



The Cluster RPG

a 2d6 open gaming variant

Book 3: Trade, Travel and Worlds

Science Fiction gaming across the ages

Cluster RPG Book 3

Trade, Travel and Worlds

A modified version of the Cepheus Engine SRD

by

Frank Miskevich

Version 1.0.1

Cepheus Engine and Samardan Press are the trademarks of Jason "Flynn" Kemp," and ClusterRPG is not affiliated with Jason "Flynn" Kemp or Samardan Press™.

The Traveller game in all forms is owned by Far Future Enterprises. Copyright 1977-2022 Far Future Enterprises.

Chapter 9- Worlds

Extended World Profile	4
ClusterRPG Extended Profile	5
Star Mapping	6
Universal World Profile (UWP)	
Starports	6
Planet Size	7
Atmosphere	7
Hydrographics	8
Population	9
Government	10
Law Level	12
Tech Level	13
High and Low Gravity Worlds	14
Trade Codes	14
Planetoid Belts	14
Giant Planets	14
Bases	15
Travel Zones	15
Politics and World Allegiance	15
Communications and Trade Routes	16
Planetary Temperatures	16
Habitable Zone	17
Axial Tilt and Seasons	17
Day and Night	18
Simple 2d6 Random System Generation	19
ClusterRPG Random Dice Generation	22

Chapter 10- Off World Travel

Interplanetary Travel	35
Interstellar Travel	35
Jump Travel	36
Starship Operations	37
Starship Expenses	38
Exploration and Mapping	41
Getting There and Back Again	42
Distress Signals	43
Computer and Ship Security	43
Planetary Travel	45
Planetary Laws	45

Chapter 11- Trade and Commerce

Commercial Efficiency	48
Starship Revenue	48
Bulk Cargo	48
Passengers	49
Mail and Packages	50
Charters	50

Speculative Trading	51
Common Trade Goods	52
Trade Goods by Trade Code	52
Random Trade Goods	53

Chapter 12- Environmental Hazards

Acid	56
Carrying Capacity	56
Diseases	57
Extreme Temperatures	57
Falling	57
Poisons	58
Radiation	58
Starvation and Dehydration	59
Suffocation and Vacuum	59
Weather	59

Chapter 13- Wilderness Encounters

Energy	60
Life in the Extremes	61
Wilderness Terrain Types	61
Producers in Terrain Types	62
Animal Encounters	65
Planetary Themes	66
Choose Terrain Type	66
Choose Animal Type and Subtype	67
Choose Animal Skills	67
Choose Animal Size and Characteristics	69
Choose Animal Weapons and Defenses	69
Animal Encounter Tables	71
Animal Reactions	72

Chapter 14- Social Encounters

Social Encounters	73
Scenario Encounters	73
Random Social Encounters	74
Legal Encounters	75
Patron Encounters	75
Rumors	77
Social Attitudes	78

Chapter 15- Space Encounters

Encounter Range	80
Space Encounter Tables	80
Starship Encounters	81

Chapter 16- Refereeing the Game

Rule Zero	82
Gaming Styles	82
Improvisation	83
Recycling Game Material	85
Running the Game	85
That's Not in the Rules!	86
Solo Plas as Referee Prep	86

Chapter 17- Adventures

EPIC System	89
Adventures in Five Acts	91
3-D Campaigns	92

License	93
-------------------------	----

Chapter 9: Worlds

The basic planetary characteristics are typically listed in what is known as the Universal World Profile, or UWP. The 8 key characteristics of the classic world profile are given as pseudo-hex code for Starport, Size, Atmosphere, Hydrology, Population, Government, Law Level, and Technology Level. Additional information such as star type, planets, bases, moons, etc can and should be generated to more fully describe a system. The information is meant to provide a sense of environment for the players and the features are described more fully below.

Note that there are multiple ways of creating settings for play. A relatively quick method (based on the Cepheus Engine rules) is presented first, with a more complicated method (ClusterRPG dice based rules) presented immediately afterward. The most detailed system (ClusterRPG System Generator computer program) has many variables which can be used to modify the setting to optimize it for different gaming styles. It also creates computer generated subsector maps linked to html files that may be read in any compatible web browser. Other people prefer to purchase a commercial setting which usually contain a history as well as many additional details to create a more immersive story. None of the methods are right or wrong, and each has been used to create an enjoyable adventure or campaign. Pick a method and have fun!

The Extended World Profile

The standard 2d6 OGL uses a concise one-line coding to encapsulate data on an individual world in a manner that, with a little practice, can be quickly and easily read. The specifics of the Universal World Profile can be found below:

WorldName 0000 A123456-7 x Ni R 123 Na

The Explanation

“WorldName” indicates the common name for the world that is being profiled.

“0000” provides the location of the world’s hex (column, then row) on the sector or subsector map.

“A123456-7” is the classic UWP world profile. Each number or letter is a pseudo-hexadecimal code representing a specific value on the corresponding world data charts.

“X” indicates where information about a world’s bases are noted. A space here indicates that the world has no bases worthy of note on an interstellar level.

“Ni” is used here to indicate where special remarks and trade codes are displayed as part of the world data profile.

“R” provides information about the world’s Travel Zone classification. A space indicates a world that is generally safe to visit. An “A” represents an Amber Zone, indicating a world that adventurers should approach with more caution than normal. An “R” indicates a Red Zone, a world where travel is prohibited for any of a number of reasons, from physical dangers to political secrecy.

“123” represents a brief synopsis of three pieces of data: a Population Multiplier for the main world, the number of Planetoid Belts in the system, and the number of Gas Giants in the system.

“Na” indicates the system’s interstellar allegiance. “Na” is used for non-aligned worlds

ClusterRPG Extended Profile

The ClusterRPG uses a different extended world profile as shown below. Not every system will necessarily have all of the columns depending upon the Referee's setting. A setting without a large over-government, for example, may not have a membership or relative power level.

#	System name	Loc	prim UWP	Nav	Sco	Con	Aid	Res	Plan	Gia	Ast	Habit	Native	Confed	GDP	Trade
1	Warale	1, 7	A456A91-B	Y	-	Y	Y	-	22	5	4	4	-	Memb	48400	Fl, In, Ri

The Explanation

"#" represents the number of the system in the subsector for indexing purposes.

"System name" indicates the name of the system.

"Loc" provides the location of the world's hex (column, then row) on the subsector map. Subsectors are the basic organizing region used in most 2d6 OGL systems. Each subsector is a 2 dimensional grid of 8 by 10 hexes that may or may not have a stellar body in it. Systems in each subsector are numbered starting in the upper left (0101) corner, going down the page to (010A), then moving to (0201), then down, until (080A) in the lower right of the subsector. Multi-subsector maps may list the subsector location in the first digit.

"prim UWP" is the classic universal world profile. Each number or letter is a pseudo-hexadecimal code representing a specific value on the corresponding world data charts as described elsewhere.

"-" or "Y" indicates where information about a world's bases are noted. 4 types of bases are used: Naval (Nav), Scout (Sco), Consulate (Con), and Explorer's Aid Society (Aid). These refer to bases controlled by an over government or confederation, not necessarily the world itself. Few independent worlds would stay that way without any military forces. Note that many other types of bases such as pirate bases, science outposts, etc may also be present, but many bases (particularly illegal ones such as pirate stations) do not like to advertise their location openly.

"Res" stands for restriction status. "-" means green, or unrestricted, "A" stands for amber, or warning, and "R" represents restricted or interdicted status. This code represents the travel zone status of the system in general. Different worlds may not have the same restrictions, but any amber or red system will likely be hazardous. Amber systems are places where there is likely some danger, such as an unstable government or harsh laws. Red worlds are places where multiple challenges are likely present and should be entered with extreme caution or avoided entirely.

"Plan" describes the number of planets in the system

"Gia" describes the number of giant planets in the system (either gas giants or ice giants). These are useful for refueling ships equipped with fuel scoops.

"Ast" relates the number of asteroid belts found in the system.

"Hab" is the number of planets that are 'habitable' by humans, although habitable may be somewhat broadly defined. Alien races may prefer a system humans consider uninhabitable (if they like a tainted atmosphere and a very cold environment, for example).

"**Native**" refers to any existing alien species. A "Y" denotes the presence of a native intelligent sophont race in this system. Many systems may have extinct races, some with advanced technology. Your referee decides this.

"**Confed**" refers to the system's standing in a larger confederation or over government. "Advis" or advisory worlds are the most powerful systems and usually dominate multiple nearby worlds. "Memb" worlds are reasonably powerful worlds that are active participants in the stellar government. "Obs" are observer worlds which are smaller or less advanced than member worlds but are involved in the stellar association. "Front" or frontier worlds are either very small, low tech, or both. They have little influence in stellar politics.

"**GDP**" is the average GDP of an individual in the system, in credits. More technologically advanced worlds with many resources, planets, and asteroids will be among the wealthiest.

"**Trade**" represents trade codes associated with the system and are described in more detail elsewhere. They are used when identifying and pricing speculative cargos and may be used as gaming aids by the Referee in setting up how systems relate to one another and what the primary cargo are.

Star Mapping

For ClusterRPG settings, the presence of star systems is marked on one or more hex maps where each hex represents one parsec. For each system, the listed Universal World Profile is for the primary world of the system. The smallest astrogation map size, the subsector, measures 8 hexes wide by 10 hexes high and typically have systems in roughly half of all parsecs. There are two intermediate map sizes: the quadrant which measures two subsectors by two subsectors, while a sector measures four subsectors by four subsectors. Domains measure 2 sectors by 2 sectors, or 8 subsectors by 8 subsectors. Star clusters may be any size, but they are characterized by having low densities of stars on the periphery with more central subsectors having higher stellar densities. Settings may be of any size the Referee is willing to construct, but generally a sector is large enough to occupy most gamers for an entire campaign.

There is a basic 50% chance that a world (and its attendant stellar system) will be in a hex. Systematically check each hex on the subsector map, throwing one die and marking the hex with a circle if the result is a 4, 5, or 6. This indicates that a potentially habitable world is present; otherwise, leave the hex blank. The Referee may elect to alter the normal chance of a world being present, making them more frequent or less frequent to correspond to specific regions of the galaxy. A 50% density is appropriate for the spiral arms of the galaxy. Densities at the periphery of a star cluster or galactic arm may be only 1 or 2 in 6; for the central core worlds of a star cluster, 4 or 5 out of 6 may be present. The densest settings, 6 of 6, will have every parsec containing a stellar system and is only found in very dense clusters of stars.

UWP Explained

World Size

The Size characteristic for habitable worlds ranges from 0 to 10 (A), with average diameters given in the table. Similarly the reported surface gravity varies depending upon the actual composition and size of the world in question.

Two other world sizes are used in the ClusterRPG, although they should not be listed as the primary world in a system. Type E worlds are ice giants similar to Uranus and Neptune which are found in frozen distant orbits of a solar system. They have quite a bit of hydrogen that allows them to be skimmed for fuel, but they have more contaminating molecules that make them less efficient skimming targets than gas giants. Type F worlds, or gas

giants, are planets similar to Jupiter which have dense atmospheres consisting mostly of hydrogen and make excellent sources of raw fuel for spacecraft and tend to have many moons in orbit around them.

Table: World Size

Digit	Average World Diameter	Surface Gravity (g's)
0	300 km (very small ~2km to 1000km)	Negligible (typically an asteroid or small moon)
1	1,600 km	0.05
2	3,200 km	0.15
3	4,800 km	0.25
4	6,400 km	0.35
5	8,000 km	0.45
6	9,600 km	0.7
7	11,200 km	0.9
8	12,800 km	1.0
9	14,400 km	1.25
10 (A)	16,000 km	1.4

Atmosphere Types

The atmosphere is a mixture of gasses which surrounds a planet or moon. All planetoids and small moons, along with many large moons, have no atmosphere or only a trace atmosphere. Small planets such as Mars also have a minimal atmosphere. As planets get larger, their atmosphere tends to get denser but the relationship is not direct. Venus has a very dense, corrosive atmosphere despite being somewhat smaller than Earth. Pressure-wise, atmosphere codes 4-9 are breathable; mechanical assistance is required for atmosphere codes 2-3 and 13 where the pressure is either too low or too high for survival. When the temperature of a world is acceptable, a relatively lightweight mask gives sophonts freedom of movement on a planet.

Tainted: Tainted atmospheres contain some element that is harmful to humans, such as an unusually high proportion of carbon dioxide. Filters are simpler mechanical devices which allow normal humans to breathe tainted atmospheres. Technically while there are many types of taint possible, it is usually simpler to treat all taint the same way and allow technology to filter it out. A character who breathes a tainted atmosphere without a filter will suffer 1d6 damage every few minutes (or hours, depending on the level of taint). Note that some races require a tainted atmosphere; when they breathe normal air, they suffer damage as above.

Exotic: An exotic atmosphere is not breathable by humans, but is safe for exposure. A character needs an air supply to breathe in an exotic atmosphere.

Corrosive: Corrosive atmospheres are highly dangerous. A character who breathes in a corrosive atmosphere will suffer 1d6 damage each round. Equipment that is not designed to resist corrosion will degrade slowly by exposure to the atmosphere. Imagine a more extreme version of salt water degrading regular (ie. non-marine grade) plywood, and extrapolate to other materials.

Insidious: An insidious atmosphere is like a corrosive one, but it is so damaging that it attacks even resistant equipment as well. The chief danger in an insidious atmosphere is that the toxic gases will destroy the seals and filters on the character's protective gear. An insidious atmosphere worms its way past protection after 2d6 hours on average, although vigilant maintenance or advanced protective gear can prolong survival times.

Dense, High (D): These worlds have thick N₂/O₂ atmospheres, but their mean surface pressure is too high to support unprotected human life (high pressure nitrogen and oxygen are deadly to humans). However, pressure naturally decreases with increasing altitude, so if there are highlands at the right altitude the pressure may drop enough to support human life. Alternatively, there may not be any topography high enough for humans to inhabit, necessitating floating gravitic or dirigible habitats and may include sealed habitats on the surface. Most space-age breathing apparatuses can easily reduce the pressure to an acceptable level for human breathing.

Table: Atmosphere

Digit	Atmosphere	Pressure	Survival Gear Required
0	None	0.00	Vacc Suit
1	Trace	0.001 to 0.09	Vacc Suit
2	Very Thin, Tainted	0.1 to 0.42	Respirator, Filter
3	Very Thin	0.1 to 0.42	Respirator
4	Thin, Tainted	0.43 to 0.7	Filter
5	Thin	0.43 to 0.7	
6	Standard	0.71–1.49	
7	Standard, Tainted	0.71–1.49	Filter
8	Dense	1.5 to 2.49	
9	Dense, Tainted	1.5 to 2.49	Filter
10 (A)	Exotic	Varies	Air Supply
11 (B)	Corrosive	Varies	Vacc Suit
12 (C)	Insidious	Varies	Vacc Suit
13 (D)	Dense, High	2.5+	Restrictor

Hydrographics

Tiny worlds (ie. size 0 and 1) do not have enough gravity to hold onto water (it would sublimate under freezing vacuum conditions) and therefore they have a hydrographics value of zero. Very low atmospheres (0 or 1) or high atmosphere values (A, B, or C) have less water than typical (-4 DM). A world's Hydrographics value should never exceed 10 (A), nor may it be lower than 0.

Table: Hydrographics

Digit	Hydrographics	Description
0	0%–5%	No surface water
1	6%–15%	Desert world
2	16%–25%	Dry, a few lakes and small seas.
3	26%–35%	Small seas and moving water.
4	36%–45%	common fresh and salt water bodies
5	46%–55%	Large oceans

6	56%–65%	
7	66%–75%	Earth-like world
8	76%–85%	Water world (preferred by aquatic sophonts)
9	86%–95%	Only a few small islands and archipelagos.
10 (A)	96–100%	Almost entirely water.

World Population

The population of a system is the number of sophonts residing in the system full time. Habitable planets will tend to attract the most people for farming if nothing else. A small world with a huge population and adequate technology will need to have people living elsewhere in the system. If a world has a population of 0, it is uninhabited and the world automatically has a Government, Law Level and Technology Level of 0. Systems with hundreds of billions (B) or trillions (C) of sophonts are possible, but feeding that many people is exceptionally challenging. Gigantic population worlds are rare and should only be specifically placed by the referee.

“You can’t have a baby in one month by getting nine women pregnant. “

Wernher Von Braun

Population Modifier

Sometimes it is enough just to know that a world has hundreds of millions of people on it (Population 8). Other times, a Referee or player may want a more specific number. The Population Modifier is multiplied by 10 raised to the power of the Population code to determine a more specific number of people living on the world. For example, if there is a Population Modifier of 4.2 for a world with a Population code of 8, then he knows that 4.2×10^8 (420,000,000) sophonts live in that system.

Table: World Population

Digit	Population Range	Comparison
0	None	0
1	Tens 10+	A hamlet with a few extended families
2	Hundreds 100+	An outpost
3	Thousands 1,000+	A village
4	Tens of thousands 10,000+	A town
5	Hundreds of thousands 100,000+	Small city
6	Millions 1,000,000+	Large city
7	Tens of millions 10,000,000+	Metropolis
8	Hundreds of millions 100,000,000+	
9	Billions 1,000,000,000+	Present day Earth
10 (A)	Tens of billions 10,000,000,000+	

Primary Starport

Many worlds have starports, their presence being essential to interstellar trade and commerce. Each starport class offers different capabilities. The Starport Class Services table provides more specific details. Note that depending upon the population of the system, number of planets settled, etc, there may be multiple spaceports up to the system's best starport. One facility for construction, passenger service, fueling, and cargo while serving a system with tens of billions of sophonts is unlikely.

Table: Starport Class Services

Class	Descriptor	Best Fuel	Annual Maint.	Shipyards Capacity
A	Excellent	Refined	Yes	Can construct starships and non-starships
B	Good	Refined	Yes	Can construct non-starships
C	Routine	Refined	No	Can construct small craft and basic repairs
D	Poor	Unrefined	No	None
E	Frontier	None	No	None
X	None	None	No	-1 DM hazard to landing

System Government

The system government refers to the general mechanism used to manage system affairs within the system. People have developed many systems for regulating activities and interactions among one another, and the listed options cover a broad range of specific types within each class.

None: Worlds without governments may be unpopulated (in which case a government is not needed) or a system where individuals and organizations police themselves. Rules are not directly enforced, but attracting external attention to a world may create a backlash from other denizens to keep outside forces outside. Individual groups (gangs, associations, clans, merchants, etc) protect their families according to their own code.

Table: World Government

Type	Government
0	None
1	Company/Corporation
2	Participatory Democracy
3	Self-Perpetuating Oligarchy
4	Representative Democracy
5	Feudal Technocracy
6	Captive Government
7	Balkanization
8	Civil Service Bureaucracy
9	Impersonal Bureaucracy
10 (A)	Charismatic Dictator
11 (B)	Non-Charismatic Leader
12 (C)	Charismatic Oligarchy
13 (D)	Religious Dictatorship
14 (E)	Religious Autocracy
15 (F)	Totalitarian Oligarchy

Company/Corporation: The 'company town' expanded to encompass the entire system. The company makes the rules, and what is good for the company is obviously the best for the system. Depending upon the nature

of the company, this may be anything from a highly professional research station where workers are well paid and happy to an exploitative farming world where millions live in misery slaving away for 'the man'.

Participatory Democracy: Individuals vote and the vote becomes the rules for the system. Typically a majority (>50%) is enough to make a rule, but it may be based on the total number of sophonts, only those voting on an issue, or it may require a supermajority. The key feature of a participatory democracy is that votes on rules are held directly without any intermediaries.

Self-Perpetuating Oligarchy: Rules come from an elite group which chooses its own successors. This may be based on parentage, skills, or money, but the powerful make the rules and the rest are required to follow them.

Representative Democracy: Sophonts elect representatives who then pass the laws that govern the system. If the populace is not happy with the outcome (whether or not it is their fault), they may elect different representatives during the next election. Various forms of this type of government exist, including parliaments which include the head of state as one of their own, legislatures where heads of states (and/or other offices) are elected separately, or an electoral college system where individuals elect local leaders who then elect a system-wide leader. Various combinations of rules are possible under this broad umbrella.

Feudal Technocracy: Rules are made by individuals with appropriate skills who owe loyalty to those above them. The elites call upon those below to follow their directions and are responsible for making good decisions. Sophonts with essential skills (depending upon the system's tech level) will typically have more influence than those with non-essential skills. The key feature of this type of government is that those who really know and understand the problem and issues are the ones who make the decisions.

Captive Government: An outside force (military, diplomatic, mercantile, illegal, etc) controls the government. It may be openly or indirectly controlled, but the sophonts living under the system do not have a say in what the rules are. The most common captive governments are those that have been conquered militarily or those that have been placed under control for not following an over-government's rules, such as not paying required taxes or not enforcing the laws fairly. Martial law for an 'emergency' would be a form of captive government. This may be a transient type of government until an acceptable government that agrees to follow the rules is chosen.

Balkanization: This term describes a system and/or world that is ruled by multiple parties. This does not mean that the system is necessarily at war with itself, but that there is a significant rivalry and potential for conflict between the two or more groups that command a significant following.

Civil Service Bureaucracy: These governments are primarily run by individuals who follow the rules set out by a society. The society may or may not be elected. The civil servants could be an inherited position, or one which preferences a particular group of 'civil' people. This may be based on expertise (such as a technocracy).

Impersonal Bureaucracy: All individuals are equal and treated equally in the functions of the government. Personal favoritism is highly frowned upon. Fairness and equal application of the laws are important no matter how repressive or limited the rules are.

Charismatic Dictator: This is a dictator who is well liked by the people being ruled. Typically this means that the people are relatively happy and under a fairly benevolent ruler. As long as their needs are being met they see no reason to upset a government that is working well.

Non-Charismatic Dictator: This type of government is not liked by the people. In order to maintain control, the dictator must have some form of suppressing the sophonts and maintaining control. In many cases, key needs of the people are not being met and often the rulers and their subordinates profit much more than commoners.

Charismatic Oligarchy: This is a form of government where the people supports a class of elites and are happy about the relationship. The oligarchs are truly concerned with the sophonts under them, and those ruled are having their basic needs met as much as possible.

Religious Dictatorship: In this form of government, religion is the primary motivator and the central aspect of the government. The religious authorities regulate civic and personal life according to the tenets of the religion. Heretics opposed to the religion are not tolerated.

Religious Autocracy: This form of government is similar to a religious dictatorship, except the power of the religious government derives entirely from a single head of state. Rules may be stringent or lax, the leader may be loved or despised, but the overall power of the leader is unequaled.

Totalitarian Dictatorship: These governments are tightly regulated polities and people are subjugated under the leaders. Control over individuals is high, surveillance of the populace is omnipresent, and dissenters are treated very harshly.

Law Level

Law level refers to the amount of restriction placed upon individual actions based upon the society. While the actual laws cover many areas, one feature characters will often interact with are a society's rules regarding weapons. Note also that laws may differ in their severity depending upon what is being regulated. If there is no law, there will not be anything the government (or lack of it) might do. A very high law system might require all weapons to be peace bonded or kept locked away, but allow slanderous speech or a range of intoxicating chemicals. There are no specific things that MUST be restricted at various law levels, but the law level refers to the overall intrusiveness and abundance of regulations. What is important on one world may be insignificant to another.

Table: Law Level

<u>Digit</u>	<u>Descriptor</u>	<u>Not Allowed</u>
0	No Law	No restrictions; candidate for Amber Zone status
1	Low Law	Poison gas, undetectable weapons, weapons of mass destruction
2	Low Law	Portable fusion or plasma weapons
3	Low Law	Heavy weapons
4	Medium Law	Light assault weapons and submachine guns
5	Medium Law	Personal concealable weapons
6	Medium Law	All firearms except shotguns and stunners; weapons discouraged
7	High Law	Shotguns
8	High Law	All bladed weapons, stunners
9	High Law	Any weapons outside one's residence or ship

Technology Levels

Technology levels are a crude way of estimating what types of weapons, equipment, and scientific understanding will be common on a particular planet. Note that this is the commonly encountered tech level; just because most of the planet is tech level 4 does not mean that someone other than the players hasn't brought an air raft or laser carbine to the planet. In addition there are several related science fiction RPGs which have the same technology appearing at a different tech level (grav engines and fusion power, for example). Referees should feel free to adjust these technologies to their own setting.

TL-0: No technology. Barely sentient or non-sentient life forms. Used mostly for unpopulated systems.

TL-1: Primitive. Iron/Bronze age or earlier culture. Primitive metal tools and a primarily agrarian culture.

TL-2: Primitive. Renaissance culture with the beginnings of urbanization and discovery of basic science principles. Biological principles regulating life functions beginning to be discovered.

TL-3: Early Industrial. Steam power revolutionizes transport while gunpowder revolutionizes warfare.

TL-4: Industrial. Industrial revolution marks mass production in full swing. Railroads make land transportation more efficient. Telegraphs make rapid long distance communication possible. Crude prosthetic limbs become feasible.

TL-5: Industrial. Widespread electrification, radio communication, and internal combustion engines bring people closer together. Hydrocarbons become the dominant fuel source. Antibiotics first appear. Primitive flying machines open up the sky.

