returning to a shipyard for refits.

Factories: These facilities are clusters of light industry components. Their ability to be re-tooled and re-programmed allows them to construct a wide variety goods ranging from androids to missiles to wet navy ships. Each factory costs 40 CPs and has the capability of building 20 hull spaces of fighter scaled equipment per turn.

Fighters: Fighters are the smallest class of regular space vehicle. Basic units are not FTL capable. Due to their limited endurance, they rarely operate far from a base or carrier. See section 6.4 for more info.

Flag Bridges: Flag bridges are specialized systems designed for command and control of a fleet. If a graded officer is present, they can add their strategy rating during a fleet engagement and alter the starting conditions of a battle. Only the highest ranked admiral gets to add their bonus. The surface version of a flag bridge is called a headquarters component.

FTL: This is the standard abbreviation for faster than light drives. The actual means for achieving FTL speed can vary significantly from one campaign to the next. The general rule is that speeds greater than the speed of light are impossible. Most FTL drives get around that rule by using advanced physics and higher dimensions that have different rules concerning space and time.

Ground Forces: These units are used to take and hold colonies, facilities, and occasionally hostile spacecraft in the middle of combat (boarding party combat.) Ground forces can be mechanized units, infantry, power armor, or even aerospace fighters. Ground forces are described in section 6.6. Ground combat is described in section 9.2.

Ground Minefields: These are minefields that can be effectively deployed on planetary surfaces (land, water, or ice.) While minefields are well below zero gen technological standards, they are assumed to have lost practical effectiveness due to increased sensor capabilities. This technology represents a rebirth of surface mine warfare due to better tech such as stealth systems. Minefields are cheap if not mobile defenders and they are usually placed to defend key facilities or create deadly bottle necks at strategic locations. CP cost for an immobile AR 0/8 DR 0/0 stealth unit is 8 CPs per minefield.

Gunboats: Gunboats are large space fighters with larger crews. Most space fighters are 2-5 hull spaces in size while gunboats tend to be between 6 and 10 spaces. FTL gunboats are possible once the required technologies are researched. Gunboats are usually tied to tender facilities such as a ship or base. Gunboats are described in section 6.3. Wet navy patrol ships and attack subs are gunboat sized.

Hangar Bays: Each hangar bay is a size-1 system designed to house, launch, and recover fighters and gunboats. Each starship scaled hangar bay is capable of handling up to 10 hull spaces of fighter or gunboats. Hangar bays on gunboats or fighters would be too small to carry any significant combat craft. The space would be better used for weapon systems or other gear.

Heavy Industry: In CW, the factory is the work horse of the planet side defense industry and shipyard bays assume the role for most heavy construction. The only time heavy industry is needed planet side is for the construction of starship grade ground vehicles and wet navy ships. A heavy industrial plant costs 120 CPs (it has higher power requirements than light industry) and is capable of building 20 hull worth of starship scale components. Unlike factories which must be re-tooled for a specific product line, heavy industry has the same multi-function capability as shipyard bays.

Intruder Defense Systems: This technology allows crew and combat troops to get an AR/DR bonus against boarding party attacks. These systems include anti-personnel gas systems, automated weapons, passageway surveillance, selective decompression, forcefield barriers, along many other possible devices.

Ion Storm Generators : Usually found as an alien booby trap, this weapon system is designed to deny other races the use of their smaller ships, fighters and unshielded gunboats over a very large area of space. The weapon is known to be able to generate up to Force 2 storms and can probably generate larger storms than those so far demonstrated. Other storm types can also be encountered. If one of these devices were detonated near a colony it would mostly likely destroy the colony and significantly degrade the habitability of the planet.

Jump Gate: Another specialized system that incorporates a jump drive into an enormous gateway. The system is able to open a path between two widely separated areas of space and allow passage of ships between those points, even ships that are not equipped with FTL technology. There must be a gate at both ends of the jump route otherwise the trip is strictly one-way (although freighters and construction crews can be sent through a one-way gate to erect another gate at the other end and connect the two). The gate must be constructed to handle a specific size of ship in hull points. Anything larger than this will not be able to use the gate. Cost varies with the size of the base that houses the gateway.

Long-Range Missiles: Simply put, these missiles have a longer range than conventional missiles. When deployed properly, long-range missiles allow a basic first strike effect against enemy units. Only cloaking can negate this effect since you can't shoot what you can't see.

LRS: Also known as scanners, long-range sensor systems are devices which improve detection percentages and reduce survey time requirements. Each LRS is a size-1 system and costs 3 CPs.

LRS Buoys: These systems are bought and deployed as smart mines. Each mine requires a power system, a LRS component, and a mine controller at a minimum. Each buoy detects units as per its LRS capability and sends the detection information back to friendly units.

Magazines: A magazine is a size-1 automated system used to increase the ammunition capacity of a unit's missile launchers or other ammunition based systems. Each magazine costs 1 CP and increases the number of combat rounds of ammunition available to a starship's missile launchers by 100 rounds. Magazines are also an important safety feature in that when a magazine is hit it channels the blast away from the ship. The magazine is destroyed, but the ship will survive. Gunboats and fighters sacrifice this feature, but it is a moot point given that a single point of internal damage will destroy them.