TL-6: Post-Industrial. Fission power becomes possible and primitive computers appear. Advanced materials start becoming available. Supersonic jets become feasible, while the first rockets are developed.

TL-7: Pre-Stellar. Rockets can reach local orbit reliably with unmanned probes able to reach other planets in the same system. Computers and primitive robots become common. Initial steps in manipulating organisms begin.

TL-8: Pre-Stellar. Gravitic technology enable planetary travel and exploration of companion star systems. Fusion and solar power make energy greener. Space habitats develop. Medical transplants and functional prosthetics become common.

TL-9: Early Stellar. Jump technology becomes available, opening up other systems for interstellar trade and colonization.

TL-10: Early Stellar. Gengineering and tissue regeneration developed. Orbital habitats are standardized. Interstellar trade leads to economic boom and cultural interchanges.

TL-11: Stellar. Jump-2 technology, meson technology revolutionize warfare again. Meson communicators feature untappable communication technology. Fusion power refined and improved.

TL-12: Stellar. Jump-3 technology improves transportation. Synaptic logic and cyborgs revolutionize robotics and self-motivated robots become more common. Screen technology improves space defenses. Weather control and terraforming become feasible.

TL-13: Stellar. Jump-4 technology. Battle dress makes individual soldiers much deadlier. Plastiflesh improves battlefield injury recovery. Xenotransplantation in adults becomes accessible.

TL-14: High Stellar. Jump-5 technology improves long distance transport efficiency. High synaptic robotics make advanced models difficult to distinguish from flesh people. Bonded Superdense armor becomes available.

TL-15: High Stellar. Currently known maximum. Jump-6 spacecraft. Anagathics extend human lifespan. Black globes provide a new direction for defensive technology. Robots achieve skill level 4 skills, human maximum.

High and Low Gravity Worlds

Worlds where the gravity is 0.6 or less are low-gravity worlds. Common features include improbable-looking rock formations, thin and spindly life forms and flying as a common form of locomotion (assuming the atmosphere is thick enough to support flyers). Humans tend to find life on low-gravity worlds to be initially pleasant, but regular exercise regimes and medicinal supplements are required to prevent bone and muscle degradation. Those who spent too long on low-gravity worlds cannot tolerate higher gravities. Characters on low-gravity worlds suffer a –1 DM to all skill checks until they acclimate, a process which takes 1d6 weeks. Characters with the Zero-G skill at level 0 or better acclimate immediately.

High-gravity worlds have a gravity 1.2 times or more than of Earth. They tend to be large or extremely dense worlds; common features include wide rocky plains, squat, muscular creatures, and plant life that spreads out like lichen instead of growing up. Crawling, burrowing or swimming are common forms of locomotion. Humans often find high-gravity worlds unpleasant. Especially high-gravity worlds may require the use of powered exoskeletons to support the human frame. Characters on high-gravity worlds who are used to normal gravity suffer a –1 DM to all skill checks until they acclimate, a process which takes 1d6 weeks.

Individuals who are acclimated to low gravity worlds who attempt to move directly to a high gravity planet will suffer a -2 DM on all skill checks until they acclimate first to normal gravity, then to high gravity. Some alien species are unable to acclimate to high gravities and always suffer a -2 DM penalty. Sophonts moving from high gravity directly to low gravity or vice versa have a -2 DM penalty. Zero-G skill reduces the penalty when going from high gravity to low gravity by 1 per skill level.

Trade Codes

Trade codes are assigned based on a world's UWP values. These codes affect the price for various commodities when engaging in speculative trading described in Chapter 11. Some worlds are better at producing certain goods than others. Agricultural worlds, for example, are much better at producing crops than vacuum worlds. Therefore taking food items from Ag to Va worlds will typically increase the profit.

Planetoid Belt Presence

Planetoid, or asteroid, belts exist in many systems. They are mined by belters for ice, ore and other interesting things. Planetoids also make excellent hulls for non-jump spacecraft commonly used in system defense. If the primary world of the system is Size 0, then there's at least one planetoid belt in the system automatically.

Giant Planet Presence

A star system may have one or more gas giant planets. The presence of a giant planet allows starships equipped with fuel scoops to refuel by skimming; this eliminates fuel cost for the vessel and increases profit. It also allows refueling at systems that do not have starports. Refueling in this fashion requires 1d6 hours per 40 tons of fuel. Gas giants also typically have a number of large and small moons that range in size from a few kilometers across to moons the size of small planets.

Bases

Stellar systems may have bases for military forces, the navy, the scouts, or for other arms of interstellar government. Bases can help determine political boundaries within a given region of space. An interstellar government will place bases along its borders to guard against aggression from rival states, or to control local systems. The presence of multiple bases within a few parsecs might indicate a contested border, or a mighty stronghold. While other bases may exist, the two primary bases are the Naval Base and the Scout Base.

Naval Base

A naval base is a supply depot, refueling station, repair yard or fortress of the Navy. Naval bases have both starships as well as battalions of marines, intelligence stations, and stockpiles of combat vehicles or weapons. Naval vessels can obtain refined fuel and supplies here. Naval bases tend to have a substantial reserve fleet which can be activated in an emergency, as capital warships take years to produce.

Scout Base

A scout base or outpost offers refined fuel and supplies to scout ships. Scout bases are typically much smaller than naval bases and less heavily defended. Scouts bases are also known for trading favors with reliable crews, particularly if they have connections to the Scout service. While they have full resupply capability and substantial weapons, they also have legal, research, scientific, communications, and other resources which are used for many purposes. Scout bases tend to be more open to outsiders than naval bases.

Pirate Base

A pirate base serves as a haven for interstellar pirates. Note that most pirate bases are secret, otherwise the navy would come in and vaporize it. While the base might have a reputation among pirates, other ships looking for them may be less than welcome. Other bases will help pirates clandestinely while maintaining a legal front for official business.

Travel Zones

Most worlds are assumed to be civilized, or at least amenable to adventurers and other visitors. Some, however, are caught in the throes of war, plagued by disease, or simply not ready for interstellar visitors. Such worlds are classified by travel zones to denote such status. In most cases, the Referee should indicate travel zones based on the information available. Two such zone types exist: amber and red.

Amber Zone

An Amber world has been deemed dangerous, and travelers are warned to be on their guard. Amber worlds are often undergoing upheaval or revolution, or else are naturally hazardous environments. While dangerous, rewards are often commensurate with the risk involved.

Red Zone

Red worlds are interdicted and travel to them is forbidden or strongly discouraged. Interdictions are enforced by the Navy. Red zones can indicate that the world is too dangerous to allow visitors. The Referee assigns Red worlds at their discretion.

Polities and World Allegiance

Worlds may be independent, or part of a larger polity that spans a system or more. Polities range from loose confederations of a few worlds with common trade or defense policies or cultural links, to vast star empires containing thousands of systems and trillions of citizens. Note that allegiance and influence, while related, may be different things. Influence is related to proximity (how many parsecs away), similarities in government type,

and similarity in law levels. Worlds more similar in politics and beliefs will have more influence with each other than a similar sized world with fewer commonalities.

Communications Routes and Trade Routes

Within a subsector, governments will have established communications and trade routes connecting some (but not all) worlds. Messages between businesses, governments and people generally follow these routes. Communications routes should be carefully drawn so as to avoid making all parts of the subsector accessible; a subsector should have some areas as backwaters for exploration and adventure. Communications routes are drawn as single lines connecting hexes on the subsector grid.

Planetary Temperatures

Planetary temperature is probably the biggest missing feature from the universal world profile (UWP) used throughout 2d6 and derived gaming systems. Part of the challenge is that on many worlds only part of the surface might be what humans consider habitable. First, identifying the average temperature of the world is key. Average temperatures may be divided into a series of 9 bands, the coldest and hottest of which are considered uninhabitable by humans. The temperature bands are given on the table below.

On Earth, the average temperature is 14.6 °C (and rising!) at sea level. This puts our average temperature solidly in the temperate range. Note that there is no probability associated with each temperature. This is intentional, as the average planetary temperature is mostly determined by how close the world is to its star. The closest worlds are boiling hot, the distant worlds are freezing cold, and the habitable zone goes from roasting near the star(s) to very cold at the outer edge of the habitable zone. Note also that habitable worlds include those with average temperatures below the freezing point of water. This accounts for 1) equatorial regions being warmer than the poles; and 2) that fact that water with ions or other chemicals in it may freeze at temperatures lower than 0 °C. Seawater on Earth, for example, freezes at about -2 °C.

band	temperature
frozen	less than -20 °C
very cold	-19 to -10 °C
cold	-9 to 0 °C
cool	1 to 10 °C
temperate	11 to 20 °C
warm	21 to 30 °C
hot	31 to 40 °C
roasting	41 to 50 °C
boiling	greater than 50 °C

Altitude Effects on Temperature

As the altitude increases, temperatures decrease. Temperature drops between 6-10 °C per 1000 meters elevation depending upon humidity, or roughly 8 °C per 1000 meters. A simple estimate would be the temperature drops 1 temperature band (10 °C) per 1200 to 1500 meter rise.

Habitable Zone

All life on Earth requires liquid water. The habitable zone around a star is basically where liquid water is capable of existing. Worlds too close to a star are too hot, while distant planets are too cold; the goldilocks zone is

where the temperature is just right. Models predicting how large this zone is vary somewhat dramatically, and as of yet there are no good actual extrasolar systems to compare models against.

For game purposes, habitable planets may be as common or as rare as a referee likes. Given the number of extrasolar planets already found and how their variety has changed the study of planetary formation and planetary dynamics, it is easy to pick and choose parts of the actual science which make the game fun. It is still science *fiction*. However, based on the life cycle of stellar evolution it is most likely (maybe even required) that habitable planets circle what are known as main sequence stars which exist for enough millions of years that life can evolve. The 4 major types of main sequence stars which likely host habitable planets are listed below.

Red dwarfs (type M) are the smallest and coolest stars which have planets and which may support life. Because they are small and cool, planets must orbit them rather closely to be within the habitable zone. How close? The answer depends upon the habitable zone model used. Their planetary year (the time it takes to complete one orbit around the star) will be much shorter than an Earth year, though.

Orange stars (also called orange dwarfs or type K stars) are somewhat smaller than our sun and slightly cooler. Habitable orbits will be generally closer, probably smaller orbits than Venus, but Earth likely still fits within the outer range of their habitable zone of these stars.

Yellow dwarfs are type G stars like our sun. Orbits between Venus and Mars (probably including closer in asteroids) can likely potentially support life.

Yellow-white stars (type F, also known as **white stars**) are larger than our sun and correspondingly hotter. The habitable zone around these stars could easily start at Mars or a bit further out since they put out even more energy than our sun.

Note that all of these orbits are *potentially* habitable, not definitely. Planetary bodies may be too small (Ceres), too dense an atmosphere (Venus), too polluted (a future Earth?), too... some combination of things (Mars). There may also be large moons circling gas giants within the habitable zone of a star, so multiple habitable moons might exist in any given orbit. The sheer number and diversity of exoplanets already identified give a referee plenty of opportunity to define how many and where habitable planets might be found.

Axial Tilt and Seasons

In planetary systems which develop from the same rotating gas cloud as stars, planets orbit the star in concentric, nearly circular coplanar orbits known as the ecliptic. Individual planets, however, also rotate around their axis where the period of rotation equals the planetary day. That axis may be nearly perpendicular to the ecliptic (Jupiter at 3 degrees) or very tilted (Uranus at 98 degrees, or rolling on it's side!). The axial tilt causes seasons, where sunlight strikes parts of the planet more or less directly.

Seasonal Length

Seasons depend upon the axial tilt and the orbit of the planet around its primaries. (It also depends upon the ellipticity of the orbit and the approach to the brightest star of a multiple system, but for this treatment it will be assumed to be a circular orbit around a single 'apparent' primary.) Equatorial regions have relatively minor seasonal variation as the sunlight is mostly head-on with minimal atmosphere to pass through. Summer is the time when the tilt of the planet causes an area to receive the most direct sunlight, while in winter a region receives less direct sunlight. When one hemisphere of the planet is in summer, the other is in winter, and then it switches 1/2 an orbit later. The orbital period determines the length of a season, with each of the 4 seasons taking 1/4 of the orbital period. Certain distant planets around bright primaries may be habitable, but the

greater distance can dramatically increase the length of the orbital 'year' and therefore the length of each season.

If a planet's season is longer than Earth's, then naturally the weather will be more extreme during the late middle part of that season. For Earth, Dec 21st is the winter solstice, the shortest day of the year when the least sunlight hits the northern hemisphere. Weather, however, is typically colder in January and February after the solstice because there is a lag while the northern hemisphere cools down. If a season is longer, the lag will still exist but it will have time to fall farther before it starts to warm again. If a star is particularly bright, the habitable zone will be further from the star causing the seasons to be longer than for a smaller star with close-in habitable planets.

Conversely, planets orbiting a small, cool red dwarf star must have a far smaller orbit to fall within the star's habitable zone. Smaller orbits are always shorter, so the seasons are also correspondingly shorter. Temperatures never have the opportunity to fall (or rise) to the same extent, and so seasonal variations would be less extreme for planets closer to their primary.

Days and Nights

The length of a planetary 'day' is determined by the time it takes the planet to make 1 full rotation around its axis. The Earth rotates every 24 hours, but the length of time the sun is in the sky varies quite dramatically depending upon one's latitude and the axial tilt. Organisms living on these worlds must either adapt to the planetary 'day' or be protected from its effects. The more extreme the axial tilt, the more extreme the difference between periods of light and dark during different seasons. Because the tilt of the Earth is 23.5 degrees, areas less than 23.5 degrees away from both poles have periods of light and darkness which exceed the length of a day. For planets with more extreme axial tilts, periods of perpetual light and dark would also be more extreme. A single star will give light to any given part of a planet for 1/2 its rotation, which for Earth would be 12 hours, *on average*. During the short winter days it may never get light at all; that same location will be lit for the entire planetary rotation during the summer.

A planet with multiple stars will receive light from all of them. Depending upon the orientation of the planet to the stars, the length of a 'day' may average more than 1/2 the rotation time. There may well be a part-day when one star is visible and a full-day when both stars of a binary system are in the sky. If one star is much brighter than the other in a binary system, perhaps a Type F yellow-white and a Type M red dwarf, the smaller companion may provide only a small fraction of the total starlight available. Various other combinations (a close companion white dwarf eclipsing an orange star, for example) might actually have a decrease in the average amount of light available at certain times during the day. The phrase 'different as night from day' may not resonate with inhabitants from some systems given the various possibilities. Referees can use the 'days' to make worlds more memorable and emphasize their alien nature at the same time.

Many inner planets and nearly all moons do not rotate freely around their axis. Due to the intense gravitational interactions with their primary, these bodies are in orbital resonance where the rotations around the axis and revolutions around the primary are related by small integer values. Tidally locked means that the time it takes to rotate around its axis is a simple ratio (often 1:1) as the time it takes to revolve around its primary. This is why our moon always shows the same face to the Earth- the moon makes 1 rotation around its axis for every revolution around Earth (about 27.5 days). All large moons (in our solar system, at least) seem to behave the same way.

In terms of the length of the day, inner planets that are tidally locked will have 'day' on the same half of the planet all the time and 'night' on the other half of the planet all the time. One side will be insanely hot, while

the other will be much much colder. If it has an atmosphere, the air on the hot side will rise and cool air from the dark side will rush in, creating massive windstorms near the day/night boundary. Inner planets that are in resonance will revolve slowly on their axis such that they may make 4, 3, 2, 1.5 or 1 rotations around their axis per revolution around the sun. Mercury, for example, is in a 3:2 resonance such that it rotates every approximately 57 days during its 88 day orbit around the sun (1.5 rotations per revolution). This means that one night on Mercury is roughly 4 Earth weeks long! Obviously a 'night watch' might be a bit too much to do straight through.

Because moons are usually tidally locked to their primary, they will have days and nights that are approximately 1/2 of their orbital period each. During some of the day, however, moons will often be eclipsed by their primary and become shrouded in shadow. A close-in moon of a large gas giant could be in complete shadow for hours at a time. Moons farther from their primary will be correspondingly less shadowed but nevertheless have to deal with eclipses on a very regular basis. Habitable moons (larger moons around a gas giant found in the habitable zone, for example), may have to deal with 'days' that are more than a week long!

Moons that formed when the planet developed generally revolve around their primary in the same plane and direction (prograde) as the planet's axial tilt. This means, depending upon the axial tilt of the planet, that it may be outside of the planet's shadow for many of its orbits. The axial tilt of the planet may thus create seasons on its moons similar to those on planets. Moons captured by a planet after its formation may have orbits substantially tilted from the planetary axis and may rotate in a retrograde fashion as well. Their eclipse periods will also vary more than regular prograde orbits.

Simple 2d6 Engine Method for Generating Random Systems

The universe is an amazing place, and almost any combination of conditions can arise. Some days, however, referees only need a new random system to be explored by the players. This is a quick generator designed to give the critical information on a world without any of the details that make a world real. Referees using this method should expect to spend significant time expanding these details if players will be spending considerable time here.

World Size

World Size may be determined by rolling 2d6-2. Note that these sizes are averages, and the actual world size may be somewhat different than suggested by the table.

Atmosphere

A planet's Atmosphere may be generated by rolling 2d6-7 and adding the planet's Size. If a world's Size equals 0, then the world's Atmosphere equals 0. The Atmosphere code should never be higher than 13(D).

Hydrographics

Hydrographic percentage may be obtained by rolling 2d6-7 and adding the world's Size, modified by the world's atmosphere or size. Tiny worlds (size 0 or 1) have a hydrographics of 0. Atmospheres A-C also have a reduced amount of surface water with a -4 DM. A world's Hydrographics value should never exceed 10 (A), nor may it be lower than 0.

Population

A world's Population may be generated by rolling 2d6-2, modified by the world's Size, Atmosphere and Hydrographics as described in the Population DMs table. A world's Population value should never exceed 10 (A)

randomly due to challenges in feeding that many sophonts. Population codes increase by a factor of 10 for each point.

The Population Modifier represents the digit(s) in front of the power of 10. For example, a population of 7 with a modifier of 4.3 would mean 43,000,000 sophonts live in the system. Determine the population modifier by rolling 2d6-2 for each digit desired. If the Population is greater than 0, the minimum Population Modifier value is 1. If the Population code is 0, then the Population Modifier is also 0.

Table: Population DMs

Condition	DM
Size is 2 or less	-1
Atmosphere is A or greater	-2
Atmosphere is 6	+3
Atmosphere is 5 or 8	+1
Hydrographics is 0 and Atmosphere less than 3	-2

Starport

To determine the system's primary starport, roll 2d6-7 and add the world's Population value. Compare the result to the Primary Starport table to determine the starport class for the world.

Table: Primary Starport

Roll	Starport Class
2 or less	X
3	E
4	E
5	D
6	D
7	C
8	C
9	B
10	B
11+	A

Government

The Government characteristic may be determined by rolling 2d6-7 and adding the world's Population. If a world's Population equals 0, then the world's Government equals 0. The Government code should never be higher than 15(F), nor lower than 0.

Law Level

Law level is determined by rolling 2d6-7 and adding the Government characteristic. If the world's Government is 0, then the world's Law Level is also 0. Law Level should never be less than 0.

Tech Level Determination

Roll 1d6 for the base tech level of the system. The following modifiers are used to determine the final average tech level of the system and may not be less than 0. Note that this is the average tech level; wealthy and/or

powerful individuals or visitors from another system may have more advanced technology than is commonly found on the planet.

Starport: 'A': +6 TL; 'B': +4 TL; 'C': +2 TL; 'X': -2 TL

Size: 0-1: +2 TL; 2-4: +1 TL

Atmosphere: 0-3: +1 TL; 10+: +1 TL

Hydrographics: 0: +1 TL; 9: +1 TL; A: +2 TL

Population: 1-5: +1 TL; 9: +1 TL; A: +2 TL; B: +3 TL; C: +4 TL

Government: 0: +1 TL; 5: +1 TL; 7: +2 TL; 13: -2 TL; 14: -2 TL

Certain world conditions must also meet a minimum Technology Level requirement. If the world possesses a lower technology level, then the Referee should increase the world's tech level to the required minimum.

Table: Technology Level Minimums

Conditions	Minimum TL
Hydrographics is 0 or 10(A), Population is at least 6	4
Atmosphere is 4, 7 or 9	5
Atmosphere is 3 or less, or 10(A)-12(C)	7
Atmosphere is 13(D) or Hydrographics is 10(A)	7

Trade Codes

Table: UWP Values for Trade Codes

Classification	Code	Atmo.	Hydro.	Population	Tech
Agricultural	Ag	4-9	4-8	5-7	
Desert	De	2+	0		
Fluid Oceans	Fl	10+	1+		
Garden	Ga	5, 6, 8	4-9	4-8	
High Population	Hi			9+	
High Technology	Ht				12+
Ice-Capped	Ic	0-1	1+		
Industrial	In	0-2, 4, 7, 9	9+		
Low Population	Lo			1-3	
Low Technology	Lt				5-
Non-Agricultural	Na	0-3	0-3	6+	
Non-Industrial	Ni			4-6	
Poor	Po	2-5	0-3		
Rich	Ri	6,8		6-8	
Water World	Wa		10		
Vacuum	Va	0			

These trade codes will affect the type and cost of goods available or desired in the system. Any world which has an included value for all of the listed conditions are given that trade code. For example, if a world has an atmosphere of 4-9, hydrographics of 4-8 and a population of 5-7 it is considered an Agricultural world.

Planetoid Belts

To determine the presence of planetoid belts in a given star system, throw 4+ on 2d6 for at least one planetoid belt to be present in the system. If planetoid belts are present, then the number of planetoid belts in the system is 1d6-3, minimum of 1.

Gas Giants

Giant planets are relatively common. For each system throw 5+ on 2d6 for at least one giant planet to be present in the system. If gas giants are present, then the number of gas giants in the system is 1d6-2, minimum of 1.

Naval Bases

For worlds with Class-A or Class-B starports, throw 8+ on 2d6 for the presence of a naval base in the system.

Scout Bases

If a world does not possess a Class-E or Class-X starport, throw 7+ on 2d6 to determine the presence of a scout base in the system. This roll suffers a DM -1 if the world has a Class-C starport, a DM -2 for a Class-B starport and a DM -3 for a Class-A starport.

Pirate Bases

If a world does not possess a Class-A starport or a naval base, throw 12+ on 2d6 to determine the presence of a pirate base in the system.

Amber Zone

A world with an Atmosphere of 10+, a government of 0, 7 or 10, or a Law Level of 0 or 9+ should be considered for Amber status.

Trade Routes

Trade routes link worlds that have strong commercial ties. Consult the Trade Route Worlds table— if any pair of worlds matching the two columns lay within four parsecs of each other, and there is a Jump-1 or Jump-2 route between them, then mark a trade route connecting those two worlds.

First End Point

Industrial or High Tech
High Population or Rich

Second End Point

Asteroid, Desert, Ice Capped, Non-Industrial
Agricultural, Garden, Water World

ClusterRPG Alternative Dice Based System Generator

While the simple 2d6 system generates one planet and a few key other worlds such as gas giants and asteroid belts, it does not say much about many features. How many planets are in the system? Are there any moons? What kind of star is present? How far apart are planets? Some of this information may not be necessary. System distances, however, are significant if gas giants are to be used as fueling stations. Distant gas giants may be so far away that it may take a week or more just to travel through regular space to reach a settled world.

The ClusterRPG dice based system generator fixes several of these deficiencies. It takes a more solar system oriented approach to developing a setting, and easily fixes things such as star types and other planets. It is less good in that there are many systems with no planets that are easily suitable for sophonts to live on them. It also require substantially more dice rolls than the standard 2d6 rules. Referees should decide which is more important to them and use the parts which appeal to them most. If players will be spending a lot of time in the

system, much more detailed information regarding culture, habitations, cities, etc will need to be produced regardless.

0) Star System

2d6 for number of stars in the system

- 2-7 single star
- 8-10 binary star
- 11-12 trinary star

for each star, roll 2d6

- 2-5 type G yellow star
- 6-8 type M red dwarf star
- 9-11 type K orange star
- 12 type F white star

1) Number of Planets

2d6+2 for the total number of planets and asteroid belts

Inner planets make up ~ 25%, middle planets make up ~ 25%, and outer planets ~50% of the total planets. The order of priority when filling in 'extra' planets goes outer planet, then middle planets. For example, there are 10 planets in our solar system (counting the asteroid belt and Kuiper Belt/ Oort cloud as separate planetoid belts): 2 inner planets, 3 middle planets, 5 outer planets. Note that this distribution of middle planets is designed to give a higher chance for a habitable world than might otherwise be the case. As planets are where sophonts live and sophonts are the core of the game, the intent is to make habitable worlds relatively common. If middle planet frequencies are too low, many systems have no habitable worlds. Referees may prefer lots of 'space' adventures as opposed to planets, and they should feel free to reduce the frequency of middle planets.

2) Planet Types

2a) for each inner planet, roll 2d6

- 2-3 asteroid belt
- 4-7 small world
- 8-9 medium world
- 10+ gas giant

2b) for each middle planet, roll 2d6

- 2-4 asteroid belt
- 5-7 small world
- 8-9 medium world
- 10+ gas giant

2c) for each outer planet, roll 2d6

- 2-4 asteroid belt
- 5-6 small world
- 7-8 medium world
- 9+ gas giant

3) World Sizes

Asteroids belts have nearly unlimited numbers of size 0 planetoids.