Maglocks: Maglocks are mechanical and magnetic hook and grapnel for attaching objects to a starship (such as a gunboat or cargo pod). Each maglock is an external component with a cost of 1 CP. A starship's towing capacity is a function of a ship's mass and drive ratings. It is covered in more detail in the Tactical Command rules.

Medical Centers: Medical centers are advanced sick bay and surgical facilities. They can perform a number of functions depending on the owning race's medical technology. One hundred twenty medical center hull spaces is equivalent to one planetary medical center. Planetary medical centers increase the CP output of medicine resources by 10%.

Several of the medical center advantages are intangible in nature. Their presence at a friendly colony or on a hospital ship can reduce certain forms of stress that a ship accrues. While CW does not track individual casualties, hospital ships do reduce this number and increase an emperor's approval rating back home.

Mega Tanks: Mega tanks are starship-scale ground vehicles used for planetary combat. Using standard power drives gives these units cost effective mobility. And, if they are equipped with grav drives, mega tanks can be dropped into combat from orbit by special transports. A mega tank can also serve as a transport for ground troops if equipped with barracks, cargo bays, hangers, etc. On garrison duty, a mega tank can serve as a mobile post or HQ, if the appropriate command post or headquarter component is bought.

Mining Stations: Mining stations are CP extraction tools built on bases or ships. They can operate without the benefit of an in-system colony. Mining stations are limited by the max CP rating of a planet. If a player wants more resources, they might decide to resort to strip-mining. See section 7.1 for more information.

Minefields: Minefields consist of a numbers of large or small weapon platforms intended to defend fixed assets such as a colony world, wormhole, or warp point. The majority of minefields will consist of mini-mines (missile sized units with some basic AI.) But, some races make extensive use of larger smart mines. Additional details on minefields are in section 9.3.

Missiles: Missiles are expendable offensive weapon systems which carry warheads. Each missile is a single shot weapon system. Each missile is rated according to the number of damage points its warhead can cause to a target; a player might be able to build missiles which have 1, 2, or 3-pt warheads. Missiles are constructed by factories. Each missile's cost is calculated as 0.1 CPs per 1-pt of warhead strength plus any multipliers for special effects.

Missile Battery: Missile batteries are weapon modules that are towed into combat. They are fired in large volleys with the intent to overwhelm a target's point defense or conduct an orbital attack against heavily defended ground forces. The weapon module is built with minimal control spaces, crew quarters, and power systems. It is not designed to be a functional starship and must be towed into position by another ship that has maglocks or towing links. Weapon modules that survive combat may be recovered and re-armed. Due to the under-powered nature of the weapons platform, energy weapons and rail guns are not useable. A missile battery equipped with mines is using known as a mine laying barge.

Missile Launchers: Missile launchers are offensive weapon systems which fire missiles. Each missile launcher is a size-1 system and the have an internal magazine that holds 10 missiles. Each missile launcher has a rate of fire of 1 missile per combat round per missile launcher. Unless specifically stated, missiles use all aspect guidance systems and have a 360 degree firing arc. Adding a magazine component can increase the number of stored rounds on a ship.

Minelayers: A minelayer is a size-1 system capable of storing, deploying, and retrieving mines. Each minelayer costs 2 CPs and can lay mines directly to the rear of a ship. Advanced minelayers know as mine launchers (4 CPs) can lob mines to the rear or the left or right flank.

Minesweeper: Mine sweeping gear is the long ranged cousin of the point defense battery. While the PDB is designed for close range high velocity intercepts, the minesweeper attempts to detect and destroy mines out to long range (well beyond the range of most mines.) It is too slow to be used for close in defense work and its low power 'sniper' weapons are too weak to harm an enemy starship.

Point Defense Batteries: PDBs are defensive weapons systems designed to shoot down incoming missiles, repel boarding party attacks, and other point defense work. PDBs are size-1.

Rail guns: Rail guns are weapons that function through the use of high velocity shells that slam into a target and do damage through the release of kinetic energy, much like bullets. Rail guns come in a number of configurations and have the same ammo restrictions as missiles. What rail guns lack for in large firing arcs, they make up for with tougher shells that can not be destroyed by conventional point defense.

Ram Ships: Ramships are small, shuttle-like craft specially designed to penetrate an enemy ship's hull and deliver boarding parties to an unshielded enemy vessel. Ramships and assault shuttles are carried in assault bays. Each assault bay increases the number of possible boarding party attacks possible and also increases their survivability when exposed to hostile point defense batteries.

Repair Bays: Repair bays function in a similar manner to shipyard bays, but are specialized to handle the repair of battle damage to ships. They may not be used for starship construction under normal circumstances (judged by the GM on a case-by-case basis). Each repair bay is a size-1 system with a cost of 3 CPs.

Resistant Armor: Armor made from exotic materials such as neutronium is nearly impervious to attack. But, it is brutally expensive to use everywhere. Many ships only use armored plate to blunt the worst part of an attack.

Resistant Shields: Resistant shield generators are very powerful devices that do not burn out like a normal shield generator. Thus they provide lasting protection until the generator itself is destroyed. These generators are expensive and increase rapidly in cost when multiple layers are used.

Science Stations: Science stations are specialized components designed for scientific research and development. They include labs, computer systems, storage for materials and research projects, as well as specialized scanning gear. Each science station is a size-1 system with a cost of 3 CPs.

Shield Generators: All shield systems are rated according to the amount of damage that they can "absorb" before flaring. Shields are electromagnetic systems which require projectors in order to function. Each shield projector is a size-1 system capable of absorbing a specific amount of damage.

Shield breaker: Shield breaker weapons are designed to disrupt and destroy shields. They inflict double damage versus shields, but are not capable of harming hull components. They are frequently used by raiders so that they can knock down the shields of a target and then send boarding parties across.

Shipyard Bays: Shipyard bays allow for the construction of starship, gunboat, and fighter hulls. Shipyard bays can work together in order to handle many different sizes of hulls (e.g., 20 shipyard bays could be ganged together to handle the construction of a single hull 20 ship, two hull 10 ships, three hull 6 ships, etc.) Each shipyard bay is a size-1 system with a cost of 3 CPs.

Snapshields: Snapshields are small, cheap shield generators that can project a shield that can cover a limited arc. In combat, these snap shields are used up before the main shields are damaged. Snap shields are one of the few shield systems that can be mounted in a fighter once researched.

Spinal Mount Weapons: Sometimes you just need to crush a base like an egg. The most cost effective way to do that is to build a big honking gun and weld a starship to it. Spinal mounts are cheaper than beam weapon arrays or rail gun turrets. Basically, the ship lines up on the target and cuts loose with a long ranged blast from the fixed weapon system. If the base or colony isn't prepared to deal with the big gun, the target can be reduced to rubble at the invader's leisure.

Super Tanks: Super tanks are gunship-scale ground vehicles used for planetary combat. Like mega tanks, using standard power drives gives these units cost effective mobility and they can be equipped with grav drives to make them drop capable. Super tanks are too small to be used as a mobile command post.

Survey Bays: Survey bays are systems that enable a ship to conduct detail surveys of a star system. They include dedicated survey data processors, facilities for landing teams, laboratories for analysis of atmospheric and soil samples, and other geological and life sciences equipment. A survey bay costs 3 CPs. Due to the personnel and vehicle requirements, survey bays can not be installed in fighters and gunboats.

Training Bases: These facilities are used for raising and housing ground forces. One training base can house a number of ground forces equal to its size rating. A size 25 training base costs 125 CPs to construct. The home world of most players is given a single size-50 base on it. Military bases are normally built on habitable worlds with a native population or colonists.

Warp Drive: Warp drive is an alternate FTL drive system. Warp drive functions by generating a bubble of warped space/time around the ship. This bubble allows the ship to slip through normal space at rates which, to an outside observer, appears to be several multiples of the speed of light, but which has no relativistic effects upon the crew or the way they view the rest of the universe.

Wet Naval Forces: These are planetary combat forces for use on water. They are not generally suitable for invasions. Most naval units are gunboat sized ships although starship scales carriers and other units are possible. Wet naval units are described in section 6.6.

Appendix B - Sector and System Generation Tables

The primary tool for creating clusters is the CW_MapGen program. This program can create star systems, sectors, or whole clusters on the fly. It also has options for realistic star systems, using real stellar coordinates, and creating data files for several different star map programs. If you want to roll your own, the following rules and tables can be used to generate star systems.

Generating Clusters and Sectors

Clusters are collections of sectors. The standard map is a 7x7 group of sectors. Most games will have 10 to 15 sectors per player.

An individual sector is a 10x10 grid of hexes. Roll 1d6 for each hex. On a 1 or 2, that hex is occupied. For each occupied hex, roll 1d100 on the following chart to determine its contents.

Roll	Map	Name
01	O	Class O star
02	Ova	Class O variable star
03	Og	Class O giant
04	Osg	Class O super giant
05	Ofl	Class O flare star
06 - 10	B	Class B star
11 - 14	A	Class A star
15	Adw	Class A dwarf
16 - 25	F	Class F star
26 - 40	G	Class G star
41 - 55	K	Class K star
56 - 67	M	Class M star
68 - 69	Mva	Class M variable star
70 - 71	Mg	Class M giant
72 - 73	Msg	Class M super giant
74 - 75	Mfl	Class M flare star
76 - 90	Neb	Nebula
91	Ast	Rogue asteroid field
92	Grv	Gravitic storm
93	Hyp	Hypermass
94	Ion	Ion storm
95	Rad	Radiation storm
96	Mag	Magnetic storm
97	Neu	Neutron star
98 - 99	Wrm	Wormhole
100	Bin	Binary system (re-roll twice)

That's all there really is to making sectors. By changing the default chance of a system you can make for populous or sparse sectors and change the wealth and relative strategic value of a region. You can even create ring-like or globular clusters.