3a) Small World Size, roll 2d6

- 2-4 size 4
- 5-6 size 5
- 7-8 size 6
- 9-10 size 7
- 11+ size 4

3b) Medium World Size, roll 2d6

- 2-3 size 6
- 4-5 size 7
- 6-7 size 8
- 8-9 size 9
- 10+ size A

All gas giants are not habitable and cannot be landed upon due to high surface gravity, exceptionally dense atmospheres, and lack of a solid surface. They do, however, make good (hydrogen) gas stations. Bases of some sort on moons around gas giants would be expected in most spacefaring systems. Gas giants are further broken down into true gas giants and 'ice giants'. In our solar system, Neptune and Uranus are considered ice giants because they have a higher proportion of non-hydrogen gasses such as methane, carbon dioxide, nitrogen, etc. They are less efficient for skimming, but there is still plenty of hydrogen available. Ice giants occur 50% of the time a gas giant is rolled when it is an outer world, but they are otherwise identical in terms of size and moons.

Note that gas giants may exist in inner orbits close to the star(s). This is more consistent with exoplanet research over the last several decades where such places known as 'hot Jupiters' have been found. Exact ratios are impossible to determine as larger planets are easier to find, hence the large number of big exoplanets. Are these ratios 'closer to reality'? If you are heading that way, please report back!

3a) Axial tilt

Axis of Rotation Table (2d6)

2d6 roll	description	tilt angle
2-3	minimal tilt	d6-1 degrees
4-5	very small tilt	d6+6 degrees
6-7	small tilt	2d6+10 degrees
8-9	average tilt	3d6+15 degrees
10-11	substantial tilt	4d6+ 20 degrees
12	extreme tilt	8d6+30 degrees

4) Number of Satellites per World

4a) Small World Satellites, roll 2d6

- 2-7 no moons
- 8-11 1-2 small moons
- 12 d6 small moons

4b) Medium World Satellites, roll 2d6

- 2-4 no moons
- 5-7 d3 small moons
- 8-10 d6 small moons AND 1 large moon
- 11+ d6+2 small moons AND 1-2 large moons

4c) Gas Giant Satellites, roll 2d6

- 2-4 2d6 small moons
- 5-6 3d6 small moons AND 1-3 large moon
- 7-8 4d6 small moons AND d6 large moon
- 8-10 5d6 small moons AND d6+2 large moons
- 11+ 6d6 small moons AND d6+4 large moons

small moons

all are size 0

large moons, roll 2d6

- 2-5 size 1
- 6-8 size 2
- 9-10 size 3
- 11+ size 4

Note that this allows the largest moons to be the size of the smallest planets. This is consistent with our solar system. There is some evidence that huge exoplanets may have equally huge moons (as in Neptune sized!), but that makes system design harder. Size 4 moons are possible to be good worlds for humans to live.

5) Atmospheres based on size classes

Size 0-1

none, ever

Size 2-3, roll 2d6

- 2-5 none 0
- 6-7 trace 1
- 8-9 very thin 3
- 10+ very thin, tainted 2

Size 4-5, roll 2d6

- 2-3 trace 1
- 4 very thin, tainted 2
- 5-6 very thin 3
- 7-8 thin 5
- 9 thin, tainted 4
- 10-11 standard 6
- 12 standard, tainted 7

Size 6-7, roll 2d6

- 2-3 thin, tainted 4

4-5	thin 5
6-7	standard 6
8	standard, tainted 7
9-10	dense 8
11	exotic A
12	corrosive B

Size 8-9, roll 2d6

2	thin, tainted 4
3	thin 5
4-5	standard tainted 7
6-7	standard, 6
8-9	dense 8
10	dense, tainted 9
11	exotic A
12	insidious C

Size 10, roll 2d6

2-3	standard, tainted 7
4-5	standard 6
6-7	dense 8
8	dense, high D
9	dense, tainted 9
10	exotic A
11	corrosive B
12	insidious C

6) Temperature and Hydrology

Inner planets are always too hot to be habitable with no liquid or frozen water. Outer planets are always too cold to be habitable. They may have frozen water, but may also have liquid oceans of other molecules such as ammonia or methane. Middle planets and potentially their moons are in the habitable zone (which is larger than scientifically likely, but fits a space travel adventure game) and can have a mixture of frozen and liquid water.

To determine temperatures of middle planets randomly, roll 2d6 and apply all of the appropriate temperature DMs. For a more realistic, if less random, solar system, simply choose hotter worlds closer to the star(s) and colder worlds further away. Once the average temperature is calculated, two different methods are included to further map the average temperatures on the planet based on axial tilt, size of the planet, and density of the atmosphere.

Temperature DMs

- Atmosphere 0 or 1 No modifiers, but temperature swings from roasting to frozen.
- Atmosphere 2 or 3 -2 DM
- Atmosphere 4 or 5 -1 DM
- Atmosphere 6 or 7 +0 DM
- Atmosphere 8 or 9 +1 DM
- Atmosphere A to D +2 DM
- Hot edge of habitable zone +3 DM

Cold edge of habitable zone -3 DM

Temperature Table

roll 2d6 and add the temperature DM's above

<u>roll</u>	<u>temp</u>	<u>degree C</u>
<3	very cold	-19 to -10 °C
3-4	cold	-9 to 0 °C
5-6	cool	1 to 10 °C
7-8	temperate	11 to 20 °C
9-10	warm	21 to 30 °C
11-12	hot	31 to 40 °C
13+	roasting	41 to 50 °C

Temperature is measured in degrees Celsius. Note that these are global average temperatures. Equatorial regions will be much warmer than polar regions, and there will be seasonal adjustments in most cases as well. Thus even on a frozen world there might be a short growing season at the equator.

Hydrology, roll 2d6-2 x10% to get the surface coverage of water (subterranean water possible)

-2 DM for hot worlds, all water found in upper latitudes

-4 DM for roasting worlds, all water at poles

Semi-accurately Calculating Seasonal Temperatures at Different Latitudes

To calculate differences between equatorial and polar temperature averages somewhat accurately, the diameter of the planet gives a reasonable estimation. For every 100km diameter of the planet, average temperatures differ by roughly 0.30°C. For Earth, with a planetary diameter of 12,700 km, this gives a 38.1°C difference between equator and poles which is close to what is actually found. This value must be modified by the density of the planetary atmosphere, where very thin atmospheres have 50% this amount of change, thin atmospheres have 80% this amount of change, standard atmospheres have 100%, while dense atmospheres would be 140% this amount. Note that this is the difference in AVERAGE temperature between the equator and poles, not the seasonal variation.

The average temperature near the equator doesn't really change very much between seasons. Seasonal temperature variances on Earth near the equator are roughly 4 °C, while polar variation is roughly 10 times that. (Warning: degrees latitude and degrees Celsius can be confusing, but I don't choose the vocabulary.) As a quick estimator, divide the Earth into 10 latitude ranges 1-10 starting at the equator, and each latitude range has a broader seasonal variation based upon the degree of axial tilt. For a planet with an axial tilt of 23.5 degrees, the seasonal variation between equator and poles increases by 0.18x for every degree of tilt, or 4.23 degrees Celsius. So for a city on Earth at 30 degrees latitude, the average temperature differs by approximately $4.23 \times (3+1) = 16.92 \approx 17$ °C between summer and winter. if there is no axial tilt, there is no seasonal variation in temperature and only the average temperature differences between the equator and poles come into play.

Using Earth as a model then, the average temperature is 14.6 °C. If the average difference between poles and equator is 38.1 °C, then the equator averages ~33 °C and the poles average -4 °C. Seasonally adjusted, the equator is roughly 31-35 °C, mid latitude variation is $4.23 \times (5) = 21.2$, or 4 °C to 27 °C, and -25 °C to 17 °C near

the poles. Not a perfect simulation but somewhat close to accurate (when you add the fact that Antarctica has a much higher elevation).

So how would this work on a different world? Imagine a planet with a 10 degree axial tilt and a diameter of 15,000km with a dense atmosphere and a cool climate averaging 8°C. Because of the size of the planet and thickness of the atmosphere, there is a fair amount of difference in average temperature between the equator and poles. At 0.3°C per 100 km diameter, this translates to an average 45°C difference between pole and equator. Multiply that by 1.40 for a dense atmosphere to get a whopping 63°C difference. That means the temperature near the poles would be roughly $8-32 = -24^\circ\text{C}$ on average, while being $8+31 = 39^\circ\text{C}$ at the equator. While much of the planet surface is habitable on average, the poles are still frozen and the equatorial regions would be quite hot for humans.

This hypothetical planet, however, only has an axial tilt of 10 degrees which reduces the differences between summer and winter. Seasonal temperatures would vary by 1.8 degrees (10 degrees tilt x 0.18) between winter and summer per 10 degrees of latitude away from the equator. With a 4°C difference at the equator the average equatorial temperatures would be 37-41°C, while polar temperatures would average $1.8 \times (9+1) = 18$ degrees different, or -33 to -11°C. Mid latitudes (45 degrees) would have an average of $1.8 \times (4.5 + 1) = 9.9^\circ\text{C}$, varying between 3-13°C winter to summer.

Temperature Calculations Using Temperature Bands

A spreadsheet or a computer can calculate the 'exact' temperatures very easily, but approximate temperatures are generally good enough as they vary daily based on weather conditions. For a planet like Earth, average temperatures vary between hot at the equator (31-40 °C) and cold at the poles (-9 to 0 °C) at sea level, or roughly +/- 2 range bands from the temperate average based solely on latitude. Small planets (sizes 2-6) would vary less between equator and the pole at +/-1 range band, while large planets (sizes 7-A) vary +/- 2 range bands. Planets with thin and very thin atmospheres have a -1 modifier and dense atmospheres have a +1 modifier to the number of range bands. Note that a small planet with a thin atmosphere could therefore have pretty much similar average temperatures over the entire planet.

Seasonal changes can also be handled based on these range bands. Near the equator there is little to no seasonal temperature variation, with moderate variation in the mid latitudes and high variation between winter and summer at the poles. A moderate axial tilt (20-40 degrees) gives approximately +/-1 range band seasonal variation in the mid latitudes and +/-2 range bands closer to the poles. To account for differences in axial tilt, planets with a low tilt (ie. 0 to 20 degrees) have a -1 band range (only the more polar areas vary significantly winter to summer), average tilt (21-40 degrees) have no modifier, and high tilt planets have +1 band range. A highly tilted planet would then differ +/- 3 range bands winter to summer so that a planet with cool poles might vary between freezing (less than -20 °C) in winter and hot (31-40 °C) in summer.

So how does this fit Earth? Near the equator the average temperature is hot (fits the model) and does not vary much (fits). In the mid latitudes, average temperatures are temperate (fits the model), with winter averages getting into the cool range (close to fitting) and the warm range in summer (close to fitting). At the poles, starting from a cold base it would range from frozen in the winter (fits) to temperate in the summer (close to fitting). Note that there is a continuous change in latitude where the average temperature might be warm, with variations between temperate in winter (fits) and hot in summer (fits), while in the upper middle latitudes it might on average be cool, with winter temperatures averaging into the very cold range (fits) and summer temperatures averaging toward the warm range (close to fitting). All in all a rather reasonable model considering how simple it is.

How about our size A example planet with a dense atmosphere, axial tilt of 10 degrees, and a cool average temperature? As a large planet it has +/- 2 range bands, with an additional band for having a dense atmosphere, giving a maximum of +/- 3 range bands. From a cool base, this would reach hot temperatures near the equator and average frozen near the poles. Because there is less seasonal variation with an axial tilt of only 10 degrees, however, the seasonal temperatures vary less significantly. Upper latitudes only vary by +/- 1 range band, so cool average areas of the planet may reach temperate conditions in the summer and cold temperatures in winter. It would never get above very cold in the polar latitudes.

7) Population

Population refers to the entire system, spread out primarily on habitable planets with appropriate atmospheres and also limited by tech levels. Higher tech levels (8+) spread out system-wide. Space faring systems with adequate resources will protect key areas, particularly inhabited worlds and gas giants for fuel.

Roll 2d6-2

+0.5 DM (round up) per system body with 1) a livable temperature + 2) breathable atmosphere + 3) 10+% water
-2 DM if there are no habitable worlds within the system

0 or less	uninhabited	
1	10's	single small community
2	100's	village
3	1,000's	multiple tiny settlements or one mid-sized one
4	10,000's	small town plus villages
5	100,000's	small city plus
6	1,000,000's	many settlements (max for size 0 world)
7	10,000,000's	large cities plus (max for size 2 world)
8	100,000,000's	metropolis with many other settlements (max for size 4 world)
9	1,000,000,000's	present day Earth (max for size 6 world)
A	10,000,000,000's	arcology developed for maximum density(max for size 7 world)
B	100,000,000,000's	(max for size 8 world)
C	1,000,000,000,000's	world-wide city. Needs tech and/or colonies to survive

adjust population sizes DOWN if there is not enough habitable space in the system, but may be spread out into otherwise uninhabitable areas if TL8+

population of C should be really really RARE; B is a huge number anyway and should also be uncommon!

8) Government Type

government type and number of factions depends on population size

Population 1-3, roll 2d6 twice, once for type and once for factions

2-4	0 none	2-5	0 factions
5-6	1 corporate	6-10	1 faction
7	2 participatory democracy	11+	2 factions
8	A charismatic leader		
9	6 captive government		
10	B non-charismatic dictator		
11+	C charismatic oligarchy		

Population 4-6. roll 2d6 twice, once for type and once for factions

2-3	1 corporate	2-3	0 factions
4	2 participatory democracy	4-5	1 faction
5	5 feudal technocracy	6-7	2 factions
6	3 oligarchy	8-9	3 factions
7	4 republic	10+	4 factions
8	8 civil service bureaucracy		
9	9 impersonal bureaucracy		
10	A charismatic leader		
11	6 captive government		
12	d6 (1-2 B non-charismatic dictator, 3-4 C charismatic oligarchy, 5-6 D religious dictatorship)		

Population 7-9, roll 2d6 twice, once for type and once for factions

2	6 captive government	2-3	1 faction
3-4	5 feudal technocracy	4-5	2 factions
5	9 impersonal bureaucracy	6-7	3 factions
6	8 civil service bureaucracy	8-9	4 factions
7	4 republic	10-11	5 factions
8	3 oligarchy	12	6 factions
9	B non-charismatic dictator		
10	7 balkanized		
11	C charismatic oligarchy		
12	d6 (1-3 A charismatic dictator, 4-6 D religious dictatorship)		

Population A-C, roll 2d6 twice, once for type and once for factions

2-4	5 feudal technocracy	2-3	2 factions
5-6	3 oligarchy	4-5	3 factions
7	4 republic	6-7	4 factions
8	8 civil service bureaucracy	8-9	5 factions
9-10	9 impersonal bureaucracy	10+	6 factions
11	A charismatic leader		
12	d6 (1-2 B non-charismatic dictator, 3-5 C charismatic oligarchy, 6 D religious dictatorship)		

Faction strength, roll 2d6

2-4	obscure- no popular support, often radical
5-7	fringe- few supporters
8-10	minor- some supporters
11-12	notable- significant fraction of the population
13	massive- at least as popular as the government

Note: Balkanized worlds (7) must have at least 1 faction that is massive and which opposes another large faction.

9) Law Level

Gives a quick summary of the overall law level, but individual areas (ie. psionics, weapons, etc) may be 1-2 levels up or down compared to the general trend. Strong factions that would oppose something the government wanted will often help cover up illegal activity or (if there is some kind of representation), reduce

that area of law. Conversely, if a faction opposed something the government allowed, they would increase the law level in that area and/or seek to arrest/investigate the characters.

roll 1d6-1

+1 DM if government type is 5 or 11

+2 DM if government type is 1 or 13

+3 DM if government type is 6 or 7

+1 DM if the number of factions on the planet is greater than 3

if there is no effective government (government type 0) the law level is also 0

<u>Level</u>	<u>Weapons</u>	<u>Drugs</u>	<u>Information</u>	<u>Technology</u>	<u>Travellers</u>	<u>Psionics</u>
0	none	none	none	none	none	none
1	poison gas WMD	addictive and dangerous narcotics	Intellect programs	nanotech, genetic engineering	contact authorities, land anywhere	dangerous talents registered
2	explosives small nukes, high-energy weapons	addictive narcotics, hallucinogens	Agent programs	Alien Tech	contact and passenger manifest; land anywhere	all psionics registered; dangerous talents banned
3	heavy weapons, lasers	combat drugs	Intrusion programs	TL 15 imports registered and licensed	register and land at defined ports	government approved telepaths only
4	light assault weapons, submachine guns	non-native narcotics,	security programs	TL 13 imports registered and licensed	register and land ONLY at starports	teleportation, clairvoyance restricted
5	concealed weapons	anagathics	expert programs	TL 11 imports registered and licensed	offworlders register all business	all psionics only by government
6	discouraged; shotguns and stun only	fast and slow drugs	recent news from offworld	TL9 imports registered and licensed	visits limited; contacts monitored	psionic drugs banned
7	shotguns	all narcotics	library progams and unfiltered data	TL7 imports registered and licensed	citizens locked to planet; visitors to port	all psionics banned
8	bladed weapons	medicinal drugs	information tech, non-approved data	TL5 imports registered and licensed	only imperial agents may land	psionic tech banned
9	all weapons	all drugs	all offworld data	all imports licensed	nobody allowed to land	psionics illegal

10) Starport

Ports of several levels may be available. The highest determines the capacity for the entire system. Distribution of the population will determine how many ports are available, but there may be more than one starport in a system with the most advanced capabilities. If available, one starport per system is Imperial property. Several

Imperial rules are constant across space: Level 0: information; Level 1: weapons, drugs, tech, travellers; Level 3: psionics

roll 2d6, then modify

if there are no habitable planets but still has a population, there must be at least a class C starport

+1 DM per population >5

-1 DM per population <4

with a population B+, they must have a class A starport

uninhabited systems have type X starports

2-3 X (no starport)

4-5 E frontier port- no facilities or repair capabilities

6 D poor port- unrefined fuel only, minimal repair capacity to TL only

7-8 C routine port- unrefined fuel only, small craft construction and repair to TL only

9-11 B good port- refined fuel, starship construction, to TL 500 tons max, repairs available

12+ A excellent port- refined fuel, jump/capital ship construction, all repairs available

11) Tech Level

Temperate, breathable worlds are the ideal and will always be settled first unless there is a compelling reason to settle elsewhere and an appropriate tech level is available. Depending on the atmosphere type, a certain tech level is a required minimum. If there is no habitable, breathable planet, use the lowest tech level for that atmosphere as the absolute minimum.

uninhabited systems have a tech level of zero and no starport (X).

roll d6 then modify as below

+1 DM per habitable planet

+1 DM if population is under 5

+1 DM per population greater than 8

+1 DM if government is 0 or 5 or 8

-2 DM if government is 7, B or D

+3 DM for C type starport

+4 DM for B type starport

+5 DM for A type starport

Tech level absolute maximum is F. Minimum tech levels for various atmospheres are listed below.

atmosphere type	tech level minimum
0 none	8
1 trace	8
2 very thin, tainted	6
3 very thin	6
4 thin, tainted	5
5 thin	1
6 standard	1
7 standard, tainted	5
8 dense	1
9 dense, tainted	5

A exotic	7
B corrosive	9
C insidious	10
D dense, high	5

12) Bases

All bases are in addition to the maximum spaceport rolled above.

Naval

roll 2d6, need 13+ for 1 base in system

- +2 DM for type A starport
- +1 DM for type B starport
- 1 DM for type D starport
- 3 DM for type E or X starport
- +2 DM for being in a border region
- 1 DM per population size less than 6
- +1 DM per population size greater than 6
- 2 DM for no habitable planets in system
- 3 DM if no gas giants present in system
- 2 DM if government greater than 9
- 2 DM if government less than 2

Scout

roll 2d6, need 11+ for 1 base in system

- +2 DM for class C or D starport
- 2 DM for class X starport
- +2 DM for being in a border region
- 1 DM per population size less than 4
- +1 DM for population 6-8
- 1 DM per population size greater than 8
- +1 DM per gas giants present in system

Explorer's Aid Society

roll 2d6, need 10+ for base (will be found on each inhabited world in the system)

- 1 DM per population size less than 6
- +1 DM per population size greater than 8
- +5 DM for class A starport (on world)
- +2 DM for class B starport (on world)
- 4 DM for starport D,E,X in system
- .5 DM per tech level less than 8
- +.5 DM per tech level greater than 9
- 3 DM if no gas giants present in system

Imperial Consulate

roll 2d6, 12+ needed for base maximum of 1 per system

- +4 DM for Class A starport
- +2 DM for Class B starport
- +3 DM for presence of Naval base

- 2 DM for Class C starport
- 6 DM for Class D or lower starport
- +5 DM per tech level greater than 9
- .5 DM per tech level less than 9
- must have population 8 or better

13) Native Aliens

Few species have developed jump drive technology on their own. Those that have are denoted as major races and typically have a system of planets that look to them for protection, trade, and alliances. Typically there will be one dominant major race on a planet, although particular trade locales may have a large range of cooperating species. A dominant minor race may hold sway on their own world but trade with several other major races who are all common in that system. Genetically modified 'native' aliens (often of terran stock) are also common. Most races have similar biochemistries and breathe similar atmospheres.

To identify a sources of sophont life in a system, **roll 2d6 as modified below**, with 10+ meaning a native race is present. No more than 1 living native race is found in any system.

- 3 DM if no world has a breatheable atmosphere
- +1 DM per world that has a breatheable atmosphere
- +1 DM per world that has a habitable temperature
- 2 DM if no world has a habitable temperature
- +1 DM per garden worlds (breathable atmosphere and temperate temperature)

Referee determines the characteristics and numbers of the native aliens present. They may be only a remnant population overwhelmed by non-native species, or they may be the dominant species in the system (or certainly on their home planet). Native-Alien interactions are also at the complete discretion of the referee and may be anything from close allies who will intermarry to kill-or-be-killed violent hatred. Pockets of 'civilization' may be existing on a planet for trade purposes while keeping the 'savages' in check. Native species may also be allies of one (or more) major races and could be found aboard local spaceships or even Imperium starships. If tech level 9 or above, the technology was brought in by outsiders. If a new major race is being put in play, it **MUST** be a referee's choice. For a detailed method for generating alien species, consider purchasing Flynn's Guide to Alien Creation. If many alien species are desired for a setting, using a set of rules designed for 2d6 OGL gaming makes life much simpler.

Chapter 10: Off-World Travel

Characters in science fiction don't live in a single village on a single planet all their lives. Instead, their adventures often take them from a planet-bound existence and out into the stars. They will travel to different worlds, seeking out new, exciting and hopefully profitable activities to pursue. Therefore, it is important to develop an understanding of off-world travel. Off-world travel can take one of two different forms, interplanetary travel through normal space and interstellar travel through Jump space. This chapter explores both forms.

Interplanetary Travel

All ship operations, including interstellar flights, involve some sublight maneuvering. Ships making short interplanetary flights usually accelerate halfway there, then reverse thrust and decelerate the rest of the way. To determine the travel time between two locations, use the formula: $T=2\sqrt{D/A}$ where **T** is time in seconds, **D** is distance in meters, and **A** is acceleration in m/sec^2 . Ships which can accelerate at 4g, will take $1/\sqrt{4}$, or 1/2 the time it takes for a ship with 1g maneuver drives. This common formula assumes a constant mass and reactionless drive system as provided by a gravitic type drive. Low tech rocket drives use unreasonable amounts of fuel per hour and their period of acceleration is very limited.

A number of worlds have surface gravities higher than 1g. For ships equipped with 2g or better maneuver engines, this is not a problem- their engines can provide plenty of thrust and only the normal challenges of landing a spaceship apply. For ships equipped with only a 1g maneuver drive, however, the drive must strain to cope with the planetary gravity well. A 5% tolerance is built into the drive, so a 1g drive can (barely) handle 1.05g surface gravity. Above this, a -1 DM penalty to the piloting roll is assessed per 10% gravity difference. Thus on a planet with a 1.17g surface gravity, a ship with a 1g maneuver drive has a -2 DM penalty to the piloting roll. Aerofins give a +2 DM to piloting rolls in atmospheres. If this additional piloting roll fails, 1 hit is done to the maneuver drives and a second piloting roll is required. (An emergency repair roll by someone else aboard the ship is highly recommended.) Continue rolling until the piloting roll is successful or the maneuver drive fails. If the maneuver drive fails, the ship will suffer a crash landing. Make piloting rolls until a success is obtained, but the ship takes 2d6 random damage from the crash landing per piloting roll attempted (minimum of 1). For ships with 1g maneuver drives, highports on high gravity planets or a 2g+ capable small craft are highly recommended to save wear and tear on the ship.

Travel time between planets in the same system vary, but can often be several days at 1g acceleration. As each planetary orbit is circular, it is rare for 2 planets to be aligned at their closest approach. In order to avoid having to calculate the exact position of the planets, the distance between 2 planets can be approximated by the distance of the farthest planet to the central star. This works reasonably well for planets in roughly circular orbits because the average location of the planet is the center of the circle.