Generating Encounters

Flare stars, variable stars, hyper masses, worm holes, nebulae, and storms do not have planets. They're present because they present opportunities for exploration and some alternate FTL drive techs can only travel from one star system to the next.

Unpopulated systems have a 3% chance of having a deep space special present. The exact nature of the special encounter is usually unknown to the player until they scout the system.

Roll	Result
01 - 05	Alien Scoutship
06 - 10	Derelict Alien Ship/Base
11 - 15	Alien Artifact
16 - 20	Wormhole
21 - 70	Monster
71 - 95	Alien Weapon/Trap
96 - 100	Something Extraordinary

Roll	Alien Scouts, Ships, and Bases
01 - 10	Pre-FTL Culture (2050-2100 CE) *
11 - 60	1st Gen FTL Culture (2100-2200 CE) *
61 - 95	2nd Gen FTL Culture (2200-2300 CE) *
96 - 100	Advanced FTL Culture *

* Roll for tech, attitude, and physiology.

Roll	Alien Artifact
01 - 05	Stasis Module (live Alien) *
06 - 10	Stasis Module (live Monster) +
11 - 15	Stasis Module (Alien Weapon) -
16 - 20	Stasis Module (Cluster Map)
21 - 25	Stasis Module (Sector Survey Data)
26 - 40	Active Alien Weapon -
41 - 60	Abandoned Alien Installation *
61 - 100	Shipwreck with FTL Drive ^

* Roll for tech, attitude, and form. + Roll for space monster.
\- Roll for weapon/trap type. ^ Roll for FTL drive type.

Roll	Wormhole
01 - 75	Other end of wormhole is in this cluster.
76 - 99	Other end leads to a 'bolt hole' system.
100	Other end connects to another cluster.

Roll	Monster
01 - 05	Parasites (25% of crew infected.)
06 - 10	Parasites (50% of crew infected.)
11 - 15	Parasites (75% of crew infected.)
16 - 20	Parasites (100% of crew infected.)
21 - 25	Space Amoeba: 1 creature (75 hull), it can absorb all energy sources.
26 - 30	Space Whale: 3d6 creatures (20 hull), fairly innocuous life forms.
31 - 35	Space Kraken 1 creature (30 hull), has tractor beam or maglock systems.
36 - 40	Star Dragon: 1 creature (40 hull), it's very territorial/aggressive.
41 - 45	Star Dragons: 2 adults (40 hull) and 1d6 youths (20 hull), adults are protective.
46 - 50	Space Sharks: 2d10 creatures (10 hull gunboat), will attack any object.
51 - 55	Space Sharks: 4d10 creatures (10 hull gunboat), will attack any object.
56 - 60	Space Piranha 3d10 creatures (5 hull fighter), will attack any object.
61 - 65	Space Piranha 6d10 creatures (5 hull fighter), will attack any object.
66 - 70	Space Piranha 9d10 creatures (5 hull fighter), will attack any object.
71 - 75	Flesh Eaters: 2d10 militia teams of monsters board the ship and try to devour the crew.
76 - 80	Thought Eaters: 2d10 militia teams of the critters try to feed on the crew. They have a strong offense, but weak defense.
81 - 85	Energy Eaters: 2d10 infantry teams of the creatures board the ship and try to devour the power and drive systems.
86 - 90	Space Pirates: 2d6 space marine combat teams surprise attack. *
91 - 95	Space Pirates: 2d6 light power armor teams surprise attack.*
96 - 100	Space Pirates: 2d6 heavy power armor teams surprise attack. *

* Roll for tech, attitude, and physiology.

Roll	Alien Weapon/Trap
01 - 05	Gravity Storm Generator (fleet encounters a force 1d3-1 Gravitic Storm)
06 - 10	Ion Storm Generator (fleet encounters a force 1d3-1 Ion Storm)
11 - 15	Nuclear Bomb (lead vessel detonates a level 1d4 nuke 95% of the time)
16 - 20	Magnetic Storm Generator (fleet encounters a force 1d3-1 Magnetic Storm)
21 - 25	Computer Siphon (computer core dumped/corrupted; ship dead in space for one week until restored)
26 - 30	Energy Siphon (engines drained/over-loaded; ship dead in space for one week until repaired/recalibrated, mechanical crews are lost 95% of the time)
31 - 40	Alien Defense Platform attacks *
41 - 50	FTL Drive Inhibitor Field (no FTL travel or jump/skip drives within the solar system, this is a natural phenomena)
51 - 55	Neural Inhibitor Field (biological crews are lost 95% of the time)
56 - 65	Hyperspace Missile Battery activates and fires randomly on ships and colonies within 5-10 light years of the base.)
66 - 70	Nova bomb (ship & system destroyed 95% of the time)
71 - 80	Ancient Minefield (ship attacked by large minefield)
81 - 85	Wormhole Generator (nearby ships are flung through a one-way wormhole)
86 - 90	Warp Channel Generator (nearby ships are flung out of the solar system)
91 - 95	Stasis Field Generator (ship and crew frozen in time 95% of the time)
96 - 100	Ancient Machine Planetoid (115 hull), programmed to destroy all life forms)

* Roll for tech, attitude, and physiology.