Interstellar Travel

Interstellar flights that do not take years require the use of Jump drives. Jump is also often used for long-distance flights within a solar system, where the real-space transit time would be greater than the 1-week Jump time. A ship can only safely Jump when it is more than one hundred diameters distant from any substantial object such as a moon, asteroid, or planet. Gravity can cause a Jump bubble to collapse prematurely, bringing a ship back into normal space early. To enter Jump, a vessel needs a properly aligned Jump grid, a suitable set of course vectors (called a Jump Plot), and a working and properly fueled Jump drive. The Jump grid allows the Jump field to properly form around the ship and protect it from Jump space. A damaged or misaligned grid can cause a ship to misjump. In the worst-case scenario, a ship with a damaged drive or a distorted grid may be destroyed at entry or breakout.

A Jump Plot is also required. A Jump Plot can be created by a navigator using the ship's computer. In addition, all Class-C and better starports can provide pre-calculated jump plots for any populated world within jump range for Cr500 per parsec distant. Each jump course tape provides the jump plot necessary to perform a jump from one specific world to a specific destination, and they become increasingly less reliable as they get older. Creating a Jump Plot is an Easy (+4) Education-based Navigation skill check taking 10-60 minutes, modified by the Jump distance (thus, a Jump-4 gives a -4 DM to the check). When the ship is ready to Jump, the engineer must properly divert power to the Jump drive. Firing the Jump drive is an Average (+0) Education-based Engineer check taking 10-60 seconds. The Effect of this check aids the Jump Success roll. All normal Jumps take roughly one week (148+6d6 hours) elapsed time, and are subject to random variations in the point of emergence. The older a plot is, the more variance there is in the actual Jump performance. A Jump carries the vessel a number of parsecs equal to the Jump number. Jumps of less than one parsec (less than three light years, or one hex) are possible, and count as Jump-1 for the purposes of navigation and fuel expenditure.

Jump Shadow

Entering jumpspace requires that a ship be at least 100 planetary diameters away from another body. When dealing with stars, however, a 100 diameter jump limit can be substantial. Especially for systems of binary or trinary stars, it is easiest to calculate the jump distance from the center of gravity. For a star the size of Sol with 1 stellar gravity, the 100 diameter limit is 140 million km, or just inside the orbit of the Earth. Jumping anywhere near Mercury or Venus is essentially impossible. For a giant star with 10 times the mass of Sol, that equates to a jump diameter of 1.4 billion km. Many stars have jump shadows large enough that several inner planets will be occluded and may require several days of in system travel to reach using M-Drives. Attempting to jump into a system inside of the jump shadow of a star can easily result in a misjump described below.

Traveling through hyperspace ain't like dusting crops, boy! Without precise calculations we could fly right through a star or bounce too close to a supernova and that'd end your trip real quick, wouldn't it?

*Han Solo
Star Wars, a New Hope*

When a star system has more than 1 star, jumping becomes a bit more complicated. Binary systems may be either close binaries (in which case only the larger of the two stars matter for casting a jump shadow) or distant binaries. With distant binaries, each star may have its own planetary system and may be a separate jump target. Unlike most other systems, distant companion stars are typically reachable using maneuver drives. This may

necessitate a long and tedious voyage in real space, but it may be completed using a TL8 gravitic drive. Pirates particularly appreciate these long transit times, and therefore more cautious captains jump between distant companions despite the increased fuel use.

When jumping out of a system momentum is not conserved and a vessel does not have to be stationary when entering jump space. Because of this, ships may accelerate the whole 100 diameter distance to escape from the jump shadow of a planet. Under these conditions the time it takes to reach the jump limit is given by $T = \sqrt{2D/A}$. This may be as short as 7.5 minutes from a small size 0 planetoid or over an hour from a large giant planet. As always, players must make sure that their jump plots are accurate and that they do not try to enter jumpspace within 100 diameters of any object whether it be moon, planet or star. Upon breakout, a speed of light energy signal is released as a ship enters normal space which may be picked up by system monitoring stations. After a jump, most drives take 24 hours to regenerate, although more expensive, higher tech drives may regenerate in only an hour.

Multi-ship Jumping

Two or more ships may enter jump together if within one ship length of the nearest other vessel, but it does create additional risk. For 2 or 3 ships, there is a -1 penalty on jump success, 4-6 ships the penalty is -2, 7-10

ships -3, etc. The exit point for all ships will be determined by the largest ship (roll randomly if several are the same size). Each ship that fails a piloting roll is doubly penalized in terms of ship damage and personnel effects.

Jump Success Roll

The pilot makes an Edu based Piloting roll taking 10-60 seconds as modified below. Success on the first try gives an accurate jump to the desired location which must be at least 100 diameters from any nearby body. Note that any of the checks above in the task chain may be modified by increasing or decreasing the time interval taken to make the check.

<u>modifier</u>	<u>condition</u>
+ effect	Navigation roll
+ effect	Engineering roll
-1	per month of outdated Jump plot
-2	per Jump drive hit
-2	using unrefined fuel for Jump
-2	using drop tanks
-1	per 10 planetary radii short of 100
-1	per 10% short of the ship's jump drive regeneration time
-n	multi-ship jump penalty -1 per partial sum

Jump Failures and Misjumps

If the piloting roll fails, it is rerolled with all the same modifiers until success is achieved. The more sequential failures, the worse the result for the location as well as the jump's effect on it's crew. For every failed jump piloting roll, each crew member makes an End check and counts the failures. If there are 3 failed rolls, each crew member makes 3 End checks to see how much they suffer upon exiting jump space. Note that many ships that suffer serious misjumps never return, and there are quite a few derelict starships drifting about the endless reaches of deep space. Lost ships are regularly recovered after drifting into inhabited space, and those lucky enough to find such a treasure often profit handsomely. The lost crews, however, are usually quite dead. For ships jumping together, all exit jump space at the same location but ships failing jump rolls count as 2 failures. The jump roll of the largest ship is used to determine where the ships enter normal space.

<u># failed</u>	<u>ship effects</u>	<u>crew effects</u>
1	3d6 million km from desired location	concussion; -1DM for all skills for 1d6 hours
2	100x d6 million km from desired location	severe concussion; -1 for all skills for 1d6 days
3	1-3 parsecs from desired location, 1 random hit	unconscious d6 hours + severe concussion
4	2d6 parsecs from desired location, 1-3 hits	unconscious 6d6 hours + severe concussion
5	10d6 parsecs from desired location, 1-6 hits	2d6 damage, unconscious, + severe concussion
6+	unknown- nobody has ever returned	bad... very bad

Starship Operations

Standard procedures exist to govern how a starship goes about its business and handles emergency situations. Under normal circumstances, a ship will not deviate from these procedures. A captain whose vessel ignores standard operating procedure will usually have to explain himself to a patrol vessel or the local port authority.

Most commercial starships follow a simple schedule, spending one week in Jump space and one week in normal space, taking care of business. Once a ship emerges from Jump space, it travels to the destination world, where passengers disembark, old cargo is unloaded and new cargo replaces it, the crew performs routine ship maintenance and refueling, new passengers come aboard the vessel, and then the starship travels to a Jump point in preparation for entering Jump space and traveling to the ship's next destination. Non-commercial starships typically follow a similar schedule. Without the obligations of passengers or cargo, however, these vessels can choose to travel much faster. The week in-system can be reduced to simply refueling by the quickest means possible and then making the next Jump as soon as their jump drive regenerates.

When a vessel first emerges from Jump space, the first course of action is to scan normal space for potential dangers. Once the commander determines that the vessel is safe, the navigator then determines the ship's location in normal space and plots a course to the ship's destination in-system. The commander may want to skim a local gas giant for free fuel. When the fuel tanks are full, the pilot can then take the ship back out to a Jump point to leave for the next system, or travel to another destination in-system, such as a local world. If the commander wishes to visit a local world, such as the mainworld, the pilot follows a course laid out by the navigator to the destination. After arriving at the world, the pilot achieves orbit and then proceeds to either the orbital starport or surface starport.

Once docked at the starport, the vessel unloads any high passengers, followed by mail, middle passengers, cargo and finally low passengers. The ship refuels, if needed, and renews its life support. If the ship's owner or captain is interested in speculative trading, they then sell off speculative cargo and buy new cargo to replace it, if they find any good deals. In addition, the commander or purser addresses all ship's business, including paying the ship expenses. While on planet, crew members may explore local areas of interest, hire new crew to fill any available positions, and even take on the occasional odd job. When it is time to depart, cargo handlers load all cargo into the vessel. Low passengers are then put into cryoberths. High passengers are then escorted to their staterooms, followed by mid passengers, if any staterooms remain available. Finally, vessels with a mail contract load up on outgoing mail. Income is collected and placed into the ship's accounts. After getting clearance from starport control, the pilot takes the ship into orbit. The navigator then plots a course through normal space to a Jump point. As the pilot takes the vessel to the Jump point, the navigator works out the Jump plot, and then the ship jumps out to its next destination.

This is how the plan goes in theory. Along the way, the vessel may encounter other ships. Gas giants are often used by pirates to attack unsuspecting ships, so more populated systems commonly patrol these areas. Patrol vessels may hail and demand to inspect a ship as it travels to and from the Jump point. Port authorities may perform a customs inspection before allowing a ship to dock at the starport or load cargo. Other ships, civilian and military, commercial and non-commercial, may be traveling in and out of the system along similar vectors. Crew may become embroiled in local trouble intentionally or unintentionally. Rivals or enemies may notice a ship's arrival and make their own plans. Life in space rarely goes according to plan.

Starship Expenses

The primary expenses for a starship are the ship's mortgage or debts, crew salaries, fuel, life support, port fees and routine maintenance.

Mortgage or Debts

If the crew is paying off debts on their spacecraft, then these debts must be paid each month. The standard terms for a ship mortgage are paying 1/240th of the cash price each month for 480 months (40 years). In effect, interest and bank financing cost a simple 120% of the final cost of the ship, and the total financed price equals 220% of the cash purchase price. Ship shares are treated as reducing the cash price of the ship, and so reduce

the monthly cash payments accordingly.

Crew Salaries

All starships and space vessels need a crew of some kind. Small craft like shuttles normally just have a pilot (and sometimes a copilot). Larger ships, and especially those using Jump drive to travel between the stars, need a larger crew. At a minimum, a starship requires a pilot, engineer, navigator, and master, although small starships can get by with only 2 crewmembers who double up on functions. The basic living expenses of crewmembers during their shipboard duties are considered paid out of the ship's life support and maintenance costs. Note that salaries are generalized and can vary depending upon circumstances and special arrangements.

<u>position</u>	<u>salary</u>	<u>minimal</u>	<u>average</u>	<u>full</u>
officer	x1.5	none	1 per 30 crew	1 per 15 crew
pilot	5000	1	2	3+ backups
navigator	4000	1	1	1+backups
engineer (power + drives)	4000	1	1 per 100 tons	1 per 50 tons
sensors/comms	3000	none	1	1 per system
medic	2500	none	1 per sickbay	2 per sickbay
turret gunner	1000	none	1 per turret	1 per turret+ backups
bay gunner	1000	none	2 per bay	3 per bay+ backups
screen operator	1500	none	2 per screen	3 per screen + backups
steward	2000	none	1 per 2 high, 5 passengers	1 per 2 high, 5 passengers
flight crew	1500	none	1 per 3 small craft	1 per 2 small craft
small craft pilot	3000	none	1 per 3 small craft	1 per 2 craft
scientist	2500	none	1 per lab	2 per lab
service crew	1000	none	1 per 20 crew	1 per 10 crew
marine	1000	none	boarding defense	assault troops

Master: A vessel's Master, or Captain, is responsible for the vessel and the safety of everyone aboard. A Merchant who receives the Starship benefit at mustering-out will hold this position. Aboard a small ship, she will usually have another job, such as Pilot or Navigator. The pay due to a ship's Master can vary, but assume 1.5x the salary of highest-paid job he is qualified to do. Many merchant ship owners take a cut of the ship's profits instead of a salary.

Officers: Senior people of various specialties who oversee those below them. All ships require at least 1 'officer' (ie. its master), but larger vessels will have many subdivisions each headed by an officer. For each step up in supervision, multiply their salary by 1.5x.

Pilot: A qualified Pilot to maneuver the ship. A Pilot makes Cr5,000 per month.

Navigator: Someone to create Jump Plots and navigate the ship. On small ships, this job is often doubled up with the Pilot's duties. A Navigator makes Cr4,000 per month.

Engineer: Someone to maintain the ship and operate the drives. Larger ships may need several engineers and technicians to back them up. Engineers makes Cr4,000 per month.

Sensors and Communications: These crew operate key equipment for interacting with the world outside the ship. They pass routine information and specialized details to multiple stations and make Cr3,000 a month.

Medics and Scientists: Ships that carry passengers must have a qualified medic. All vessels should have some form of medical assistance available. A medic makes Cr2,500 a month.

Stewards: While anyone can be assigned to look after the passengers and cook everyone's meals, professional stewards are useful in ensuring the passengers enjoy their trip, and thus that the ship stays in business. Salary is Cr2,000 per month.

Purser: Commercial ships often employ someone to look after the accounts and supplies. This is the purser's job. It is often doubled-up with other duties, particularly steward. A purser is often paid a cut of the ship's profits rather than a salary; a standard salary would be Cr2,000 per month.

Screen Operators, Flight Crew: These people defend the ship or keep small craft prepared to fly at a moment's notice. They make Cr1,500 monthly and may assist engineers in damage repair.

Gunner: Armed ships must employ gunners to operate the weapons. Salary is Cr1,000 per month.

Service Crew, Marines: Some ships employ personnel to carry out these duties. While not essential to the operation of the ship, these people are useful to have around if fighting starts. Salary is Cr1000 per month.

Fuel

Refined fuel may be purchased at any class A, B, or C starport for Cr500 per ton delivered at the starport. If fuel must be ferried out to a ship, add Cr100 per ton to the cost. Refined fuel may also be obtained by running unrefined fuel through a Fuel Purification System installed onboard a ship. Refined fuel decreases the chance of a problem occurring with a ship's power plant, maneuver drive, and Jump drive. Unrefined fuel is available for Cr100 per ton from any class A, B, or C starport delivered at the starport. If unrefined fuel must be ferried out to a ship, add Cr50 per ton to the cost. Unrefined fuel is also available for free from the following sources:

Water: On worlds with a hydrographic rating of 1 or higher, a ship may land near an open body of water or ice and pump fuel into their fuel tanks for free. Using water as fuel in this manner is considered to be running unrefined fuel. Note that many worlds may not allow ships to land and fuel for free, preferring to control the availability of fuel from the starport, thus earning the revenue from the operation.

Giant Planets: Streamlined ships equipped with fuel scoops may dive into the upper atmosphere of a giant planets and fill their tanks with unrefined hydrogen. Larger ships may use streamlined fuel shuttles to ferry fuel loads back to the main ship as needed to refill the tanks. There are no fees associated with 'skimming' a gas giant for fuel, but these are also often the favorite point of attack for pirates. Fuel skimmed from a gas giant is considered to be unrefined. It takes 6 hours to skim up to 20 tons of fuel per fuel processor on the ship, although certain gas sources may have a higher percentage of dangers such as storms, electrical discharge, etc. Ice giants are giant planets that have a higher percentage of material other than hydrogen in their atmospheres, and fuel skimming from these planets is only 1/2 as efficient as gas giants. Errors in skimming a giant planet can cause severe damage to a ship, completely negating the cost benefits entirely. The fuel may be free, but it still has potential costs.

Life Support

Each stateroom on a ship costs Cr2,000 per month, occupied or not. This cost covers supplies for the life support system as well as food and water, although meals at this level will be rather ordinary. Each low passage berth costs Cr100 per month. A spacecraft with power can sustain life support for one person per stateroom for one month comfortably, and for six months at a stretch (number of staterooms × 5,000 person/hours). Without power, this drops to two weeks at most. Additional life support capacity may be installed aboard rescue ships or space stations to support transient visitors. One ton of life support machinery costs 0.5 MCr and will provide 20 passengers or crew with minimal life support for one month at a reduced cost of Cr10,000 per ton. Crew cabins and passenger cabins designed for mid-duration trips cost the same; ie. Cr1000/sophont. Short duration cockpits and cramped cabins require significantly less life support, costing only Cr500/sophont.

Port Fees

It typically costs Cr100 to berth for 6 days in a starport, and Cr100 a day thereafter.

Routine Maintenance

A ship needs maintenance, which costs 0.1% (1/1000th) of the total cost of the ship per year and requires a shipyard. Maintenance should be carried out each month. If maintenance is skipped or skimped on, roll 2d6 each month, with a +DM equal to the number of months skipped. On an 8+, the ship takes damage to a random system. Roll on the System Degradation table for the number of hits. Repair supplies cost Cr10,000/ton.

Table: System Degradation

Roll	Number of Hits
1–3	1
4–5	2
6	3

Exploration and Mapping

Many worlds, particularly lower tech isolated systems just learning about jump drives, will not have access to full information about the systems around them. Similarly, worlds at the edge of explored space are likely to be mostly unknown. For vessels at the fringe of civilization, finding out about the great unknown beyond the established frontier is a regular task.

This does not mean that there will be no information available about stars outside of one's home subsector. Even primitive Earth cultures have looked to the stars in wonder and mapped their locations. By the time a civilization has obtained Jump drives they will certainly be able to identify the types of star in a subsector as well as some information about its planets. Not all planets may be recognized, and asteroid belts are probably unknown, but certainly large close giant planets will be identified as that is within current technology limits. Radio transmissions may also be detected easily.

Getting beyond this basic knowledge, however, requires actually reaching the solar system and visiting the various worlds. Naturally the type of sensors a ship possesses will significantly affect the time and effectiveness of scanning a system. The ability of a starship to

Planetary Information Table	
planetary feature	modifier
mountain range	+4
lights at night	+4
volcano	+2
forest	+2
island chain	+2
river	0
town	0
weather patterns	0
herd of bison	-2
village	-2
wrecked ship	-2
cave complex	-4
huge single creature	-4
shielded base	-4

move, however, makes it relatively easy to produce parallax measurements of a region of space and identify the presence of a planetary body. A complete scan of the system will take 1d6 days using civilian (-2 DM) sensors to give an average chance of spotting any given planet in the system (including asteroid belts). Improved sensors or taking longer to complete the scan increases the likelihood of success per planet, but there is always the chance that a planet, even a large planet, is missed.

Some information is very obvious. If a ship is challenged by radio and has 3 craft vectoring in on its location immediately after jumping in, it's rather obvious there is an intelligent space faring race in the system. Jump points, radio sources, power transmitters, meson sources, etc may all be quickly informative and change the nature of the mission immediately. Other pieces of information may be difficult to obtain even when searching. A scout ship scouring an asteroid field for a suspected pirate base may need weeks to find it's shielded location.

More detailed information about a planet may require entering orbit with or without sample collection. Producing a mostly accurate map of a planet and its moons takes approximately 4d6 hours per size class (with ice giants and gas giants counting as size 12) for civilian sensors. Better sensors improve the process, with survey sensors cutting the time needed by 2 time bands. Note that scanning a planet is independent of travel time to that planet which may be considerable if there are many bodies in the system. Information obtained will vary based on the sensor type as described in the Planetary Information Table. While the survey is taking place from orbit, small craft may be dispatched to collect samples from desired locations on the planet. These should be roleplayed as first contact with unknown life forms and native species are events that can change a system forever. A thorough, detailed scan of an entire system will take weeks if not months to complete.

For colonization purposes, even more detailed information may be necessary. Where are mineral deposits located in the system? How does the climate change over the course of a planetary year? Are there seasonal differences that were not included in the original survey? Are there potentially deadly life forms that escaped initial detection? What type of crops will grow best in the varied soils of the planet? What type of underwater or underground life is present? No matter the planet, more information about particular locations, creatures, or environmental effects may be needed as those details become important. Surveying a system is not a one-and-done event. An ongoing, years-long effort consisting of several different stages is required before a system may be well enough understood to mount a successful colonizing expedition.

There and Back Again

The following topics relate to getting to and from a ship, station or surface. Most crew need to travel between ships, planets and stations on a regular basis, and there are several methods for doing so.

Airlocks

A ship has at least one airlock per 100 tons. Small craft do not come standard with airlocks, but must be purchased as part of the construction process. The average airlock is large enough for three people in vacc suits to pass through at the same time. An airlock takes ten seconds to cycle. Under normal circumstances, airlocks are locked down from the bridge and require a Very Difficult (-4) Engineer (electronics) check to override. An unlocked airlock can be triggered from outside. Airlocks generally have vacc suits, rescue bubbles and cutlasses in a ship's locker nearby. Ships with cargo space have cargo hatches, allowing up to 10% of their cargo to be transferred at any time.

Docking

Two spacecraft may dock if they are close together, both have airlocks and neither ship attempts to resist the docking maneuver. Many airlock designs across charted space are compatible; for incompatible airlocks, ships extend flexible plastic docking tubes that adapt to the target airlock. Docking with another vessel is a Routine

(+2 DM) Pilot task taking 1–6 minutes. If one ship is drifting or unpowered, the difficulty rises to Difficult (–2 DM).

Boarding

Hostile boarding actions are safest when the enemy ship is crippled, in which case it is a standard docking procedure. If the enemy ship is still moving, then the prospective boarders must match the target's velocity and dock with it (a Difficult (–2 DM) Pilot task), or else just land on the hull and either make their way to an airlock or cut through from outside.

Landing

Any ship with a standard or streamlined hull may land on a surface. Unstreamlined ships suffer a –2 DM to any Pilot checks made in atmosphere while a ship with a Distributed hull suffers a –4 DM to any Pilot checks, and is likely to take severe structural damage if it lands. Ships with Aerofins receive a +2 DM bonus to atmospheric piloting rolls. Landing at a starport is a Routine (+2) task for most ships taking 10–60 seconds. Most streamlined ships have landing gear, allowing them to touch down 'in the wild', which requires an Average (+0), Difficult (–2) or even Very Difficult (–4) check, depending on local conditions. Non-distributed ships can also land on bodies of water without sinking. Failing a landing roll means that the ship has landed improperly or even crashed.

Distress Signals

A distress signal indicates that a person or group of people, vessel, small craft, or other vehicle is threatened by grave and imminent danger and requests immediate assistance. The use of distress signals under other circumstances is against most system and interstellar laws; in fact, most jurisdictions have large penalties for false, unwarranted or prank distress signals. Given the vastness of interplanetary space, help is hard to come by. Therefore, most interstellar and interplanetary governments mandate that the commander or master of any vessel that detects a distress signal is legally obligated to either respond and offer assistance plus contact the authorities to report the signal. Some pirates have been known to use false distress signals to lure other vessels into a trap. This behavior has created significant mistrust of distress signals among civilian starship commanders, but interstellar law still requires that assistance be rendered if authorities cannot reach the vessel within a reasonable time period. In the event that the commander of a vessel is unable or unwilling to respond to such a call, they are required by law to officially log their reason for not doing so into the ship's logs and system authorities. Such commanders can be held accountable for their decision, and can pay a fine on some worlds that could exceed Cr1,000,000 (or MCr1), as well as serve time in prison.

Ship Security

The primary goal of a starship's or vessel's security measures is to protect the safety of the ship and crew. Particularly on frontier worlds and lawless backwater planets, starships are at risk to a number of factors, including hijackers, piracy, sabotage, subversion and terrorism. Ship security exists on multiple levels to prevent this from happening. These can be grouped broadly into the categories of physical security and cybersecurity.

Physical Security Systems

Physical security systems for vessels are generally intended to deter potential intruders (e.g. warning signs); detect intrusions and monitor/record intruders (e.g. intruder alarms and internal monitoring); and trigger appropriate incident responses (e.g. by security personnel or the ship's crew in general). Numerous systems have proven useful. Physical barriers such as airlocks act as the outermost layer of security. They serve to prevent, or at least delay, attacks, and also act as a psychological deterrent by making intrusions difficult. Even within the ship, bulkheads and panels can be locked to limit or slow access. The means of authorization for different locking systems is captured in the Restricted Access Security table. It should be noted that the ship's computer can open or close any non-mechanical lock remotely, as well as report on a door's status. Ship

security systems can detect intrusion detection through a variety of means. Cameras, accessible to any authorized personnel, monitor public areas. Internal sensors such as motion detectors in key traffic areas and life support detectors (for unexpected changes in oxygen levels) provide additional methods of detecting intrusion.

Table: Restricted Access Security

Type	TL	means of access	override
Biometrics	8	DNA test, palm print, retinal scan, voiceprint	computer security -4 to +2 DM
Electronic Lock	7	keycard or combination	electronic device -6 to 0 DM
Intelligent Lock	9	granted by vessel's computer	computer security -6 to 0 DM
Mechanical Lock	4	physical key or combination	mechanics -4 to +4 DM

Cybersecurity

The security of a ship's computer is only as good as the Security software installed. All starships come with Security/0, but a cautious ship's owner will invest in more advanced security programs whenever possible. The Cybersecurity Tasks table outlines the difficulties of certain tasks that might be attempted by hijackers and pirates. All tasks require the Computer skill. Each additional level of Security software installed increases the difficulty by 2, so that attempting to grant crew authorization to someone on a Security/2 system will be a very difficult-4 DM task instead of an average one.