Something extraordinary can include one or more of the previous deep space encounters or something totally different at the GM's discretion. New items can frequently lead to technological discoveries. They also can represent unique powerful items or creatures than can't be duplicated. In addition to the main encounters tables, some supporting tables are useful for adding more detail.

Roll	Pirate and Space Alien Technology
01 - 10	Pre-FTL Culture (2050-2100 CE)
21 - 60	1st Gen FTL Culture (2100-2200 CE)
61 - 100	2nd Gen FTL Culture (2200-2300 CE)

Roll	**Attitude** (Pirates roll 4d10 + 60)
01 - 02	Total Pacifists
03 - 05	Pacifists
06 - 10	Peaceful
11 - 30	Cautious
31 - 60	Neutral
61 - 80	Belligerent
81 - 90	Hostile
91 - 95	Very Hostile
96 - 98	Xenophobic
97 - 100	Totally Xenophobic

Roll	Alien Physiology
01	Monera/Viral Life form
02 - 03	Protozoan Life form
04 - 05	Fungal Life form
06 - 10	Plant/Vegetable Life form
11 - 30	Invertebrate Life form
31 - 99	Vertebrate Life form
100	Something Strange (energy constructs, crystal beings, mechanized races, etc.)

Roll	FTL Drive Encounters
01 - 10	A derelict ship with a warp drive.
11 - 20	A derelict ship with a hyper drive.
21 - 30	A derelict ship with a jump drive.
31 - 40	A derelict ship with a warp tunnel drive.
41 - 50	A derelict ship with a jump gate drive.
51 - 60	An abandoned jump gate.
61 - 70	A derelict ship with a worm hole drive.
71 - 80	A derelict ship with a well diver drive.
81 - 90	An STL ship with an active stasis field. The crew may still be alive. The trip will appear to be instantaneous to them. *
91 - 100	An STL ship with a temporal compression field. The crew are inside of a time warp that makes the trip appear to last only a few weeks instead of the years. *

* Roll for tech, attitude, and form.

Generating Planets

Planetary systems have a 15% chance of having a special. Roll only once per system. If successful, roll on the following table for the type of planetary or system encounter. Due to the nature of these specials, most of them are only revealed after the system has been surveyed. Industrial era or higher alien civilizations can be detected during scouting.

Roll	Result
01	Alien Scoutship *
02	Derelict Alien Ship/Base *
03 - 05	Alien Artifact ^
06 - 30	Alien Civilization *
31 - 80	Strategic Resource
81 - 90	Monster #
91 - 95	Active Alien Base/Colony *
96 - 99	Alien Weapon/Trap -
100	Something Extraordinary

* Roll for tech, attitude, and physiology.
\+ Roll for the alien artifact table.
\# Roll for space monster.
\- Roll for weapon/trap type.
^ Roll for FTL drive type.

Most of the previous detail tables can be used for planetary system encounters. However there are some new types such as strategic or special resources. Resources appear on the wealthiest/most habitable planet depending on the type of resource.

Roll	Strategic Resources
01 - 05	Abrasive Materials
06 - 10	Acidic Materials
11 - 15	Agricultural Products
16 - 20	Animal Resources
21 - 25	Construction Materials
26 - 30	Heavy Metals
31 - 40	Light Metals
41 - 45	Lubricant Materials
46 - 50	Natural Crystals
51 - 55	Natural Medicines
56 - 60	Petroleum Sources
61 - 65	Radioactive Materials
66 - 70	Semi-precious Gems
71 - 75	Strategic Metals
76 - 100	Special Resources

Roll	Special Resources
01 - 10	Antimatter Sources
11 - 20	Exotic Gasses
21 - 30	Exotic Crystals
31 - 40	Naturally Explosive Materials
41 - 50	Precious Gems
51 - 60	Special Abrasive Materials
61 - 70	Special Acidic Materials
71 - 80	Special Magnetic Materials
81 - 90	Superconducting Materials
91 - 100	Something Unique

For planetary systems, the number of planets present varies with the spectral class of the star.

Class	Range	Die Roll
O	1 - 4	1d4
B	1 - 6	1d6
A	1 - 8	1d8
F	2 - 11	1d10+1
G	5 - 15	2d6+3
K	4 - 13	1d10+3
M	2 - 9	1d8+1

If you do not have the appropriate die, roll the next larger die that you do have and re-roll any results that outside of the number range.

The basic solar system generation system is based on temperature bands. Planets for hotter stars start 'deeper' within the extreme temperature range.

Class	Offset
O	+0
B	+1
A	+2
F	+4
G	+5
K	+6
M	+8

To determine the starting temperature index, roll 1d10 and add the offset. This determines the first planet's base STEP code. For each additional planet, add 1d10+5 to the temperature index and use the indicated value for the planet's starting values.

Index	Starting STEP Code
00-10	Extreme, -X--
11-20	Inferno, -9--
21-25	Hot, -8--
26-30	Hot, -7--
31-35	Desert, -6--
36-40	Normal, -5--
41-45	Freezing, -4--
46-55	Freezing, -3--
56-65	Cold, -2--
66-75	Cold, -1--
76-85	Plutonian, -00-
86+	Oort Cloud, 0000

Roll 2d6-1 for SIZE. Rolls less than 0 are zero and rolls greater than 9 are X's. Size determines the surface gravity and has a direct impact on the environment code. Plutonian worlds and Oort clouds are too cold to have an atmosphere.

Size	Environment Code (roll 1d6)
0	Always vacuum_0
1	**1-4** Vacuum_0, **5-6** Trace_1
2	**1-3** Vacuum_0, **4-6** Trace_1
3	**1-2** Trace_1, **3-4** Trace_2, **5-6** Low_3
4	**1** Trace_2, **2-3** Low_3, **4-5** Low_4, **6** Normal_5
5	**1** Low_4, **2-4** Normal_5, **5** Contaminated_6, **6** Hostile_7
6	**1-2** Normal_5, **3-4** Contaminated_6, **5** Hostile_7, **6** Hostile_8
7	**1** normal_5, **2-3** contaminated_6, **4** hostile_7, **5** hostile_8, **6** violent_9
8	**1** contaminated_6, **2-3** hostile_7, **4-5** hostile_8, **6** violent_9
9	**1** hostile_7, **2** hostile_8, **3-4** violent_9, **5-6** extreme_X
X	**1** hostile_8, **2-3** violent_9, **4-6** extreme_X

The planetary condition code is subject to several rules. Living worlds refer to normal tectonically active planets. Smaller worlds tend to be more inert. Larger terrestrial worlds tend to be overly active. And, gas giants drop back down to more docile ranges at the surface. There are several rules that are applied to determine the condition code.

Size	**Planet Code** (roll 1d6)
0	Always dead_0
1	**1-4** dead_0, **5-6** depleted_1
2	**1-3** dead_0, **4-6** depleted_1
3	**1-2** depleted_1, **3-4** depleted_2, **5-6** barren_3
4	**1** barren_3, **2-4** barren_4, **5** living_5, **6** water_6
5	**1** barren_4, **2-4** living_5, **5** water_6, **6** seismic_7
6	**1-3** living_5, **4** water_6, **5** seismic_7, **6** seismic_8
7	**1** living_5, **2** water_6, **3-4** seismic_7, **5** seismic_8, **6** violent_9
8	**1-2** seismic_7, **3-4** seismic_8, **5** volcanic_9, **6** extreme_X
9	**1-2** seismic_8, **3-4** volcanic_9, **5-6** extreme_X
X	**1** seismic_8, **2-3** volcanic_9, **4-6** extreme_X

Water worlds can only exist at certain temperature ranges. If the temperature is 7 or higher, the code reverts to 5. Water worlds in the desert zone are muggy swamps and shallow seas over their tropical and temperate latitudes. Water worlds at temps of less than 5 are ice worlds. Worlds with a temp of 4 have some liquid water at the equator. All others are solid ice.

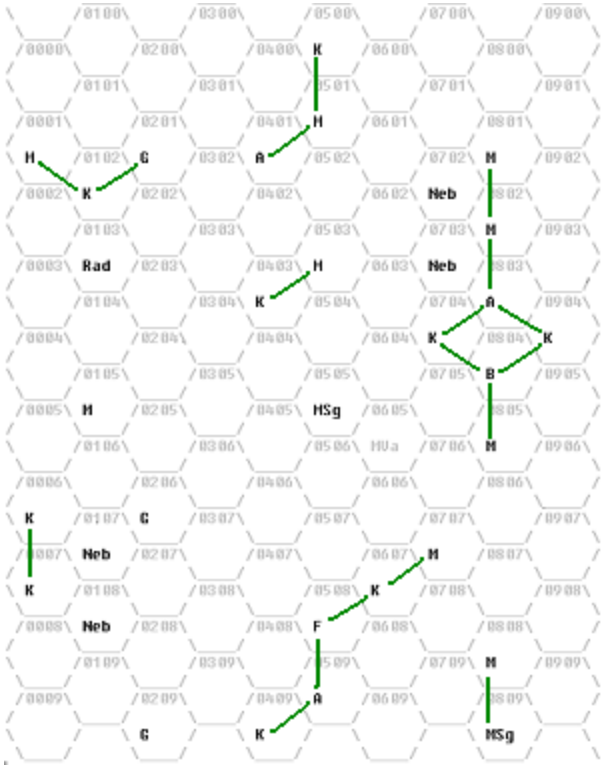
Additionally, some planets can have abundant life in many forms. Hot worlds with an environment and size code of 3-7 have a 33% chance of silicon life. Terrestrial worlds with a temperature of 4-6 and an environment and size code of 4-6 have a 33% chance of having terrestrial life. Outer gas giants with a temperature of freezing or cold have 33% chance of methane based life.