Cybersecurity Tasks	
Task	difficulty
access ship records	0 to +4 DM
grant crew authorization	-2 to +2 DM
override key ship systems	-4 to 0 DM
override security systems	-6 to -2 DM
hack into starport system	-4 to +2 DM
track another user online	-2 to +2 DM
alter financial records	-6 DM
place a tracker in a system	-2 to +2 DM
hack a low security system	0 to +4 DM

Security Measures

Security measures on board a starship activate when an intrusion or emergency has been detected. These measures can include internal alarms, artificial gravity control, tranq gas and the venting of atmosphere.

Internal Alarms: If an alarm is tripped (hull breach, fire, door being forced open, alarm button pressed) it will alert the crew. The location of the alarm will be shown on computer displays. The average passenger ship has several crew trained in combat; military ships may carry marines. Some vessels will even have security robots who respond automatically to alarms.

Artificial Gravity Control: It is possible to alter the artificial gravity on board. Reducing gravity to zero will limit actions to the level of a character's Zero-G skill. Gravity can also safely be increased by up to 25% per maneuver drive rating. Thus a maneuver drive-3 could increase gravity to $1+3/4= 1.75g$ for a time.

Tranq Gas: Some ships carry tranq gas canisters in the air vents, which can be released automatically. These flood a compartment with gas that forces an Endurance check each round, with a -1 DM per previous check. Any character who fails the Endurance check is knocked unconscious. Sophonts with vacc suits, respirators, antidote or even a common filter mask will be unaffected.

Venting Atmosphere: If a compartment is connected to an airlock, then the air can be vented from that area. Characters in that area must make a Strength check to hang on and will also begin to suffocate. Internal doors

on a ship are airtight, so portions of the ship can be selectively vented, dependent on the ship's floor plan and the relative positions of airlocks. Soponts with their own air supply will not be affected by suffocation.

Computer Hacking

Information is power, and in almost every technological society information is stored digitally. To obtain information from a computer system where a sophont has permission is easy- simply ask for it. To access information that is not generally available or is highly secret is usually much more difficult. The computer-security skill is used to protect or hack systems or networks. Based on the specifics of the information desired or the difficulty of the intended effect, a variety of factors come into play.

Computer security comprises a number of different levels. First, having a valid account on a system makes it easier to access any information on it, giving a +2 DM. Stolen credentials give a +1 DM unless they have direct access to the desired information (see above). Attacking a system locally from a normal host is also easier than coming in from an external network, giving an additional +1. Furthermore, using a more advanced computer makes hacking easier, giving a +/- 1 DM per model number difference. Cyborgs and datajack augments also facilitate hacking, each giving +1 DM.

Software used will also make things more or less difficult. Intrusion programs are illegal hacking tools that can provide +1/level when assisting breaking into a system. They are also highly illegal, so a digital search of someone's personal computer might be enough to land a character in jail. Security software running on the host system provides a -2 DM per level penalty for breaking into a system. Additional protection such as an air gap or hardwired restricted access can give anything from a -1 to -4 DM penalty for entering a system unless the restriction is bypassed in a nondigital way. An air gap might be bypassed by physically sitting down at a local terminal and trying to hack in, for example.

Based on the above modifiers, a character rolls their computer- security check against a base difficulty of 8. An exceptional success means the target is completely unaware the information was accessed. Success means the information was obtained, but the attack will be identified at a later date. A marginal success obtains the information but the attack is detected immediately. A marginal failure means some of the information was obtained but the target knows about the attack and have some idea who did it. A failure means no information was obtained and basic information about the hacker's attempt is known. An exceptional failure means they not only know exactly who hacked into the system but are able to reverse-hack and implant their own tracker/virus onto the hacker's computer without the hacker knowing.

Planetary Travel on Other Worlds

On civilized planets, regular travel services may be available for a few credits, allowing characters to ride to their destination aboard anything from a rickshaw to a maglev bullet train. Characters may ride aboard steam ships, dirigibles, submersibles, grav speeders or atop living mounts depending upon circumstances. Assume a basic cost of 1d6X5 Credits per day of travel per person. If the characters wish to use a vehicle of their own, this cost is not necessary. However, a suitable vehicle must be available.

Characters and the Law

In each of the situations listed in the Potential Law Enforcement Encounters table, roll 2d6 and add the listed modifiers. If the total is lower than the planet's Law Level, the characters are investigated or challenged by agents of planetary law enforcement. Die modifiers are dependent upon the system law level and/or government as well as the particular incident. Sophonts with a history of trouble in a system may also be placed under additional security restrictions or observation depending upon the situation.

Check means that the characters' travel documents and identities are checked, either by a police officer or guard, or electronically by querying the characters' comms. A successful Admin or Streetwise roll can allay suspicion, but if this check is failed, the planetary authorities move on to Investigate.

Investigate means that a detective or bureaucrat probes deeper into the characters' backgrounds. If the characters have a ship, it will be searched. They may be followed, or have their communications tapped. They may also be questioned closely. Outsiders are often initially blamed for many acts of violence whether or not they were actually involved.

Ready to fight means that local law enforcement comes in expecting modest violence. Their response will generally be proportional to the threat posed by the player characters; if the characters are just making trouble in a bar, then most police forces will just use batons, tranq gas and stun weapons. Response will be proportional to the threat as viewed by that society.

Shoot first means questions come after the situation has been neutralized. If the characters are in Battle Dress and firing PGMPs at the palace of the planetary governor, then the police will show up with military support and the best weapons and armor available at the planet's TL (or even a few levels higher). If high levels of violence are ongoing, law enforcement response will be lethal until the situation calms down. Only after the fighting stops will the authorities start talking to any survivors.

Law Enforcement Encounters

<u>Situation</u>	<u>DM</u>	<u>Response</u>
first approach to planet	0	check
culturally inappropriate sophonts wandering the streets of a city (once per day)	0	check
acting suspiciously compared to social expectations	-1	check
bar fight	-1	ready to fight
shots fired	-2	ready to fight
breaking and entering	-2	investigate
firefight involving armored sophonts and military weapons	-4	shoot first
murder and/or carnage	-4	investigate

Arrests and Sentencing

Characters arrested for a crime will face punishment, determined by rolling 2d6+DMs on the Sentencing table. For crimes involving smuggling banned goods, the DM is equal to the difference between the planet's Law Level and the banned goods in question. Other crimes have a set DM, per the Sentencing Modifiers by Crime table.

Table: Sentencing Modifiers by Crime

<u>Conviction for:</u>	<u>DM</u>
misdemeanor or minor incident: trespassing, civil disobedience, etc	law level-7, max penalty roll of 3
simple assault, white collar crime, minor smuggling, minor property damage	law level-5, max penalty roll of 5
serious theft, serious assault, arson, attempted murder, grand larceny	law level-3, max penalty roll of 9
dangerous smuggling, manslaughter, terrorist plot, kidnapping	law level -1
murder, simple terrorism, mass rioting, enslavement, torture	law level +0
mass casualties, system coup, nuclear or biological contamination	law level +4, penalty roll of 11+

A character with the Advocate skill may attempt to affect sentencing by making a check even after the players are convicted. Bribery and plea bargaining may also be appropriate depending upon the world. If successful, reduce the Sentencing DM by the Effect of the check or implement a penalty determined by the referee.

Sentencing Table

2d6+ modifier result	sentence
0 or less	dismissed with warning or fine of 1d6x100 credits
1-2	fine of 2d6 x 500 credits
3-4	fine of 2d6 x 2,000 credits
5-6	exile and/or fine of 2d6 x 10,000 credits
7-8	1d6 months prison and/or exile and/or fine as above
9-10	1d6 years prison and/or exile
11-12	3d6 years prison and exile
13-14	life imprisonment
15+	death sentence

A result of **Exile** means that the character must leave the planet immediately and never return. Fines for smuggling goods are per ton of goods seized – gun running can be an extremely risky proposition.

Chapter 11: Trade and Commerce

Commercial Efficiency Ratio

The Commercial Efficiency Ratio, or CER, is a quick estimate of how profitable a particular style of ship is for trade. To calculate a CER, add the total 'revenue space', ie. the portion of the ship that brings in money, in tons. This includes cargo space, staterooms that can be occupied by passengers (not crew), as well as low berths. Multiply the revenue space by the Jump Range of the ship and divide the cost of the ship in MCr. For unsubsidized legal trading, a CER of about 3 or more is needed to pay its bills. Ships with a CER of 5 or more can easily make money carrying even bulk cargo.

For all shipping, a few rules apply. First, ships that can take more passengers than cargo can often get away with a lower CER as passengers pay more per ton than cargo. Second, for trade to be profitable ships must operate at close to their maximum jump number. Short distance travel by a ship with a large jump range wastes the space of the fuel and engines needed for those longer jumps. The optional jump rule helps with this problem; by lowering the amount of fuel required for longer jump capability, the capacity penalty is reduced. Priority cargo pays more for higher jump range and, if it is available, is as efficient as middle passage passengers. Finally, this commercial efficiency assumes that the ship can trade without interference. Armor and weapons are wasted space commercially at least until pirates show up demanding the cargo. Weapons also allow a ship to carry mail which, when available, is the most profitable cargo per ton for short haul ships.

Starship Revenue

Starships generate revenue by carrying passengers, cargo, mail and charters. Goods taken on in orbit are delivered when placed in orbit around the destination. Goods taken on a planetary surface are considered to be delivered when off-loaded on the surface of the destination world. This custom applies to bulk cargo, passengers, and mail. Speculative cargo may be delivered wherever and whenever it is sold as there is no agreed contract in place beforehand.

For any given destination world, roll on the Available Freight and Passengers table to find out how many tons of freight and type of passengers are available. A ship may choose to remain in port and see if new cargoes present themselves; roll again every 3 days. If desired, players may determine how much commerce there is for every destination, and then choose where to go based upon profitability. The number of passengers must be determined at the same time as cargo; if a ship remains in port waiting for freight, passengers will find another ship, and vice versa. A ship without the capacity to carry all the available freight or passengers can take some of what is available, up to its total capacity. The table below is based upon the destination starport and assumes leaving from a Class A or B starport; reduce by 1/2 (rounded down) if leaving from a class C starport and no standard freight or passengers are available from a class D or worse starport. There may be sophonts interested in traveling or moving things, but the port will not be busy enough to support waiting around.

Available Freight And Passengers

Starport	Bulk Freight	trade number	Priority Freight	high passage	mid passage	low passage
A	3d6x10	x1.5	3d6x3	3d6	3d6	3d6
B	3d6x5	x1	3d6	2d6	3d6	3d6
C	3d6x2	x.75	2d6	1d6-1	2d6	3d6
D	3d6	x.5	0	0	1d6-1	2d6
E	1d6	x.25	0	0	1d3-1	1d6-1
X	0	0	0	0	0	0

Bulk Cargo

Ships will commonly pay their way by transporting cargo in bulk. This is on a flat-fee basis per ton of cargo and is a reliable method for a ship to pick up a few credits. A ship's accounts are credited with Cr500 per ton of cargo per parsec traveled, upon delivery. Rate of travel for bulk freight is not important, but must be completed within 4 standard weeks (28 days). Priority freight is cargo that is perishable or requires special handling and costs 1/2 of the rate for middle passengers per ton of cargo. It must be delivered within 10 days of being accepted for transport or it loses value. This allows time for 1 accurate jump, with little time available for refueling or repositioning, particularly if either (or both!) termini have a large jump shadow involved.

Ship's Passage

A ship must provide sufficient accommodation for its crew; normally this means one stateroom per two crew members (this is termed double-occupancy) and 1 stateroom per officer. Any remaining stateroom space may be used to carry passengers. Passengers cannot share accommodation with crew, with the exception of working passage. Passage is calculated per jump, and multiple jump trips may be arranged in advance. Passenger travel can be classified into five categories – high, middle, low, working and stowaway.

High Passage: The luxurious mode of travel is called high passage, which involves first class accommodations and cuisine. High passengers have the services of the ship's steward, entertainment included and complete attention to their comfort. There is a baggage allowance of up to 1,000 kilograms. High passage costs 3 times the rate of middle passage and provides food and lodging for 1 person for a distance of 1 jump. Double occupancy is allowed at a discounted rate of 4.5 times middle passage. Each level of Steward skill (including level 0) allows the steward to effectively look after two high passage passengers on board a ship (so a character with Steward 2 could care for six passengers).

Middle Passage: In order for starships to fill their staterooms with passengers, middle passage is offered on a standby basis, in the event that not enough high passages are sold. While middle passengers occupy staterooms normally similar to those occupied by high passengers, they do not receive the level of service or entertainment accorded the higher paying passengers. In addition, the quality of the cuisine is significantly lower. Baggage totaling 100 kilograms is allowed. A middle passenger may be 'bumped' and the stateroom taken by a late arriving high passenger; the middle passenger's fare is returned, but no other compensation is made. (The middle could then buy a high passage and 'bump' another middle passenger, if the extra cost seemed worth it.) Middle passage is the base fare and provides food and lodging for 1 person for a distance of 1 jump. Double occupancy is allowed for 50% more. Each level of the Steward skill (including level 0) allows the steward to care for five middle passengers. Cost per jump varies based on the distance to be traveled in a given segment of the trip. Fewer ships are available for high jump multiple passenger transport and thus the price rises rapidly.

1 parsec jump: 2000 Cr
2 parsec jump: 5000 Cr
3 parsec jump: 9000 Cr
4 parsec jump: 13,000 Cr
5 parsec jump: 17,000 Cr
6 parsec jump: 21,000 Cr

Low Passage: Transportation while in cold sleep (suspended animation) is possible at relatively low cost to the passenger. The passenger is placed in a low passage berth before the ship takes off, and travels the entire journey in a state of suspended animation. They do not age, and require very little life support. Unfortunately, the low passage system involves some intrinsic dangers to the passenger, and he runs some risk of not surviving

the voyage. Therefore a qualified medic should always be in attendance when reviving passengers from low berths. When a passenger is revived from cold sleep, they must make a Routine (+2 DM) Endurance check; failure means that the passenger permanently loses 1d3 points from a random characteristic. If a medic is present, the medic may assist the passenger with an Education-based Routine (+2) Medicine skill check, as per the Aid Another rules. Low passage costs 20% of the middle passage rate (no double occupancy) and includes a 20 kg baggage allowance; many cryoberths have a built-in baggage compartment.

Working Passage: A starship captain with a crew shortage may hire an individual to fill the vacant position, paying not money but passage in return. Working passage may not continue for more than three jumps, or the individual is considered to have been hired for standard salary. In order to be hired for working passage, the individual must have some expertise in the position for which he is hired. Baggage totaling 100 kilograms is allowed.

Stowaway: A stowaway is a person who secretly boards a vessel in order to travel without paying and without being detected. Unnoticed by the captain, crew, port officials and customs authorities, stowaways may gain access to a vessel with or without the assistance of port personnel. Once on board the ship, stowaways often hide in empty containers, cargo holds, maintenance shafts, crawl spaces, storage rooms, engine rooms, unused staterooms, and behind false panels. Stowaways risk imprisonment or heavy fines if caught, as it is considered a crime in most jurisdictions. If caught at the destination world, stowaways may be deported. Should this occur, the travel costs for the stowaway's return to the previous world visited, per the ship's logs, can become the obligation of the ship's owner or captain. Because of this, most commanders do not take kindly to any stowaways they discover aboard their vessels, and have been known to space them.

Mail and Incidentals

Merchant ships may receive mail delivery contracts, usually as an adjunct to their established routes. To deliver mail, 3 conditions must be met: 1) five tons of ship cargo capacity must be committed to postal duty on a full time basis; 2) the ship must be armed, and 3) a gunner must be a part of the crew. The starship is paid Cr10,000 (Cr2,000 per ton of postal cargo area) per parsec for each trip made, regardless of the actual mail tonnage carried. Such tonnage will not exceed 5 tons per trip. Roll 1d6-1 for the number of actual tons of mail, though the ship receives the full fee whether there is anything to carry, or not.

As many systems monitor intrasystem mail delivery as part of their security services, there is a small but lucrative market for messages or packages that do not go through the regular system. Any ships may be approached to deliver private messages, at times through the ship's owner or captain, and at times clandestinely through a crew member. Private mail is usually intended for delivery to a specific point (such as an Explorer's Society hostel, or to a bar owner in the starport), and is generally accompanied by a Cr20 to Cr120 honorarium for letters/files or 3x that for small packages less than 1 kg. The Referee should decide if a private parcel is awaiting transmittal, and determine randomly which crew member is approached to carry it. Serving as a carrier for private mail may act as an introduction to the recipient as a dependable, trustworthy person; alternatively the messenger may be killed to clean up loose ends. It depends upon the message or package.

Charters

Vessels are often chartered by commercial or private concerns. The reasons vary: private transport, standby cargo capacity for a priority load, special or "discreet" deliveries, etc. Charter price for a starship is computed based on its capacity. Starships are chartered in 2-week blocks; the charge is 3x the monthly operating cost of the vessel (maintenance, life support + standard salaries). The owner pays all overhead and supplies the crew. Sophonts chartering a vessel will choose a vessel based upon their priorities whether it is availability, speed, cargo capacity, or defensive capability. This assumes that a ship will undergo normal departure and customs

checks. Smuggling places the ship's owner in a very dangerous position and could result in fines and/or imprisonment depending upon the cargo or fugitives being transported. Wise captains know what and who is being carried aboard their vessel.

Speculative Trading

Speculative trading follows a basic procedure. The following checklist outlines the various steps in the speculative trade procedure.

1. Find a supplier
2. Determine goods available
3. Determine purchase price
4. Take goods to new world or market
5. Find a buyer
6. Determine sales price

Find a Supplier

The first step in the process is simple: find a supplier with something to sell. Characters can search for multiple suppliers, but there is a -1 DM per previous attempt on a planet in a given month.

Finding a supplier: Broker, Education or Social Standing, 1d6 days, Average (+0).

Finding a black market supplier: (Illegal goods only) Streetwise, Education or Social Standing, 1d6 days, Average (+0).

Finding an online supplier: (Worlds with TL 8+ only) Computers, Education, 1d6 hours, Average (+0).

The size of the Starport provides a bonus to finding a supplier. Class A starports give a +6 DM, class B starports give a +4 DM and class C starports give a +2 DM.

Determine Goods Available

Goods are divided into three categories of goods – Common, Trade, and Random goods. Common goods can be purchased on any world. Trade Goods are most common on worlds with a matching trade code. There are also a certain amount of random goods on any world; no rhyme or reason, they happen to be available. The amount of each type of goods available is limited – the tons column on the Trade Goods table determines how many tons of a given type of goods is available for purchase.

The supplier has a broker skill just like the character does. Naturally brokers on more populous planets will typically be more specialized and have a higher skill level than a planet with a few thousand individuals. Worlds with larger starports and more trade will also tend to attract the best and brightest brokers. While larger, better ports may have more opportunity, your opponent may be sharper and more demanding in a sector trading hub.

A given supplier has a number of goods based upon the planet's population and the type of starport. To determine the number of parcels available, multiply the population code for the source planet by the trade number given in the Available Freight and Passengers Table, rounding up. For each trade parcel, roll a d6: 1-2 gives a common good, 3-4 gives a trade good, and 5-6 gives a random goods roll. If a world has more than one trade code, pick one randomly or cycle through them if there are multiple rolls. If a world has no trade code, roll on the random goods table for trade goods as well. The trade code table references goods on the common (c) or random (r) table for quantities and prices. If more than one number is listed, either may be present (Referee's choice). For the random goods table, roll d66 to determine the goods available, ignoring results 61–65 unless dealing with a black market supplier. If you roll the same type of goods multiple times, then the supplier has extra amounts of those goods available.

Some goods are illegal, and can be purchased only through a black market supplier. Black market suppliers will have far fewer parcels than regular traders, so divide the number of options by 3, rounding down. When black market traders roll a common good, they may have whatever is associated with the asterisk value of their trade code. A black market supplier will also have any randomly rolled illegal goods. Other goods may be legal on some worlds, but not legal on others (such as personal weapons and armor, which might be restricted on a world with a high law level). The Referee should decide such situations as they occur. Asterisks in the random goods table mark items likely to be regulated in high law systems. In these cases, double the sale DM modifier if the trade goods are considered illegal.

For a black market supplier who has regular goods, this typically means there is something wrong with them; either they are stolen property, not licensed for export, defective in some way, etc. The purchase price for illegal regular goods is +3 DM, so the buyer can get a really good deal on the merchandise. If a buyer is caught smuggling goods, however, it might mean anything from a fine to confiscation of goods to imprisonment and impounding of their ship.

Illegal suppliers are trying to make a living and therefore they want to deal with traders coming from offworld as this will reduce their chances of discovery. This means that they usually have to work at least semi-honorably for the streetwise trader to consider them acceptable; otherwise they are just con men. This does not mean that they are honest or respectable, however, and smugglers have to be constantly on the lookout for a double cross. Cheating a criminal will usually start a violent altercation and will almost certainly generate an 'anonymous' tip to the police about the offworlders buying stolen goods. If the black market trader is caught by the authorities, they may be willing to trade information about the real criminals (ie. the players) in exchange for leniency. Smuggling is a risky business, but the profits of a successful run can be huge.

Table: Common Trade Goods

roll	Item	Cost (Cr)	Tons	Purchase DMs	Sale DMs
1	Basic Consumable Goods	1000	2d6 x 5	Ag +1, Lt +1	Na +1, Ni +1
2	Basic Electronics	25,000	2d6 x 5	Ht +1, In +1	Ni +1, Po +1
3	Basic Machine Parts	20,000	2d6 x 5	In +1, Lt +1	Ni +1, Ic +1
4	Basic Manufactured Goods	15,000	2d6 x 5	In +1, Ic +1	Ni +1, Va +1
5	Basic Raw Materials	5000	2d6 x 5	Ni +1, Va +1	In +1, Hi +1
6	Basic Unrefined Ore	2000	2d6 x 5	Va +1, Ds +1	Wa +1, Ni +1

Table: Trade Goods by Trade Code

roll	Ag	Ds	Fl	Ga	Hi	Ht	Ic	In	Lo	Lt	Na	Ni	Po	Ri	Wa	Va
1	1c	6c	5c	1c	3c	11r	2c	11,12r	5c	1c	2c	1c	1c	12,13r	5c	5c
2	13r	6c	42r	14r	4c	16r	4c	13,16r	6c	1c	4c	5c	6c	25r	35r	6c
3	14r	21r	42r	24r	25r	22,26r	35r	22,23r	14r	5c	23r	21r	15r	33r	42r	21r
4	31r	21r	43r	31r	25r	41r	45r	26,32r	15r	6c	23r	31r	15r	36,41r	42r	45r
5	34r	46r	55r	34r	32r	51r	45r	33,36r	15r	35r	55r	54r	23r	44r	43r	46r
6	54r	56r	56r	53r	32r	52r	53r	44,51r	54r	54r	56r	54r	25r	52r	55r	56r
*	61r	62r	62r	61r	63r	63,65r	61r	64,65r	61r	62r	63r	61r	63r	63r	62r	64r

* most common illegal goods found

Table: Random Trade Goods

D66	Trade Goods	Base Price (Cr)	Tons	Purchase DMs	Sale DMs
11	Advanced Electronics	100,000	1d6	Ht +2, In +3	Ni +2, Po +1
12	Advanced Manufactured Goods	200,000	1d6 x 5	In +3, Ri +2	Ag +1, Ni +2
13	Agricultural Equipment	15,000	1d6 x 5	In +3, Ri +2	Ag +2, Ga +1
14	Animal Products	1500	4d6 x 5	Ag +2, Ga +3	Hi +2, Ri +1
15	Collectibles	50,000	1d6	Po +2, Lo +1	Ri +2, Hi +1
16	Computers and Computer Parts	150,000	2d6	Ht +3, In +2	Na +1, Ni +2
21	Crystals and Gems	20,000	1d6 x 5	Ds +2, Va +1	In +1, Ri +2
22	*Cybernetic Parts	250,000	1d6	Ht +2, In +1	Hi +2, Ri +1
23	Food Service Equipment	4000	2d6	In +3, Na +2	Ag +1, Ga +1
24	Furniture	5000	4d6	Ag +2, Ga +3	Hi +1, Ri +2
25	*Gambling Devices & Equipment	4000	1d6	Hi +1, Ri +2	Na +2, Ni +1
26	Grav Vehicles & Parts	160,000	2d6	Ht +3, In +1	Ni +2, Po +1
31	Grocery Products	6000	1d6 x 5	Ag +3, Ga +2	Hi +1, Ri +2
32	Household Appliances	12,000	4d6	Hi +1, In +2	Na +1, Ni +2
33	Industrial Supplies	75,000	2d6	In +3, Ri +2	Na +1, Ni +2
34	*Liquor & Other Intoxicants	15,000	1d6 x 5	Ag +2, Ga +2	Hi +1, Ri +2
35	Luxury Goods	50,000	1d6	Wa +2, Ic +3	Hi +1, Ri +2
36	Manufacturing Equipment	25,000	1d6 x 5	In +3, Ri +2	Na +1, Ni +2
41	Medical Supplies	75,000	1d6 x 5	Ht +1, Ri +1	Hi +1, Va +2
42	Petrochemicals	10,000	2d6 x 5	Wa +1, Fl +3	Ag +2, In +1
43	*Pharmaceuticals	100,000	1d6	Fl +1, Wa +2	Hi +1, Ri +1
44	Polymers	7000	4d6 x 5	In +2, Ri +3	Ni +2, Va +1
45	Precious Metals	50,000	1d6	Va +3, Ic +2	In +1, Ht +2
46	Radioactives	1,000,000	1d6	Va +2, Ds +1	In +2, Ht +1
51	Robots & Drones	500,000	2d6	Ht +3, In +2	Ni +1, Ds +1
52	Scientific Equipment	60,000	2d6	Ht +3, Ri +2	Hi +2, Ni +1
53	Survival Gear	4000	2d6	Ga +2, In +1	Ds +2, Wa +2
54	Textiles	3000	2d6 x 5	Ag +3, Ni +2	Na +1, Hi +2
55	Uncommon Raw Materials	40,000	2d6	Fl +2, Wa +2	In +2, Ri +1
56	Uncommon Unrefined Ores	20,000	2d6	Ds +2, Va +1	In +2, Ht +1
61	*Illicit Luxury Goods	150,000	1d6	Ag +2, Ga +3	In +2, Ri +4
62	*Illicit Pharmaceuticals	100,000	1d6	Wa +2, Fl +2	In +4, Ri +3
63	*Medical Research Material	20,000	1d6 x 5	Po +2, Na +1	Ht +4, Hi +3
64	*Military Equipment	250,000	2d6	Ht +3, In +2	Hi +4, Ni +2
65	*Personal Weapons & Armor	75,000	2d6	In +2, Ht +1	Lt +4, Po +2
66	Unusual Cargo	10,000 to 500,000	1d6	--	--

Note: Unusual cargo covers unique or highly unusual items, such as alien artifacts, high tech prototypes, stolen artwork of antiquity, secret documents, or unique lifeforms. Such items often form the seed for an adventure. These will typically be items that don't quite fit the normal rules but would still be something another world might be very interested in purchasing for the right price. Prices, quantity and actual value are set by the referee.