The final step in generating a planet is determining the max CP potential of that planet or asteroid belt. The basis for determining this is by planet size. Moons and asteroids (size 0, 1, and 2) have a max CP of 1d100+50. Gas giants have a max CP of 2d100+50. All other worlds have a default max CP of 3d100+100. Additionally, there are modifiers based on planet condition or temperature (use the worst modifier if both apply.) Dead worlds have their max CP divided by 5, rounding down. Extreme heat and inferno worlds have their max CP divided by 2, rounding down.

Maps for Alternate Drives

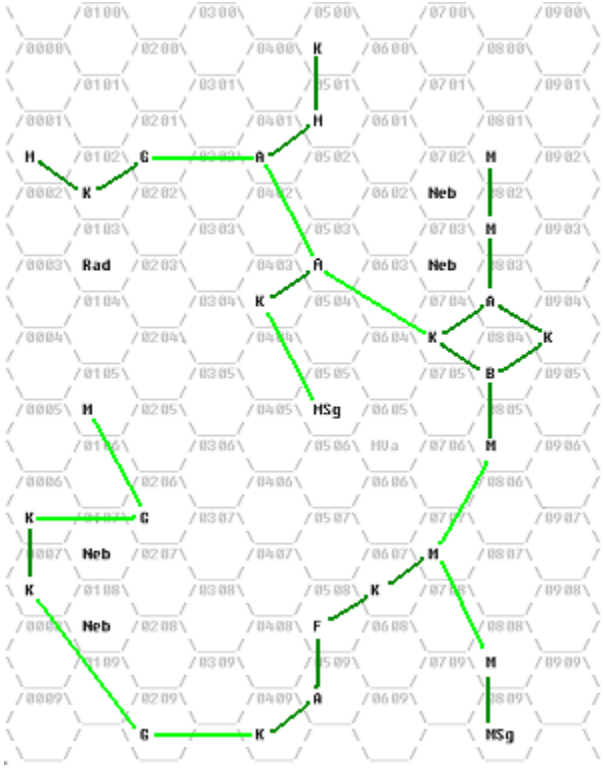
There are other possible drive technologies that are dependent on more than just the location of the star systems. For example, well divers depend on the mass of the star for determining their maximum jump range. And, jump gate users are limited to an artificial network of devices. But, the most common drive that needs additional work by the GM is the super string or warp point drive. While very fast, these ships are limited to using a jump map that connects the stars together.

The first rule of jump map making is that nature takes the path of least resistance. All star systems, that are one hex away from another star system, have at least one jump route. If the stars are part of a cluster of four or more stars, they will form a loop rather than a network of criss-crossing jump lines. Jump lines very rarely cross each other. What you will end up with is a map with insolated stars and small island clusters of stars.



These patterns are connected to other singles and groups that are two or more hexes away. Long jumps are not always present. Roll a 1d6 to determine their appearance. Two hex jumps happen on a roll of 1-4. Three hex jumps happen on a roll of 1-2. And, a four hex jump only happens on a roll of a 1. Four hex jumps tend to be very rare and only happen with very isolated singles or groups. Once a distant group or single is connected to another group or single it usually does not connect to that same group at a different star. Groups can bridge to other groups, but they will not form dense networks of jump lines.

In a similar manner, multiple sectors can be linked together in order to make a cluster jump map.



Appendix C - Travel Time Charts

Don't let all these numbers throw you. Their use is optional. I've included them to show you how I determined the travel times used in section 4.0. Depending on the distance to travel and the drive rating of the ship, there are certain sweet spots where the optimal travel time between acceleration, FTL travel, and deceleration is reached.

Travel times in days for a 1G ship:

PSoL	1 Hex trip	2 Hex Trip	3 Hex trip	4 Hex trip	5 Hex Trip	6 Hex trip
1%	299.14	591.34	883.54	1175.74	1467.94	1760.14
2%	159.99	306.09	452.19	598.29	744.39	890.49
3%	118.23	215.63	313.03	410.43	507.83	605.23
4%	100.83	173.88	246.93	319.98	393.03	466.08
5%	93.16	151.60	210.04	268.48	326.92	385.36
6%	90.37	139.07	187.77	236.47	285.17	333.87
7%	90.35	132.10	173.84	215.58	257.33	299.07
8%	92.08	128.61	165.13	201.66	238.18	274.71
9%	94.97	127.43	159.90	192.37	224.83	257.30
10%	98.66	127.88	157.10	186.32	215.54	244.76
11%	102.95	129.52	156.08	182.64	209.21	235.77
12%	107.68	132.03	156.38	180.73	205.08	229.43
13%	112.75	135.23	157.71	180.19	202.66	225.14
14%	118.09	138.97	159.84	180.71	201.58	222.45
15%	123.65	143.13	162.61	182.09	201.57	221.05
16%	129.37	147.64	165.90	184.16	202.42	220.69
17%	135.24	152.43	169.62	186.81	204.00	221.18
18%	141.23	157.47	173.70	189.93	206.17	222.40
19%	147.32	162.70	178.08	193.46	208.84	224.22
20%	153.50	168.11	182.72	197.33	211.94	226.55

Travel times in days for a 2G ship:

PSoL	1 Hex trip	2 Hex Trip	3 Hex trip	4 Hex trip	5 Hex Trip	6 Hex trip
1%	295.67	587.87	880.07	1172.27	1464.47	1756.67
2%	153.04	299.14	445.24	591.34	737.44	883.54
3%	107.82	205.22	302.62	400.02	497.42	594.82
4%	86.94	159.99	233.04	306.09	379.14	452.19
5%	75.80	134.24	192.68	251.12	309.56	368.00
6%	69.53	118.23	166.93	215.63	264.33	313.03
7%	66.05	107.79	149.53	191.28	233.02	274.76
8%	64.30	100.83	137.35	173.88	210.40	246.93
9%	63.72	96.18	128.65	161.12	193.58	226.05
10%	63.94	93.16	122.38	151.60	180.82	210.04
11%	64.76	91.32	117.89	144.45	171.01	197.58
12%	66.02	90.37	114.72	139.07	163.42	187.77
13%	67.62	90.09	112.57	135.05	157.52	180.00
14%	69.48	90.35	111.23	132.10	152.97	173.84
15%	71.56	91.04	110.52	130.00	149.48	168.96
16%	73.82	92.08	110.34	128.61	146.87	165.13
17%	76.22	93.40	110.59	127.78	144.97	162.16
18%	78.73	94.97	111.20	127.43	143.67	159.90
19%	81.35	96.73	112.11	127.49	142.87	158.25
20%	84.05	98.66	113.27	127.88	142.49	157.10
21%	86.83	100.75	114.66	128.57	142.49	156.40
22%	89.67	102.95	116.23	129.52	142.80	156.08
23%	92.57	105.27	117.97	130.68	143.38	156.09
24%	95.51	107.68	119.86	132.03	144.21	156.38
25%	98.49	110.18	121.87	133.56	145.25	156.93

Travel times in days for a 3G ship:

PSoL	1 Hex trip	2 Hex Trip	3 Hex trip	4 Hex trip	5 Hex Trip	6 Hex trip
1%	294.51	586.71	878.91	1171.11	1463.31	1755.51
2%	150.73	296.83	442.93	589.03	735.13	881.23
3%	104.34	201.74	299.14	396.54	493.94	591.34
4%	82.31	155.36	228.41	301.46	374.51	447.56
5%	70.01	128.45	186.89	245.33	303.77	362.21
6%	62.59	111.29	159.99	208.69	257.39	306.09
7%	57.95	99.69	141.43	183.18	224.92	266.66
8%	55.04	91.57	128.09	164.62	201.14	237.67
9%	53.30	85.77	118.23	150.70	183.17	215.63
10%	52.37	81.59	110.81	140.03	169.25	198.47
11%	52.03	78.59	105.15	131.72	158.28	184.84
12%	52.13	76.48	100.83	125.18	149.53	173.88
13%	52.57	75.05	97.52	120.00	142.48	164.95
14%	53.28	74.15	95.02	115.89	136.76	157.64
15%	54.20	73.68	93.16	112.64	132.12	151.60
16%	55.30	73.56	91.82	110.09	128.35	146.61
17%	56.54	73.73	90.92	108.10	125.29	142.48
18%	57.90	74.13	90.37	106.60	122.83	139.07
19%	59.36	74.74	90.12	105.50	120.88	136.26
20%	60.91	75.52	90.13	104.74	119.35	133.96
21%	62.53	76.44	90.35	104.27	118.18	132.10
22%	64.21	77.49	90.77	104.05	117.34	130.62
23%	65.95	78.65	91.35	104.06	116.76	129.47
24%	67.73	79.91	92.08	104.26	116.43	128.61
25%	69.56	81.25	92.93	104.62	116.31	128.00
26%	71.42	82.66	93.90	105.14	116.38	127.62
27%	73.32	84.14	94.97	105.79	116.61	127.43
28%	75.25	85.69	96.12	106.56	116.99	127.43
29%	77.21	87.28	97.36	107.43	117.51	127.58
30%	79.18	88.92	98.66	108.40	118.14	127.88
31%	81.19	90.61	100.04	109.46	118.89	128.31
32%	83.21	92.34	101.47	110.60	119.73	128.86
33%	85.24	94.10	102.95	111.81	120.66	129.52
34%	87.30	95.89	104.49	113.08	121.67	130.27
35%	89.37	97.72	106.06	114.41	122.76	131.11

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