Determine Purchase Price

Determining the purchase price for speculative cargo is based on the results of a skill check. The results of this skill check represents the best possible offer the parties can reach under the current conditions.

Determining the purchase price: Broker, Intelligence or Social Standing, 1d6 kiloseconds, Average (+0). The skill check is further modified by adding the largest Dice Modifier that applies from the Purchase DM column and subtracting any Dice Modifiers from the supplier (such as their Broker skill with Intelligence or Social Standing). The Referee should then consult the Purchase column of the Modified Price table, using the skill check result to determine the Purchase Price percentage. The final price of the speculative cargo is the Base Price multiplied by the Purchase Price percentage. The trader does not have to accept this price, but if they reject all offers, then they cannot deal with that supplier again for at least one week. After that week, the players may attempt a new skill check to determine the purchase price for a different set of goods.

<u>Result</u>	<u>Purchase</u>	<u>Sale</u>
2-	200%	40%
3	180%	50%
4	160%	60%
5	140%	70%
6	120%	80%
7	110%	90%
8	100%	100%
9	90%	110%
10	80%	120%
11	70%	140%
12	60%	160%
13	50%	180%
14	40%	200%
15	30%	230%
16+	20%	260%

Local Brokers

A speculative trader can hire a local broker to represent her in trade negotiations. This allows the players to use the broker's skill levels instead of their own, although that comes at a price in the form of a percentage of the final negotiated purchase price, which must be paid even if no sale is made.

The Local Broker table indicates the commission charged for a given skill level, as well as indicating what maximum skill levels are commonly available for a given class of starport.

Table: Local Brokers

<u>Modified Skill Level</u>	<u>Commission</u>	<u>Notes</u>
2	4%	max for Class D or E Starport
3	8%	max for Class C Starport
4	12%	max for Class B Starport
5	16%	max for Class A Starport

Selling Goods

Selling goods works just like purchasing goods, with the following changes:

A character must find a buyer, instead of a supplier.

When selling goods, add the highest Sale DMs for the world trade code and subtract the buyer's broker skill. Note that if a purchase was illegal in one world that does not affect if it is legal in another. Selling illegal goods involves a -2 DM if they are going through a middleman but no modifier if they are selling directly to the

consumer (Referee's decision). If a character does not accept the price offered for their goods, they must find wait a week to find another buyer, in which case a new skill check to determine the selling price is made.

Chapter 12: Environments and Hazards

The following are common environmental hazards that can be encountered in a 2d6 ClusterRPG game.

Acid

Corrosive acids deal 1d6 damage per round of exposure, except in the case of total immersion (such as into a vat of acid), which deals 10d6 damage per round. An attack with acid, such as from a hurled vial or an animal's acidic spittle, counts as a round of exposure. The fumes from most acids are poisonous. Those who come close enough to a large body of acid to dunk a creature in it must make an Average (+0) Endurance check or take 1d6 point of damage. All such characters must make a second Average (+0) Endurance check one minute later or take another 1d6 point of damage. Creatures that are immune to acid's caustic properties might still drown in it if they are totally immersed and need to breathe. For more details, see **Suffocation**.

Carrying Capacity

Strength determines how much weight characters can lift and how much any additional encumbrance slows them down. Characters carrying more than their Light Load suffer penalties unless the sophont has stalwart movement. Stalwart movement reduces the effect of encumbrance by one degree.

Light Load: As a light load, a character can lift and carry up to twice their Strength characteristic score in kilograms without any penalties or difficulties. For example, an average character with a Strength score of 7 can carry up to 14 kilograms as a light load.

Medium Load: A medium load is considered to be twice a character's light load, or four times their Strength characteristic score in kilograms. Characters carrying a medium load suffer a -1 DM to all physically based checks, including skill checks. In addition, they move at 75% of their base speed. For example, an average character with a Strength score of 7 can carry up to 28 kilograms as a medium load. Such a character would suffer a -1 MD on all physical checks, and move at 4.5 meters per round.

Heavy Load: A heavy load is three times the character's light load, or six times their Strength characteristic score in kilograms. Characters can lift up to a heavy load overhead. Characters carrying a heavy load suffer a -2 DM to all physically based checks, including skill checks. In addition, they move at 75% of their base speed. For example, an average character with a Strength score of 7 can lift up to 42 kilograms as a heavy load. Such a character would suffer a -2 DM on all physical checks, and move at 3 meters per round.

Maximum Load: A character's maximum load is six times that of their light load, or twelve times their Strength score in kilograms. Characters can lift up to the maximum load off the ground, but can only stagger around with it. While overloaded in this way, characters cannot undertake any other actions, and can only move 1.5 meters per round. For example, an average character with a Strength score of 7 can barely lift up to 94 kilograms as a maximum load. Such a character could perform no other actions while struggling with the load, except to move 1.5 meters per round.

Push/Drag: Characters can push or drag up to five times their heavy load weight, moving at half their normal speed. Favorable conditions (smooth ground, dragging a slick object) double these numbers, and bad circumstances (broken ground, pushing an object that snags) can reduce them to one-half or less.

Gravity and Carrying Capacity

The above assumes the character is operating at a standard 1.0 gravity. When operating under a different gravitational pull (or within an artificial gravity set to a non-standard value), simply divide a character's load weight by the gravitational pull to determine the new load weight value under those conditions.

Diseases

Diseases reduce a character's Characteristics, usually Endurance. The character must make an Endurance check with the listed DM to resist the effects of the disease. If the character fails the Endurance check then he takes the listed damage and must make another Endurance check a few hours or days later, depending on the interval of the disease. Once an Endurance check has been passed, the character has fought off the disease.

Table: Sample Diseases

<u>Disease</u>	<u>DM</u>	<u>Damage</u>	<u>Interval</u>
Pneumonia	0	1d6+4	1d6 weeks
Anthrax	-3	1d6+2	1d6 days
Regina Flu	+1	1d6-2	1d6 days
Biological Weapon	-6	1d6+8	1d6 hours

Extremes of Temperature

Unusually hot or cold worlds can cause damage unless the characters are suitably protected. Temperatures are in Celsius.

Table: Extreme Temperatures

<u>temperature °C</u>	<u>Damage</u>	<u>Example</u>
below -200	3d6/round	absolute zero, Pluto
-200	2d6/round	liquid nitrogen, Neptune
-100	1d6/round	Ceres
-50	2d6/hour	Mars
-25	1d6/hour	Arctic
0	none	melting point of water
50	1d6/hour	very hot desert
100	2d6/hour	water boiling point
200	1d6/round	Mercury
500	2d6/round	Venus
above 500	3d6/round	surface of a star

Catching on Fire

Characters touching a fire source might find their clothes, hair, or equipment on fire. Those at risk of catching fire are allowed a Difficult (-2) Dexterity check to avoid this fate. If a character's clothes or hair catch fire, she takes 2d6 damage immediately. In each subsequent round, the burning character must make another Difficult (-2) Dexterity check. Failure means he takes another 2d6 damage that round. Success means the fire has gone out. A character on fire may automatically extinguish the flames by jumping into enough water to douse himself, spraying himself down with a fire extinguisher, vent all atmosphere or otherwise smother the flames. If the character has no such means, rolling on the ground or smothering the fire with cloaks or the like permits the character a DM+2 on his next Dexterity check.

Falling and Gravity

A character who falls on a 1-gravity world suffers 1d6 damage per three meters fallen. High- or low-gravity worlds will increase or decrease the damage. Look up the size code for the world and the gravity level associated with it and multiply the falling damage by the gravity number.

Poisons

Poisons operate in the same way as diseases, but generally work much faster and often have a wider range of effects. Most poisons do not have an interval but apply their damage immediately.

Table: Sample Poisons

Poison	DM	damage
arsenic	-2	2d6
tranq gas	-1d6	unconscious if End check failed
neurotoxin	-4	1d6 Int

Radiation Exposure

Radiation exposure is measured in rads. Once a character has absorbed a certain number of rads, she will suffer certain effects. One problem with radiation exposure is that while physical symptoms can be treated and may heal, the radiation does not go away easily. The character's rads must be tracked. Further exposure adds to what the character is already carrying around until a deadly level is reached. Accumulated rads can be removed using anti-radiation drugs. Characters exposed to a radiation weapon will receive a one-time dose of radiation. Entering a radioactive area or being exposed to a leak or solar flare will cause exposure each round or hour. Every time a character experiences an exposure to radiation, they must check to see if they've come down with radiation sickness, as outlined on the Radiation Effects table. The character must make an Endurance check at the listed DM, and if she fails, she takes the damage listed and must make another Endurance check after the listed interval has passed. This cycle continues until the character succeeds at an Endurance check. At any Radiation Level below Mild, the character is treated as having a lower Endurance characteristic score. If a character should accumulate enough rads to move to a higher Radiation Level, the new Endurance characteristic score immediately goes into effect. On the other hand, if a character moves to a lower Radiation Level, such as through anti-radiation drugs, the character heals the difference between the former level and the current level over time, as if it were physical damage. If a character's Effective endurance falls below zero, the character goes unconscious and cannot recover until their Radiation Level drops enough to allow healing to take place.

Table: Common Radiation Exposure Sources

Situation	Instant (rads)	Extended (rads)
irradiated area, low level	--	1d6/hour
irradiated area, moderate level	--	2d6/hour
irradiated area, high level	--	6d6/hour
irradiated area, severe level	--	12d6/hour
active exposure, low level	3d6	3d6x10/hour
active exposure, moderate level	1d6x10	1d6x100/hour
active exposure, high level	2d6x10	2d6x100/hour
active exposure, severe level	4d6x10	3d6x100/hour

Table: Radiation Effects

<u>radiation level</u>	<u>rads</u>	<u>effective</u>	<u>Endurance</u>	<u>DM</u>	<u>damage interval</u>
mild	<100	--	none	none	none
low	100-199	End-1	+1	1d6	1d6 weeks
moderate	200-599	End-3	0	1d6+2	2d6 days
high	600-999	End-6	-1	1d6+4	1d6 days
severe	1000+	End-10	-2	1d6+6	1d6 hours

Starvation and Dehydration

Characters might find themselves without food or water and with no means to obtain them. In normal climates, a character needs at least a gallon of fluids and about a kg of food per day to avoid starvation. In very hot climates, characters need two or three times as much water to avoid dehydration. A character can go without water for a number of hours equal to 20 plus twice their Endurance score. After this time, the character must make a Routine (+2) Endurance check each hour (-1 DM for each previous check) or take 1d6 damage. A character can go without food for 3 days, in growing discomfort. After this time, the character must make a Routine (+2) Endurance check each day (-1 DM for each previous check) or take 1d6 damage. Damage from thirst or starvation cannot be recovered until the character gets food or water.

Suffocation

In an area where oxygen levels are decreasing, such as on board a starship without life support, a character begins to suffocate, suffering 1d6 damage each minute. A character who is utterly without air (such as one who is being smothered or strangled, or who has been dumped out an airlock) suffers 1d6 damage each round instead.

Vacuum Exposure

Sophonts exposed to the airless cold of space are not immediately doomed. Contrary to popular belief, characters exposed to vacuum do not immediately freeze or explode, and their blood does not boil in their veins. While space is very cold, heat does not transfer away from a body that quickly. The real danger comes from suffocation and ionizing radiation. On the third round of exposure to vacuum, a character must succeed on a Very Difficult (-4) Endurance check each round or suffer from aeroembolism ("the bends"). A character that fails the check experiences excruciating pain as small air bubbles form in its bloodstream; such a character is considered stunned and generally unable to move, and remains so until returned to normal atmospheric pressure. A character that fails the check with an Exceptional Failure (Effect -6 or lower) falls unconscious. The real danger of vacuum comes from suffocation, though holding one's breath in vacuum damages the lungs. Treat anyone trapped in a hard vacuum as being utterly without air under the **Suffocation** rules. Unfiltered radiation bombards any character trapped in the vacuum of space without protective gear. A character exposed to this ionizing radiation suffers from severe sunburn as well as the effects equivalent to a high level irradiated area. See **Radiation Exposure** for specific details.

Weather

Driving wind, rain, snowstorms and so forth give a -1 DM to ranged attacks from poor visibility and a -1 DM to ranged attacks from environmental interference. Sensors can be used to avoid the visibility penalty. Extremely high winds and torrential rain can inflict a negative Dice Modifier of -1 to -4 to all skill checks.

Chapter 13: Planetary Wilderness Encounters

Characters in the uncivilized areas of a planet's surface quickly find out that they are not alone. So long as a world can support life, animal encounters and other natural events are common, regardless of the current terrain. This chapter discusses various factors that affect encounters in the wilderness on a planet's surface.

Energy

In order for planets to have a functioning biome, there are several key ideas which should be implemented for the ecology to make sense. First and most importantly there must be an energy source. For many planets, that energy source will be the sun(s) of the system, but geothermal energy may be accessible on certain worlds as well. Secondly, organisms which convert the energy source into the chemical energy of life are required. These are known as producers and must form the most abundant organisms on the planet. Third, the further an organism is from the producers the fewer there must be. Primary consumers (herbivores) outnumber secondary consumers which outnumber tertiary consumers, etc. There are many planetary parameters which will affect energy availability including seasons, organism sizes, atmosphere, etc that are critical to the organisms living there. The system below provides a model for how organisms may interact with the planet to create an ecology appropriate for the planet.

Geothermal Energy Availability

Compared to solar energy, geothermal energy is always a very patchy and less evenly distributed energy source. Living organisms depending on this resource may also live in more patchy communities. Temperatures in the vicinity of a thermal vent field may be many degrees warmer than average for a planet and would likely have little to no seasonal variation. Producers must still vastly outnumber consumers, but different vent regions may have different species present depending upon how isolated the vent systems are from one another.

Life using geothermal energy should probably be more common on frozen, very cold or cold worlds compared to warm ones. When temperatures are higher on inner worlds, solar energy will be more available and therefore more likely to support life. A very cold planet, however, may only have liquid water in the vicinity of a geothermal vent system. In these cases, life will not be constrained by temperatures at the poles or equator but rather where vents are located. Note that atmospheric taint could logically be caused by geothermal processes which may increase the likelihood of geothermal dependent life forms on a world. In addition, if a vent area would lose its geothermal heat source through plate tectonics it would create a perfect location for a dead civilization or extinct intelligent life form for intrepid adventurers to discover.

Producers must take the chemical or thermal energy from the ground and convert it into biologically available energy. They will not be dependent on day or night- geothermal energy is not tied to planetary rotation. Organisms must stay within the protected vent regions unless they can protect themselves from the bitter cold beyond the hot springs. Since only geologically active areas have geothermal energy, typically population sizes depending upon geothermal energy are also much smaller than for the more generally available solar energy.

Solar Energy Availability

Depending upon the temperature of the planet, solar energy may be more or less abundant in different regions. Boiling planets have more energy available than cold planets, for example. Regional and seasonal differences will have varying amounts of solar energy accessible depending upon the amount of tilt a planet has on its axis of rotation compared to the system ecliptic. The more tilted the planet is, the more extreme the seasonal variations are. Equatorial regions receive more direct sunlight than polar regions and therefore have both warmer and more consistent climates than at the poles. The following table may be used to determine the axial tilt of a planet.

Life in the Extremes

These types of calculations also reveal why humans can live on relatively inhospitable or 'barely habitable' worlds. It is not that the whole world is pleasant; that is clearly not the case. Rather there are patches of mountains near the poles of boiling hot worlds or some equatorial lowlands on very cold planets which bring the temperatures in that region into a more habitable range. Technology can also extend the range of livable temperatures on a planet much as air conditioning has improved the appeal of living in the southern United States. If humans can live in the harsh vacuum and extreme cold of space, surely the frozen tundra or steaming ocean is merely another engineering challenge for sophonts to overcome.

Native life forms on a planet, though, probably don't need any assistance to live in their habitat. There are fish, for example, that can survive months under a frozen-over lake or plants that can grow in deserts around the southwestern US. They may need special adaptations to handle more extreme environments, but in their home environment they are hardly unusual in coping with those conditions. Naturally, though, moving a cactus to the arctic isn't likely to be a successful transplantation. Organisms from one world will do best in an environment that is similar to the world where they evolved. Invasive species coming from an entirely different evolutionary history, however, might outcompete native life forms and colonize those 'extreme' environments on their new world. Given the human diaspora many millenia ago, there very well may be organisms found on some worlds with no direct evolutionary link to other species on the same world.

Caves and underground living offer one technique to avoid the extremes of a world's weather variations. Excluding volcanic areas, caves typically keep a constant average temperature year round that is roughly the average temperature for that location. Depth down to one or two kilometers does not greatly affect the temperature. Cave temperatures change very slowly, so living underground can average out some of the more extreme seasonal variations present on many worlds. For worlds with tainted or deadly atmospheres, underground living also provides a respite from the challenges of the atmosphere itself. Airlocks entering the habitable chambers can still allow access to the environment but rock walls can be many meters thick. In volcanic or geologically active regions, caves may be linked to geothermal energy sources and may be much warmer than other areas. In these areas, temperatures increase rapidly as magma or active vents are approached.

Deeper water is another place which moderates the temperature to a great extent. Surface water is heated by the sun, and the water is mixed by the action of wind and waves to create a surface region that is closer to the surface temperature. Deep water, though, does not mix well with the surface. Below the range where sunlight reaches, water maintains a temperature relatively close to freezing. The thermocline is the relatively narrow transition region between the surface water and the much colder water below it. The depth of the thermocline varies depending upon the surface water temperature. In cold regions, there may not be a thermocline at all, while equatorial regions with their more constant surface temperature typically have a relatively stable deeper thermocline. The cooler, deeper waters, may provide a respite on warm or hot worlds from the high temperatures found on the surface.

Wilderness and Terrain Types

Life is a delicate balance of many variables and does not evolve the same way on every world. In other cases, life evolved long ago but did not survive to the present day. On most worlds life began as a barely functional replicating molecule. As it evolved to better take advantage of the resources available, the best adapted organism for the conditions and particular niche would outcompete less efficient organisms. This creates an ecology where all organisms share basic characteristics such as using DNA for storing genetic information.

Organisms on different worlds may use rather different molecules for its basic building blocks and therefore have specialized nutritional requirements that may not be available on all worlds.

The tree(s) of life on habitable worlds have relatively few main branches which commonly share a few characteristics. While many animals on Earth share bilateral symmetry, for example, radial symmetry (such as starfish) or plants may not share this basic organization. While it is not essential to have a unitary body plan for all organisms in a system, a consistent thread between organisms on a planet will create a more unified 'feel' to the world. Most of the organisms on a planet will likely never be significant to the players, but having a few 'show' organisms that set the tone for everything else will make a given planet appear more realistic and memorable. Changing worlds should feel more exotic than moving to a different subdivision.

The two organism characteristics that best provides a framework for everything else are symmetry and genders. If all of the major species have trilateral symmetry and are hermaphrodites, this will suggest specific changes to a culture or environment that can create particular features that might be useful for the referee. A hermaphrodite that can self-fertilize, for example, may bring out a recessive trait in their offspring that creates a specific racial caste or evolutionary offshoot later on. By building out from a common thread, these changes will permeate the behaviors and characteristics of the organism's entire existence. While pairing off for defense or companionship may be important for a hermaphrodite it would not necessarily be required for reproduction. The referee has many options when putting together animal behaviors related to their physiology.

Producers in Terrain Types

There are 16 different terrain types detailed in the ClusterRPG. (This guide substitutes 'Tundra' for 'Jungle' found in the Cepheus Engine rulebook since a jungle is simply tropical rain forest.) Beyond the animals present, however, there needs to be a way for those animals to live. The numbers and types of primary producers will set a limit to the number of organisms which can be supported. If photosynthetic bacteria are the main producer in the open ocean, for example, the primary consumer must feed on those bacteria. Secondary and tertiary consumers must eat the primary consumers, and there are clearly fewer of the higher order consumers. Typically there is a 90 percent loss of biomass/energy as organisms move up the food chain. So for every ton of tertiary consumer present there would need to be at least a thousand tons of producers to feed 100 tons of primary consumers and 10 tons of secondary consumers in the ecosystem. Omnivores that eat producers as well as other level of consumers are energetically more efficient than pure consumer carnivores, but depending upon the percentage of non-animal material in their diet omnivores may be closer to primary consumer than higher level consumers.

Producers range from microscopic to Sequoia sized, allowing a range of producers that can coexist with one another in any desired environment. Nor does producer size restrict the size of the organism that consumes them. Filter feeding baleen whales, among the largest creatures every found on Earth, feed on tiny zooplankton. A giant herbivore that feeds on algae is not inconceivable. Small consumers can and do eat leaves, nuts, berries, etc from even the largest producers. While every terrain type has unique animals in it, the producers that directly or indirectly feed those creatures must be even more numerous.

Clear Terrain is rocky and relatively flat. Plants that live here are very patchy and depend upon precipitation for water since rock is generally not very porous (there are exceptions here). Mosses and lichens may be very common. If it has not eroded yet the rock must be relatively water resistant; if it is soft it will be cleaved by numerous canyons all leading to major waterways. Puddles, ponds, etc where water accumulates will be common locales for larger groups of plants. While there will be little living cover, boulders and eroded rocks will provide plenty of cover for animals of all sorts. Overall biomass is low and will tend to cluster around water.

Weather events may also be relatively extreme here, where canyons and boulders may provide the only cover from large weather systems moving through. Flash floods in low lying areas are common.

Plains and Prairies are famous for their giant fields of grasses and modest height plants. Soils tend to be rather thick and fertile, providing support for the many plants that grow there. Water may be present in many forms, from precipitation to streams and lakes to underground aquifers. Larger animals tend to be very visible for great distances. Smaller animals effectively hide in the short plants. Both herbivores and predators take advantage of this cover. Giant herds of herbivores are common in the plains. These areas tend to have huge amounts of biomass and relatively lower diversity of species compared to other biomes. Weather can also be more extreme as geography does not disrupt weather systems from crashing into one another.

Deserts are largely dry areas where water is the limiting factor. All organisms that live here, plant or animal, must cope with this basic lack. Plants may be moderately tall, but will mostly be short and found in patches where water accumulates after rare storms. Relative humidity is very low, leading to high evaporation rates and rapid parching of unadapted individuals. While wind and sandstorms might be common, rain is unusual and flooding very very rare. Deserts have a very low biomass overall and few organisms that can all survive on minimal water.

Hills and Foothills are generally high biomass areas that vary in altitude significantly. River valleys tend to separate larger hills, with flowing water running between the rounded highlands. In low water areas, hills tend to be spikier and less rounded than in wetter regions. Trees, bushes, and grasses grow in varied abundances. Species diversity is relatively high. Weather is somewhat moderated by the geography, although certain areas may be more affected due to funneling effects on wind and water.

Mountains often have more extreme, usually much colder, weather than surrounding lowlands. Depending upon the overall climate in the area this may make life in higher elevations very different than lower on the same slopes. Sharp changes in elevation limit what can grow on many surfaces. Organisms living on the mountain must be able to cope with the local environment, not necessarily the prevailing conditions off-mountain. Mountains tend to occur in more geologically active areas. Biomass varies based on altitude, with smaller producers living in the most elevated areas (ie. above the treeline). Mountains greatly disrupt weather systems and so climates on one side of a mountain range are often very different than on the other side depending upon the prevailing winds.

Forests are large areas of tall, dominant producers which extend for kilometers in many directions. They tend to have very high biomass concentrated primarily in producers, but with plenty of resources for consumers of various sorts. Cooler forests (on Earth, anyways- it may not be true on other planets) usually have lower species diversity overall. Temperate and warm forests will often have a greater diversity of producers which results in a greater diversity of consumers living off them. Weather tends to be somewhat moderated under the protection of the giant producers.

Woods are smaller areas of tall, dominant producers which support many smaller consumers but cannot support very many higher level consumers as the biomass and area are too small. Temperate and warm woods have a greater diversity of producers as well as consumers, but the woods do not affect temperature as much as forests do.

Tundra is a low biomass area of dispersed, low height producers or a small layer of producer in poor soil. Tundras are relatively clear without large producers or geologic features and higher level consumers must cover

great distances in search of food. Usually frozen much of the year, producers in the tundra take advantage of their short time in the sun and typically grow at a phenomenal rate before going dormant for the harsh winter. This region has some of the greatest range in temperatures of any planetary region. Subsoil is frozen much of the year preventing producers from establishing deep footholds but often preserving dead biomass very effectively.

Rain Forest is a terrain type dominated by large producers and very high precipitation rates. Vegetation is abundant and lush, and a diverse population of consumers take advantage of these producers. Tropical rainforests, or jungles, have perhaps the highest biomass and greatest diversity of any planetary region. The combination of precipitation and large producers typically occur near large bodies of water that provide the water required. Temperate rain forests have a lower biomass than more tropical areas due to the reduced sunlight available.

Rough, Broken terrain is very varied with many canyons and rises dotting the landscape. Producers are fairly sparse and the soil is rocky with a low nutrient content. Most of the producers that do exist are small, with consumers typically on the smaller size as well. Temperatures often vary dramatically by season and many organisms may only grow for part of the year. Overall biomass is low.

Marsh, Swamp terrain is characterized by a variety of medium to large producers and extensive stagnant water surrounding them. Producers may often be substantially submerged, with only particular areas consistently above the water level. Diverse consumers of many forms are common, with flying, aquatic, terrestrial, and amphibian organisms coexisting in a relatively high biomass area. Swamps and marshes often have seasonally varying water levels and serve to greatly moderate local climate.

Shores and Beaches provide an interface between large bodies of water such as lakes and oceans adjacent to terrestrial environments. These areas are often relatively open and typically have somewhat larger organisms found in this region. Abundant water is present, with plants limited only by the amount of light and soil quality. Erosion on shores of larger bodies of water can be substantial and tides will depend on the number and size of the planet's moons. More extreme variations may limit the variety of organisms living on shores, although the water does moderate temperature fluctuations.

Riverbanks are the interface between flowing aquatic environments and terrestrial environments. Water is generally abundant, and producers along rivers are often substantially different than producers even a hundred meters away. The diverse ecosystem tends to have a high biomass and relatively diverse consumers, although most are too small to change climate compared to large bodies of water.

Ocean Shallows are areas of large bodies of water not too far from land. These typically include features such as a continental shelf or inland sea. Light typically reaches all the way through the water to the sea floor below, allowing producers to exist in all layers of the water. Shallows tend to have moderately high biomass spread out in all layers. Shallows may be no more than 200 meters deep. Temperature fluctuations are substantially moderated in these areas.

Open Ocean is the area of an ocean that is far away from land. This is the most common terrain (along with ocean shallows) on water worlds and deals with the surface of the ocean where light penetrates. Producers are spread throughout the first 200 meters of open ocean, with an indeterminate amount of water below. Consumers are found throughout this region as well as below the photic zone. Temperature fluctuations are greatly reduced in these areas due to the massive amounts of water present.

Deep Ocean is the part of the ocean where light effectively does not penetrate. Below 200 meters in depth, there are no producers since there is no solar energy. Any producers present must use geological energy of some sort. Consumers do exist in this region of the ocean, with primary consumers rising out of the depths to eat producers in the open ocean. Historical 'sea monsters' likely live(d) in this zone and is one of the least explored areas of most worlds. Temperatures are nearly constant at these depths and do not change easily.

Animal Encounters

Animals in any ecological system interact with each other, forming food chains, obeying instincts, defending territory, and generally living out their lives. When people enter such an ecological system, they will encounter the animals of the system, prompting natural reactions, such as attack or flight. Although the precise nature of animals may change, and they may prove quite alien to ordinary experience, most will conform to the broad classifications given below. A Referee may choose to establish his own ecological system on a specific world, ignoring the encounter system outlined here. This system, however, is intended to allow broad latitude in both animal types and attack/defense mechanisms, while remaining essentially logical and reasonable.

Animal Types: Nearly all animals may be classified into four basic categories: herbivore, omnivore, carnivore, and scavenger. Specific definitions for these terms are provided in a later section of these rules, and differ from the precise scientific definitions in current use. Within each category, a variety of animal types exist, based on specific feeding/hunting habits; examples of this concept are grazers, chasers, and pouncers. Animals which are encountered may be further classified into various categories and types, and specific attack and defense mechanisms determined. The resulting description indicates the actions an animal will take without resorting to such confining labels as bear or tiger. While a Referee may well elect to use such names, this system also allows the players freedom to encounter truly alien beasts as well.

Effect of Gravity on Organism Size

High gravity worlds exert a constant strain on an organism. Physics requires that organisms living on high gravity worlds be able to cope with the extreme gravity. Large animals such as elephants on Earth can suffocate if they lie too long on their side, for example. Worlds with higher gravity would therefore tend to have smaller organisms, and those creatures that are more massive would tend to spread out widely to support their mass. Organisms that live in water, however, are able to support much of their mass in the water itself. Larger bodies of water tend to support larger organisms. Flying on high gravity worlds, particularly those with relatively thin atmospheres, would be almost impossible. Even dense atmospheres would have a difficult time supporting large flying animals against the relentless pull of gravity.

Low gravity worlds tend toward the other extreme. Without the need to support a heavy frame, low gravity organisms would be able to grow very tall and spindly. Plants could race toward the heavens in a bid for increased access to sunlight, attempting to out-compete their neighbors. Herbivores able to reach more of the leaves from the taller plants might have a competitive advantage over smaller or shorter animals. If the atmosphere is even moderately dense, flying creatures would be able to be much larger as physical strength is able to more easily overcome the weaker pull of the planet. Even moderately sized organisms from low gravity worlds, however, will typically have significant problems thriving on higher gravity worlds.

Because of the factors discussed above, both gravity (determined by planet size and density) as well as atmospheric density will play significant factors in determining the sizes and modes of transport of living organisms. Aquatic organisms are insulated from the effects of gravity compared to terrestrial creatures. Fliers and walkers tend to be larger on low gravity worlds and smaller on high gravity ones. Fliers are also larger in denser atmospheres as it is easier to support their weight. However, even plants might have issues in thin

atmospheres of small planets. If they grow too high, the amount of gas available in the upper reaches would decrease and the incidence of harmful radiation would also be significantly higher if plants reach too tall a height. These criteria should then modify the standard tables based on these additional world characteristics.

Animals and Characteristics

Animals have several characteristics similar to sophonts, but there are several key differences:

Instinct: Instinct is the animal equivalent of Education. Animals apply their Instinct DM to tasks such as sensing prey or solving problems. It may be a combination of learned as well as inborn behaviors.

Pack: Pack is the animal equivalent of Social Standing. The higher a creature's Pack score, the larger the group that it is associated with, and the more standing the creature has in that group. Pack affects the number of individual animals found together.

Planetary Themes

A world's ecology can be extremely diverse. However, the Referee may elect to implement specific themes on a planetary basis, to create consistency and flavor in presentation. Distinctive features help make each world stand out to the players as unique experiences. These could range from basic symmetry to reproductive methods (and the associated genders), from the number of limb pairs to the common sensory organs. The implementation of a planetary theme lies at the discretion of the Referee.

Step One: Choose a Terrain

Terrain has an impact on the type of animals one might encounter. Giant aquatic creatures are not found in forests, after all, nor are feathered flying creatures found at the bottom of the ocean.

Table: Terrain DM Chart

Terrain	subtype DM	size DM	1	2	3	4	5	6
Clear	+3	0	W	W	W	W	W+2	F-6
Plain or Prairie	+4	0	W	W	W	W+2	W+4	F-6
Desert (hot or cold)	+3	-3	W	W	W	W	F-2	F-4
Hills, Foothills	0	0	W	W	W	W+2	F-4	F-6
Mountain	0	0	W	W	W	F-2	F-4	F-6
Forest	-4	-4	W	W	W	W	F-2	F-4
Woods	-2	-1	W	W	W	W	W	F-4
Tundra	+2	+1	W	W	W	W	W+2	F-6
Rainforest	-2	-2	W	W	W	W+2	W+4	F-4
Rough, Broken	-3	-3	W	W	W	W+2	F-2	F-4
Swamp, Marsh	-2	+4	S-6	A+2	W	W	F-4	F-6
Beach, Shore	+3	+2	S+1	A+2	W	W	F-4	F-6
Riverbank	+1	+1	S-4	A	W	W	W	F-4
Ocean shallows	+4	+1	S+4	S+2	S	S	F-2	F-4
Open ocean	+4	-2	S+6	S+4	S+2	S	F-2	F-4
Deep ocean	+4	+2	S+6	S+4	S+3	S+2	S	S-2

The Terrain DM Chart details modifiers for animal subtypes and sizes. In addition, the result of 1d6 determines the basic movement for a given creature (A for Amphibious, F for Flight, S for Swimming, and W for Walking). Some movement codes have a number after them; these are an additional Size DM for the animal. For example, mountainous terrain does not have any general subtype or size modifiers on the table. Based on a d6 roll, the animal will be either a walker (1-3) or a flyer (4-6). Depending on the roll, the flyer may have a size modifier of -2, -4, or -6 depending upon the roll.

Gravity and Atmosphere Size Modifiers

Walkers and fliers receive a +/-1 size modifier per 10% difference from 1 standard gravity (1.00g).

Fliers receive a -4 size for very thin atmosphere, -2 size for thin atmosphere, and +2 size for dense atmosphere.

Step Two: Determine the Animal's Type and Subtype

The Referee should then determine the animal's type and subtype. If the Referee is building up an encounter table, the animal's type is obvious: the type necessary to fill in this entry on the encounter table. Otherwise, the Referee must choose an appropriate type: Carnivore, Herbivore, Omnivore or Scavenger. The Referee might also roll on the 1d6 Animal Encounter Table Template to randomly choose an animal type.

Once the animal type has been determined, the Referee rolls 2d6 and adds in the terrain's Subtype DM. After that, the Referee consults the Subtype by Animal Type table under the column of the animal's type to determine the animal's subtype.

Table: Subtype by Animal Type

2d6	herbivore	omnivore	carnivore	scavenger
<2	filter	gatherer	pouncer	carrion-eater
2	filter	eater	siren	reducer
3	intermittent	gatherer	pouncer	hijacker
4	intermittent	eater	killer	carrion-eater
5	intermittent	gatherer	trapper	intimidator
6	intermittent	hunter	pouncer	reducer
7	grazer	hunter	chaser	carrion-eater
8	grazer	hunter	chaser	reducer
9	grazer	gatherer	chaser	hijacker
10	grazer	eater	killer	intimidator
11	grazer	hunter	chaser	reducer
12	grazer	gatherer	siren	hijacker
13+	grazer	gatherer	chaser	intimidator

Step Three: Note Modifiers and Skills by Subtype

Terran creatures that exemplify these specific subtypes are noted in brackets after the name. The Referee should make note of the characteristic modifiers and skills that are noted after the description – the exact level of skills varies depending on the particular creature.

Carrion-Eater (vulture): Scavengers which wait for all other threats to disperse before beginning. Carrion-eaters have Recon. Instinct +2.

Chaser (wolf): Animals which kill their prey by attacking and exhausting it after a chase. Chasers have Athletics. Dexterity +4, Instinct +2, Pack +2, damage +2.

Eater (army ant): Eaters will eat anything they encounter, including characters. Endurance +4. Pack +2, damage +1.

Filter (earthworm): Herbivores which pass their environment through their bodies are termed filters. Unlike grazers, which move to food, filters move a flow of matter through themselves and filter out the food. Endurance +4, damage -2.

Gatherer (raccoon, chimpanzee): Gatherers are herbivores that collect and store food. Gatherers have Recon. Pack +2, damage -1.

Grazer (antelope): Grazers move from food source to food source, often in large packs. Their primary form of defense tends to be fleeing danger. Instinct +2, Pack +4, damage -2.

Hijacker (lion): Scavengers which steal the kills of others through brute force or weight of numbers are hijackers. Hijackers have Melee. Strength +2, Pack +2, damage +2.

pack	no. appearing
0	1
1-2	1d3
3-5	1d6
6-8	2d6
9-11	3d6
12-14	4d6
15+	5d6

Hunter (baboon): Opportunistic predators that stalk easy prey. Hunters have Survival. Instinct +2, damage +1.

Intermittent (elephant): Herbivores that do not devote their entire time to searching for food. Intermittents have Pack +4, damage -2.

Intimidator (coyote): Scavengers which establish their claim to food by frightening or intimidating other creatures and have damage +1.

Killer (shark): Carnivores that possess a raw killing instinct, attacking in a frenzied manner. Killers have Melee and either Strength or Dexterity +4, Instinct +4, Pack -2, damage +2.

Pouncer (cat): Pouncers kill by stalking and ambushing their prey. Pouncers have Recon and Athletics. Dexterity +4, Instinct +4, damage +1.

Reducer (vermin): Reducers are scavengers that act constantly on all available food, devouring even the remains left by other scavengers. Pack +4, damage -1.

Siren (venus fly-trap): Sirens create a lure to attract prey. Usually, this lure will be specific to the species the siren preys on, but some rare lures are universal. Pack -4.

Trapper (spider): An animal which allows its prey to enter a trap. Generally, any creature surprised by a trapper is caught in its trap. Pack -2.

Step Four: Determine Animal Size and Characteristics

For each creature, roll 2d6 for its Size and apply any Size DMs based on terrain and movement. The creature's Size determines its Weight, Strength, Dexterity and Endurance – for example, a roll of 7 means that the creature has a mass of 100kg, a Strength score of 3d6, a Dexterity score of 3d6 and an Endurance of 3d6.

Intelligence for most animals is 0 or 1. Roll 2d6+DMs for the animal's Instinct and Pack. To determine the number appearing value, consult the Number Appearing by Pack Characteristic Score table.

All animals have at least Athletics 0, Recon 0, and Survival 0, and most will have at least 1d6 ranks split among these skills, Natural Weapons, and any skills listed in their behavior.

Table: Animal Size

2d6	weight (kg)	Str	Dex	End
<2	1	1	2d6	1
2	3	2	3d6	2
3	6	1d6	3d6	1d6
4	12	1d6	4d6	1d6
5	25	2d6	3d6	2d6
6	50	2d6	3d6	2d6
7	100	3d6	2d6	3d6
8	200	3d6	2d6	3d6
9	400	4d6	2d6	4d6
10	800	4d6	2d6	4d6
11	1600	5d6	2d6	5d6
12	3200	5d6	1d6	5d6
13	5000	6d6	1d6	6d6
14	10,000	6d6	1d6	6d6
15	15,000	7d6	1d6	7d6
16	20,000	7d6	1d6	7d6
17	25,000	8d6	1d6	8d6
18	30,000	8d6	1d6	8d6
19	35,000	9d6	1d6	9d6
20+	40,000	9d6	1d6	9d6

Table: Animal Armor

2d6	armor
<4	0
4-5	1
6-7	2
8-9	3
10-11	4
12-13	5
14-15	6
16+	7

Step Five: Determine Animal's Weapons, Armor and Base Speed

Weapons: When generating weapons, roll 2d6 and consult the Animal Weapons table. Add a +8 DM if the animal is a Carnivore, and a +4 if it is an Omnivore; subtract a -6 DM if the animal is an Herbivore. Scavengers automatically have teeth but may have other weapons as well. If a number is present after the Weapons type, then add that number to the number of damage dice the creature rolls. Damage from attacks depends on the creature's Strength score. Animals do a base 1d6 damage per 8 Str, with Str 1-3= 1d6-3, Str 4-5= 1d6 -2, and Str 6-7=1d6-1. The remainder of Str/8 determines the number of pips added, with 0-2 = +0, 3-5 = +1, and 6-7= +2. Thus an animal with 27 Str will do 3d6+1 damage (27/8= 3d6 and a remainder of 3 adding +1).

Armor: When generating an animal's armor, roll 2d6-7, and add the animal's Size result (the die roll result that determined the animal's size, not the actual weight of the animal.) Add a +4 DM when rolling for armor if the animal is an Herbivore, and a +2 if it is a Scavenger; apply a -2 DM if the animal is a Carnivore. Also, Flyers suffer a -2 DM when determining armor. Consult the Animal Armor table for the animal's armor rating.

Base Speed: An animal's base speed is determined from a base speed dependent upon the animal subtype, and then adding the variable speed modifier. For comparison, a normal human's base speed is 6 m/sec per minor action. Fliers gain an additional bonus of *2 to their speed. It is hard to outrun a flier.

Table: Animal Speed Multiplier by Subtype

Type	base speed	variable
Carnivore		
Chaser	7.5	+d6*1.5
Killer	4.5	+d6*1.5
Pouncer	4.5	+d6*1.5
Siren	3	+d6*1.5
Trapper	3	+d3*1.5
Herbivore		
Filter	0	+d3*1.5
Grazer	4.5	+d6*1.5
Intermittent	3	+d3*1.5
Omnivore		
Eater	3	+d6*1.5
Gatherer	3	+d3*1.5
Hunter	4.5	+d6*1.5
Scavenger		
Carrion-eater	3	+d3*1.5
Hijacker	4.5	+d3*1.5
Intimidator	3	+d3*1.5
Reducer	1.5	+d3*1.5

Table: Animal Weapons

2d6	weapons
<2	hooves
2	hooves and horns
3	horns
4	hooves and teeth
5	horns and teeth
6	thrasher
7	claws
8	teeth
9	claws and teeth
10	claws +1
11	stinger
12	teeth +1
13	claws +1, teeth+1
14	claws+1, stinger+1
15	claws +2
16	teeth +2
17	claws+2, teeth+2
18	claws+2, stinger+2
19+	projectile

Universal Animal Format

The following format is used to represent animal's basic game statistics in the 2d6 OGL rules.

- [Animal Name; optional]
- [Size]kg [Subtype] ([Type]), [Terrain] [Locomotion], [Animal UPP, replacing Education with Instinct and Social Standing with Pack], #App: [Number Appearing]
- [Animal Skill List, in alphabetical order, with skill levels listed after skill names]
- [Animal weapons]; [Animal armor]; Speed: [Speed]m
- [Animal Description; optional]

For example, this creature could represent a tough little flying alien pest that loves to shred things and eat them:

Clawed Seagull
 6kg Eater (Omnivore), Hill Flyer, 6A5168, #App: 2d6
 Athletics-0, Melee(Natural Weapons)-1, Recon-1, Survival-2, Flyer-1
 Claws (2d6); Hide (1); Speed: 6m

Animals in Combat

Unless otherwise noted, animals operate just like characters in combat. Stingers, teeth, and thrashers work at close quarters, while claws, hooves, and horns have extended reach. Animals using projectiles are treated as thrown weapons and may use either the athletics or natural weapons skill. Note that many animals do not want to fight, but will fight to protect themselves, their offspring or mates (sometimes), territory, or food depending upon their instincts. Just because an animal is 'wild' does not mean that it is hostile.

Creating Encounter Tables

The system for creating animals in the 2d6 OGL rules can be used to generate creatures on the fly. However, the system works best when the Referee prepares an encounter table for each terrain likely to be encountered. This not only gives the Referee statistics for wilderness adventuring, but also provided a large amount of potential background data for expanding the world within the universe the Referee has created. To create an encounter table, first the Referee should select a table format. Although an encounter table can be in whatever format the Referee desires, the two formats most commonly used are represented in these rules as the 1d6 Template Encounter Table Template and the 2d6 Template Encounter Table Template. Note that the Templates only provide an animal's type (carnivore, herbivore, omnivore or scavenger), and in the case of the 2d6 table, an 'event'. Events may be anything from geological features to weather to unusual natural phenomena and should be tailored to the particular situation. Randomly encountering a newly erupting volcano in the middle of a plains (without a really good reason!) might interfere with the player's suspension of disbelief.

1d6 Template Encounter Table

1d6	Animal Type
1	scavenger
2	herbivore
3	herbivore
4	herbivore
5	omnivore
6	carnivore

2d6 Template Encounter Table

2d6	Animal Type
2	scavenger
3	omnivore
4	scavenger
5	omnivore
6	herbivore
7	herbivore
8	herbivore
9	carnivore
10	event
11	carnivore
12	carnivore

These encounter tables are templates only and need not be followed slavishly. If players are scavenging equipment from a battlefield there very well may be a special encounter table with extra entries for scavengers, unexploded ordinance, valuable power packs, armor, etc. instead of lots of herbivores. In a more natural setting, however, herbivores generally make up the majority of the animals in an ecosystem and it is the carnivores which are least common. The carnivores should be able to prey on at least one of the herbivores, given that they need to be able to eat something in the area. These tables are meant as a guide to what might be found in a given type of terrain.

The **Hills Terrain Encounter Table** below is an example of a completed encounter table.

<u>2d6</u>	<u># app</u>	<u>mass (kg)</u>	<u>Subtype</u>	<u>Move</u>	<u>UAP</u>	<u>Weapons</u>	<u>Armor</u>
2	2d6	100	Hijacker (S)	W-12	9H91A7	teeth (1d6)	fur (2)
3	4d6	200	Gatherer (O)	W-6	CC816D	teeth (2d6)	scales (3)
4	1d6	25	Intimidator (S)	W-6	34A1DB	claws (1d6) + teeth (1d6)	hide (3)
5	3d6	100	Hunter (O)	W-6	D94184	stinger (2d6)	hide (2)
6	3d6	25	Grazer (H)	W-12	34A1DB	hooves (1d6) + horns (1d6)	shell (2)
7	3d6	6	Intermittent (H)	F-6	38217B	horns (1d6)	fur (1)
8	3d6	5000	Grazer (H)	W-12	N3M16B	hooves (3d6) + horns (3d6)	shell (7)
9	4d6	400	Chaser (C)	W-12	E8B1AE	claws (3d6) + stinger (3d6)	fur (1)
10			Event*			1d6x5m tall cliff	
11	2d6	800	Chaser (C)	W-12	AAD1A6	projectile (2d6)	hide (2)
12	1d6	3200	Killer (C)	W-12	B7G18A	teeth (3d6)	fur (3)

Using the Encounter Tables

Each day an adventuring band may possibly have one or more encounters with some animal life forms. As a general rule, the Referee will check for an encounter once while the band is traveling and once while the band is halted (for rest, exercise, encampment, or whatever). There is a one-third chance (5+ on 1d6) that an animal encounter will occur in any of the specified terrain types. The Referee may choose to modify this frequency depending on planetary or local conditions.

In addition, specific encounters at specific locations are always possible. For example, the Referee may already have populated a location (perhaps a ruin) with specific animals. These are not subject to normal random encounter rules. A colony of creatures that has eaten the previous scouts and taken over their ship as their new lair will defend their prize and their home.

By their lifeless nature, vacuum worlds (and any other world without life) tend to have encounter tables comprised primarily of events. On an airless world, events could include silt pools that operate like quicksand, magnetic anomalies, solar flares, thin crust that cracks under weight, or possibly tracks left by previous explorers might make up the majority of 'encounters'. Not all encounters need to be lethal. An outcropping of dazzling quartz crystals might provide an interesting diversion while the characters search for the weak distress beacon.

Animal Reactions in Encounters

When characters disturb an animal or otherwise draw attention to themselves while within its territory roll 2d6 and consult the Animal Reactions by Subtype table. If the result on the table is neither attack nor flee, then the animal stands still until provoked again, in which case roll again.

Table: Animal Reactions by Subtype

<u>Subtype</u>	<u>Attacks</u>	<u>Flees</u>
chaser (C)	if they outnumber the characters	5 or less
killer (C)	6 or better	5 or less
pouncer (C)	if it has surprise	if it is surprised
siren (C)	if it has surprise	4 or less

trapper (C)	if it has surprise	5 or less
filter (H)	10 or better, if possible	5 or less
grazer (H)	8 or better	6 or less
intermittent (H)	10 or better	4 or less
eater (O)	5 or better	4 or less
gatherer (O)	9 or better	7 or less
hunter (O)	if larger than an opponent 6 or better if smaller than all opponents, 10 or better	5 or less
carrion eater (S)	11 or better	7 or less
hijacker (S)	7 or better	6 or less
intimidator (S)	8 or better	7 or less
reducer (S)	10 or better	7 or less

Chapter 14: Social Encounters

An encounter is defined as an unexpected or casual meeting with someone or something. A large part of the Referee's job is the administration of encounters. Through encounters, the Referee presents information, opportunities and conflicts for the players to interact with, which is the core of any gaming session. There are a number of different types of social encounters: routine, legal, patron, random, rumor and scenario.

Encounter Tables: This chapter provides a number of encounter tables to serve as inspiration for the Referee. The Referee is encouraged to create tables more in line with their own universe or with the specific adventure they are running. Certain types of encounters may also be planned by the Referee as part of the adventure. Ideally the players should not be able to tell a random encounter from one that the Referee has been plotting for weeks.

Routine Encounters

Routine encounters involve meeting normal people while doing normal activities, such as interviewing potential crew members in a starport diner or buying new ammunition from the clerk in a gun shop. Such scenes are rarely important in and of themselves. From a roleplaying perspective, routine encounters create a background of expected behavior that make scenario encounters and random encounters stand out in comparison because of their unexpected content. Routine encounters help move characters logically from the time and place of one important scene to the next. They happen frequently, and are usually easily handled.

Scenario Encounters

Within the ClusterRPG rules, an adventure is defined as a story for players to experience, comprised of a series of related scenes or encounters. These related encounters are called scenario encounters, because they serve to further the plot of the adventure toward its climax. The Referee creates scenario encounters as dictated by the story they are telling with the players. How these encounters play out usually determines what direction the adventure is heading.

Legal Encounters

Legal encounters involve interactions with local planetary law enforcement. Some worlds have stricter laws than others. This is represented by the world's Law Level value. The higher the Law Level, the more likely that offworld visitors will be harassed by local law enforcement. When the Referee determines that a legal encounter happens, a local police officer will stop the adventurers and require identification. Further complications are at the Referee's discretion. Those complications may be brought about by the players if they mishandle the encounter. An offended bureaucrat or politician can make life 'interesting' for visitors.

Random Encounters

Random encounters offer players a sense of variety in their gaming experience. These encounters often include individuals pursuing goals that are unrelated to those of the adventurers themselves. From a roleplaying perspective, random encounters help create the illusion of a universe that exists outside of the adventurers experiences, thus creating a sense of verisimilitude. Players may have a hard time telling Random encounters from Scenario encounters, at least until that deceitful trader shows up for the third time...

Random encounters can be determined by rolling a D66 on a table such as the Random Encounters table below. Unique tables might be created for specific worlds or adventures. As with other social encounters, non-player character reactions may be determined randomly by the Referee or selected according to the nature of the situation. A random encounter can become a larger part of the story if it appeals to the players.

Table: Random Encounters

D66	Encounter	D66	Encounter
11	Adventurers	41	Political Dissident
12	Alien Starship Crew	42	Potential Patron
13	Ambushing Brigands	43	Public Demonstration
14	Bandits	44	Religious Pilgrims
15	Beggars	45	Reporters
16	Belters	46	Researchers
21	Drunken Crew	51	Riotous Mob
22	Fugitives	52	Security Troops
23	Government Officials	53	Servant Robots
24	Guards	54	Soldiers on Patrol
25	Hunters and Guides	55	Street Vendors
26	Law Enforcers on Patrol	56	Technicians
31	Local Performers	61	Thugs
32	Maintenance Robots	62	Tourists
33	Merchants	63	Traders
34	Military Personnel on Leave	64	Vigilantes
35	Noble with Retinue	65	Workers
36	Peasants	66	Referee's Choice

Patron Encounters

A patron is a non-player character that gives financial or other support to a person, organization, cause, or activity. Referees often use patrons as a tool to attempt to engage player characters in adventures. Patron encounters represent the beginning of an open-ended adventure idea, aka the hook. The patron provides the mission that serves as the basis for an adventure, as well as the reward for successfully completing it. This may be a one-off mission, or it might become a long running theme to tie various threads together.

Adventurers frequently seek out patrons as a source of employment. Less frequently, a patron may seek out the adventurers, based on their reputation. The Referee may roll a D66 on the Patron Encounters table or create one independently. Unique Patron Encounter tables might be created for specific worlds or adventures.

Table: Patron Encounters

D66	Potential Patron	D66	Potential Patron
11	Agent	41	Hunter
12	Athlete	42	Marine
13	Barbarian	43	Mercenary
14	Belter	44	Merchant
15	Broker	45	Navy
16	Bureaucrat	46	Noble
21	Celebrity	51	Physician

22	Colonist	52	Pirate
23	Con Artist	53	Politician
24	Corporate Executive	54	Rogue
25	Courier	55	Scientist
26	Diplomat	56	Scout
31	Drifter	61	Smuggler
32	Educator	62	System Defense Officer
33	Entertainer	63	Technician
34	Financier	64	Terrorist
35	Fugitive	65	Tourist
36	Hijacker	66	Referee's Choice

Format for Patron Encounters

Some Referees prefer to “wing it,” and consider little more than a patron’s name and the mission at hand. However, for those seeking a more detailed way of creating reusable patron encounters, the 2d6 OGL rules offers a fairly comprehensive format for recording patron encounters. This format identifies five specific elements for a given patron. These are:

- The patron’s name and role. Names can be changed if the patron encounter is reused.
- The skills and resources required to complete the mission
- The suggested reward for the mission
- The mission as described to the characters
- What’s really going on. Several possible variants are presented – either pick or roll for which situation is real. This is the key element that allows reusability.

Here is an example of a patron encounter captured in this format:

Bruce Ayala, Interplanetary Playboy

Required: Investigate, Streetwise; No special equipment required.

Reward: Cr500 a day, plus expenses; minimum of two weeks.

Players’ Information

Word on the street is that the famous holoivid star and interplanetary playboy Bruce Ayala is cruising the local bar scene. That night, Bruce Ayala, along with his entourage of publicists and models, staggers into the same locale as the party and buys a round for every offworlder. Over the course of the evening, he continually hounds the party for details of their exploits, always comparing their adventures to roles he's portrayed. Late into the evening, Ayala corners one of the party members and offers the crew a job, if it can be handled with discretion. He provides contact information, and arranges a meeting to discuss terms, if they are interested.

Referee’s Information

When Bruce Ayala achieved system-wide fame as a holoivid star, he admits that it went right to his head, and it cost him the love of a wonderful young woman by the name of Martha McKernan. He's kept tabs on Martha over the years through private investigators and the like, one of whom has reported that she's gone missing a few days ago. Ayala wants to hire the party to discretely investigate Martha's disappearance, locate the young woman and rescue her from whatever situation she might be in. He's concerned that his current media

distributor, Penultimate Productions, have pulled something, as he has been secretly planning to sign a new contract with a competitor, System Media Studios. That represents a great loss for Penultimate Productions, and Ayala feels that they are not above coercion to insure the holoivid star continues to bring them money. In all of the options presented below, further development is left to the discretion of the Referee.

1. All is as it appears. Bruce Ayala is correct; Penultimate Productions has discovered their star's clandestine plans. Slowly moving away from the verge of bankruptcy, the media distributor owes their recovery to Bruce Ayala's success in the box office. Worried that the star's departure could cost them everything, the executive producers have hired thugs to kidnap Martha McKernan and use her to force him to extend his current contract.

2. Sadly, Bruce Ayala is incorrect. His own agent, Cornelius Brass, has a gambling problem, a huge gambling problem. He's fallen in so much debt to the local crime syndicate that they've started threatening his life and the lives of his family, and the man has become desperate. Brass has arranged for the kidnapping of Martha McKernan, hoping to ransom her to enough Credits to pay off his debt and tuck away a tidy bankroll so he can continue his gambling habit.

3. Bruce Ayala has been less than truthful. He's been stalking the innocent Martha McKernan for years, using his fame and fortune to attempt to force her into marrying him. In an act of desperation, Martha has gone on the run, trying to make her way out of the star system undetected in an effort to find safety from Ayala's overwhelming attentions.

4. System Media Studios has kidnapped Martha McKernan as a form of leverage to use on Bruce Ayala in the event he changes his mind and backs out of the secret negotiations. They believe he is unaware of her disappearance, and only intend to reveal her status as a prisoner should he start entertaining the thought of extending his current contract with Penultimate Productions.

5. Martha McKernan has watched Bruce Ayala's meteoric rise to success with envy and jealousy. She feels scorned by the holoivid star, and every image of Bruce Ayala with some starlet has pushed her further into the depths of hatred and loathing. Martha has arranged her own "kidnapping", so that she can demand a costly ransom from Bruce. Any extended contact with Martha will reveal that she is not completely sane, and will likely go to extreme lengths to harm and humiliate Bruce Ayala.

6. Martha McKernan is actually on vacation, hiking deep in a wilderness preserve to get away from civilization for a few weeks. Edmund Sang, a private investigator employed by Bruce Ayala, has reported her missing simply to get more money from Mr. Ayala to "locate" her. When the party shows up and begins investigating, he realizes that he might get caught and so desperately attempts to redirect them, to avoid having his deception discovered. Sang's efforts to create a false trail points to the local crime syndicate, who do not take kindly to the party investigating their illicit activities looking for a girl they've never heard of.

Rumors

Rumors are best thought of as encounters with information rather than with people or events. Rumors often fill one of two different roles: they plant the seed for a potential new adventure, or they provide background information that makes the universe seem larger than just the character's experiences. Rumors can take many forms, including, but not limited to, graffiti on the walls, newspaper or online articles, overheard conversations, secret notes, and televised broadcasts.

Because rumors are encounters with information, the player character has no patron should they decide to pursue the rumor itself. If the matter doesn't pan out, the player character has no one to blame but herself. However, given the promise of potential reward, enterprising characters are likely to attempt to exploit the information they've uncovered. The problem is that rumors are usually unsubstantiated and often erroneous...

Table: Random Rumor Content

<u>D66</u>	<u>Encounter</u>	<u>D66</u>	<u>Encounter</u>
11	Background information	41	Minor fact
12	Background information	42	Misleading background data
13	Broad background information	43	Misleading background data
14	Broad background information	44	Misleading background information
15	Broad background information	45	Misleading background information
16	Completely false information	46	Misleading background information
21	General location data	51	Misleading clue
22	General location data	52	Obvious clue
23	General location data	53	Partial (potentially misleading) fact
24	Helpful data	54	Reliable recommendation to action
25	Important fact	55	Specific background data
26	Information leading to trap	56	Specific background data
31	Library data reference	61	Specific location data
32	Library reference (general information)	62	Specific location data
33	Library reference (general information)	63	Terminology
34	Major fact	64	Veiled clue
35	Major fact	65	Veiled clue
36	Minor fact	66	Referee's Choice

Influencing Attitudes

The Referee determines the starting attitude of any character the characters encounter during the game. The characters can then try to influence the character's attitude using Social Standing and various interaction skills, such as Liaison and Carousing. The Attitude Descriptions table describes the effects of character attitudes.

Table: Attitude Descriptions

<u>Attitude</u>	<u>Means</u>	<u>Possible Actions</u>
Hostile	Will take risks to oppose you	Attack, interfere, berate, flee
Unfriendly	Wishes you ill	Mislead, gossip, avoid, watch suspiciously, insult
Indifferent	Doesn't care either way	Socially acceptable interaction
Friendly	Wishes you well	Chat, advise, offer limited help, advocate
Helpful	Will take risks to aid you	Protect, back up, heal, aid, support

Characters can attempt to improve another's attitude, using a Difficult (-2) Social Standing-based check using the appropriate skill, usually Liaison. With a success, the character's attitude is improved by one step; with an exceptional success, the attitude improves by two steps. Note that a particularly bad influence check can

actually make a character's attitude worse. On an exceptional failure, the character's attitude shifts one step more Hostile. In general, a character can attempt to influence another character only once in any given scene. Players get to choose their characters' attitudes, and so interaction skills cannot force a player-character to behave in a specific way. Typically, the only way a player character can be forced into a particular behavior is through the use of psionics, leg irons, or some other external force.

Chapter 15: Starship Encounters

Space is amazingly vast, and starships are incredibly small in comparison. Aside from points where people tend to congregate, such as within 100 diameters of inhabited planets or potential refueling locations, the chances of encountering another vessel is small enough to essentially occur only at the Referee's discretion. Random encounters with intelligent beings in such areas are extremely unlikely, and player-characters would be correct in assuming that such an encounter was not a random occurrence. Referees are encouraged to simply use the Astrogation Encounter Type table for random encounters under such conditions, simply to avoid violating the players' suspension of disbelief by providing generally non-starship encounters.

However, within those regions of interplanetary space where people congregate, there's always a chance for a space encounter. As a general rule of thumb, the Referee should check for space encounters when entering or leaving such a region. Roll 1d6; on a 6, a space encounter occurs. Referees may determine the type of space encounter based on the events occurring within the game, or they may randomly determine the type of encounter by rolling 2d6 and consulting the Space Encounters table. Each entry on the Space Encounters table is supported by a sub-table; the Referee can roll 1d6 and consult the sub-table for a more specific example of a random encounter if needed. Like any random encounter system, if a result doesn't make sense for the current location in the game, then feel free to ignore it and roll again, or better yet, choose a result that does make sense.

Encounter Range

If two vessels randomly encounter each other while traveling in the depths of interplanetary space, the encounter will begin at Very Long range. More often, ships engage near a planet at Medium range. If the characters do not succeed in a Sensors check (as modified by any stealth efforts made by the other vessel), then the encounter begins at one range category closer (Long instead of Very Long, or Short instead of Medium). Most civilian vessels, as well as military vessels that are not currently engaged in maneuvers, have transponders that operate as an "Identification Friend or Foe" (IFF) system to differentiate friendly from enemy spacecraft on sensors. When these are active, other vessels gain a DM+4 on detection efforts. (It is generally against the law to operate a civilian vessel without such a transponder, but some ship crews have been known to disconnect their transponders when engaging in illicit activities.) Some encounters, such as the starship encounter types, ignore the general rules for range, and instead occur at a range determined by the Referee.

Space Encounter Descriptions

Most of the entries on the space encounter tables are self-explanatory. However, some encounters have special rules that require further explanation.

Comet: Dust and particles from the comet interfere with some sensors, imposing a DM-2 on Comms skill checks while in the comet's tail. An unusual object or vessel may be found at the heart of a comet, but such occurrences are very rare and reaching such sites imposes a risk of impact with space debris.

Debris from collision or attack, Lost equipment or garbage, and Micrometeorite storm: The vessel is in danger of being impacted by small objects with great force. The vessel suffers 1d6 damage for every point of the vessel's Thrust rating, unless the pilot succeeds in a Pilot skill check to avoid the debris.

Interplanetary dust cloud: Dust clouds may interfere with comms, sensors, or both, imposing a -2 on Sensors or Comms skill checks while in the cloud. The Referee may impose a second space encounter within the cloud, or simply impose a risk of impact with space debris.

Jettisoned cargo pod: For some reason, another vessel has jettisoned its cargo into space, generally to protect the safety of its crew from physical threats or legal actions. The contents of the pod can be determined randomly as per the trade goods rules in Chapter 7, and perhaps complications related to the situation.

Solar flares: Solar flares release tremendous amounts of electromagnetic energy (including harmful ultraviolet rays and X-rays), as well as highly charged protons and electrons. Being caught in a solar flare receives 1d6x100 rads every hour until the flares pass. Pilots have been known to try to hide in the radiation shadow of some celestial body, even small asteroids, to try and protect their ship.

Starship Encounters

2d6	Encounter Type
2	Alien Vessel
3	Derelict
4	Space Habitat
5	Astrogation
6	Space Junk
7	Merchant Vessel
8	Personal Vessel
9	Hostile Vessel
10	Military Vessel
11	Spacecraft
12	Referee's Choice

Alien Vessel Encounter Type

1d6	Encounter Type
1	Alien courier
2	Alien frontier trader
3	Alien merchant freighter
4	Alien military vessel
5	Alien raider
6	Alien research vessel

Astrogation Encounter Type

1d6	Encounter Type
1	Asteroid (inhabited)
2	Asteroid (uninhabited)
3	Comet
4	Interplanetary dust cloud
5	Micrometeorite storm
6	Solar flares

Derelict Vessel Encounter Type

1d6	Encounter Type
1	Escape pod or life boat
2	Merchant vessel
3	Military vessel
4	Personal vessel
5	Research vessel
6	Space habitat

Hostile Vessel Type

1d6	Encounter Type
1	Captured merchant vessel
2	Captured military vessel
3	Enemy military vessel
4	Raider
5	Ship in distress (false)
6	Ship in distress (true)

Merchant Encounter Type

1d6	Encounter Type
1	Frontier trader
2	Frontier trader
3	Merchant freighter
4	Merchant liner
5	Merchant trader
6	Merchant trader

Military Vessel Encounter Type

1d6	Encounter Type
1	Corvette
2	Destroyer
3	Patrol frigate
4	System defense boat
5	System monitor
6	Warship (1: Dreadnought; 2-3: Heavy cruiser; 4-6: Light cruiser)

Pers. Vessel Encounter Type

1d6	Encounter Type
1	Asteroid miner
2	Courier
3	Research vessel
4	Survey vessel
5	Unusual ship
6	Yacht

Spacecraft Encounter Type

<u>1d6</u>	<u>Encounter Type</u>
1	Cutter
2	Launch or life boat
3	Fighter
4	Pinnacle
5	Ship's boat
6	Shuttle

Space Habitat Encounter Type

<u>1d6</u>	<u>Encounter Type</u>
1	Medical facility
2	Military facility
3	Orbital factory
4	Orbital habitat
5	Refueling station or spaceport
6	Research facility

Table: Space Junk Encounter Type

<u>1d6</u>	<u>Encounter Type</u>
1	Astrogational buoy or beacon
2	Communications satellite
3	Debris from collision or attack
4	Defense satellite
5	Jettisoned cargo pod
6	Lost or abandoned equipment or garbage

Chapter 16: Refereeing the Game

The Referee is the person who takes responsibility for running a ClusterRPG game. The Referee creates the adventure, runs the players through it, takes on the roles of the various characters the characters meet, and handles any questions about the rules. While running the game is a big responsibility, it's not as hard as it might seem, and providing a fun and entertaining game for your friends can be quite rewarding.

The rules of the 2d6 OGL provide a comprehensive outline for the basic activities confronting any character in the universe you are creating. These rules are necessarily brief and admittedly omit many possible activities. After all, a roleplaying game cannot ever attempt to provide adequate rules that govern the entire universe. In the hands of players and a Referee, however, the ClusterRPG rules allow broad leeway in creating a setting and game that suits many different tastes. This chapter is about helping you as the Referee run your games. The advice found within this chapter is completely optional; feel free to use it or ignore it as you like.

Rule Zero

Remember that it is just a game. The most important thing in it is to have fun, both for you and your players, and everything else is secondary to that. So if a rule, a plot, or even realism and consistency get in the way of your fun or that of your players, it is your right and duty as the Referee to change it. As a Referee, you, not the rulebooks, are the final arbiter in your game. This is a serious responsibility, but also a great freedom: the freedom to create and run an entertaining game that suits your needs and the needs of your group. If you and your players are enjoying yourself, you are doing things right, even if you are ignoring or modifying the rules and even if your game is not necessarily realistic or even self-consistent. With that in mind, the most important rule of the game, dubbed Rule Zero in the 2d6 OGL rules, is that the Referee always has the right to modify the rules. As a Referee, your rules modifications can be as simple and improvised as “um, grab some dice, roll them, and tell me the number” or involve extremely complex homebrew charts that dictate the smallest of details. This is your game, after all.

Gaming Style

Every gamer tends to enjoy a specific gaming style. Some people are consummate “Role-Players”, gaining a lot of pleasure from character development and interaction. Others are intense “Combat Monkeys”, finding that an action-packed cinematic frenzy of laser bolts and hand grenades meets their gaming needs. Some players are “Puzzle Solvers”, finding the mental challenges of riddles, logic problems, puzzles and mystery adventures to be the perfect balm. Most of us are a mix of all of the above, in differing proportions and varying levels of interest and intensity.

As a Referee, it is recommended that you bear in mind that all styles of play are valid. If everyone is an action fan, combat-heavy games work well. Roleplaying the group’s interactions with shopkeepers can be entertaining, as well. For some, delivering long angst-ridden poetry in-game can be fulfilling. Intraparty conflict might be a good thing, with the right group of gamers. Even violating the advice found in these rules is perfectly okay, so long as the entire gaming group is having fun. Remember Rule Zero! Be aware of what you and your players want. If you want something different from your players, something is going to have to change. Logically, it should be the group in the minority, which in this case would be you as the Referee. Similarly, if a single player wants a different style of play, if it can't be easily integrated, don't force the issue. Sometimes players or Referees don't fit a particular gaming group's style. It does not make anyone wrong; things just did not work out or come together for that particular game.

Improvisation

One of the keys to successfully running a 2d6 gaming session boils down to your ability to improvise when circumstances so dictate. You can certainly plan everything out for your session, to the degree with which you

are comfortable. However, at some point in time, whether intentionally or accidentally, you are going to have to improvise a scenario that you did not plan in advance. Maybe the mercenary rolled poorly in that last combat, dying during the previous encounter, and the corporate executive that hired the adventurers only made the deal with him. Perhaps the party decides to pursue another adventure, which you had not yet prepared, half-way through the current one, based on a clue they found in the second encounter of the evening. Whatever the reason, you should be prepared as a Referee to improvise as needed to keep the session moving.

A common misconception exists that improvisation during a game and preparation for a game are two opposed approaches. To the contrary, the more efficiently you prepare for the game, the easier it will be for you to improvise and “wing it” during actual play. The key to efficient preparation is not deciding ahead what the characters will do (leave that to the players), but rather creating material which would both allow the players to do exciting things and which will allow you to easily set up challenges, encounters, NPCs, locations and plots that will fit the flow of the game. This might sound like a lot of work at first but is actually much simpler, the key here is to create flexible material which will fit different plot lines, different locations and different uses with ease. In today’s world, spare time and inspiration tends to come at unexpected and irregular times. Carry a small notebook with you. Whenever an idea for whatever part of your game strikes your mind, jot it down in the notebook.

Later on, when you happen to have a little more spare time, look these ideas and develop the ones you like a little bit more. Organize a binder at home (or a directory on your computer), with different partitions (or electronic files) for NPCs, locations, creatures, locations and plot hooks. Each item (NPC, location etc) you develop shouldn’t be long, a few sentences per item will work in most cases (remember that most stats for a character or creature will fit in a small paragraph, if not a single sentence.) Keep these well-organized and these could be used whenever you need them in-game or in a short-term preparation for the game. The same goes for location maps you happen to doodle during work, while riding public transit or while attending boring classes or lectures, nothing of this kind should go to waste. Most of the adventure elements you prepare, even locations or NPCs intended to be used in a specific plot line, should be designed in such a way that it will be easy to ‘recycle’ these elements for use in different circumstances in the event you don’t use that element in the intended plot or location. Players have a tendency to miss the stuff you’ve labored hard to create, so be prepared to make a few changes to all the unused bits and pieces of previous adventures to use in the next ones.

Improvisational Preparation

It is definitely possible to prepare in advance for improvisation. It is suggested that Referees consider preparing the following for their adventure or campaign:

A list of random names for NPCs, locations and vessels can serve any Referee well. Take them from any source you like, your imagination, baby-name sites, even phone books, but it always helps to have a quick source of names for the people and places you have to create on the fly rather than just calling them “this guy” or “that tower”. That way, when the characters ask a random citizen for their name, you can easily choose one from your list, provide it to the group and then cross it off. Having the ability to name a character or place quickly helps establish a strong sense of depth and internal consistency within your setting.

Many Referees also find it helpful to keep **a small collection of generic locations and encounters** on hand, in case the party decides to go in an unexpected direction. It is perfectly okay to use adventures or modules that you find online or in the products you own. If you can create a few easy-to-place encounters beforehand, this could also prove to be very useful. Your goal here is simply to have activities for the characters to do through

the rest of the given gaming session. You can always recoup and plot a better strategy for this new direction the players have taken between sessions. These little scenarios just give you a delaying tactic that lets you entertain your players at the same time.

A collection of stat blocks for stock NPCs, perhaps expanding on the small collection found later in this guide, can provide you with potential allies, contacts, rivals, enemies, bystanders and potentially even ready-made player-characters should the need arise over the course of the gaming session.

Creating a **reference sheet** of the player-characters' important combat statistics can help you evaluate the impact of an encounter or challenge when you have to improvise a scenario on the fly.

A notebook or electronic document for **session notes** can help you capture the details you've created for your campaign or adventure, either on the fly or through early preparation. With this, you are more likely to provide a consistent and vibrant gaming experience.

Recycling Game Material

As preparation time is limited for most Referees, you may find it of good benefit to maximize your effective use of material and rules while minimizing the time devoted to creating new non-player characters, vessels, adventures or locations from scratch. The generality of the 2d6 system is of great help here, as the rules are relatively simple and abstract; a major part of each animal, location, vessel or character is nothing but narrative, and narrative is easy to change. This is called "reskinning". By changing the narrative, the stat block for a veteran mercenary might be reused as an alien hunter with little or no modifications to the game mechanics.

A good example is the use of location floor plans. If, for example, you've downloaded or bought detailed floor plans for a particular location (or a product including these floor plans) or perhaps you've found them online, you can use them in more than one way. If the floor plans originally detailed the hidden base of some human space pirates, you can still easily modify them to be used for an alien fortress, for the remnants of a research facility devastated by a natural disaster, or even for a private mansion for an eccentric corporate executive. The map can remain the same, or largely the same, but the description can change the perception of the players.

Running the Game

The first rule of any RPG system is to have fun. A good Referee will make a reasonable effort to create a gaming experience that is fun for everyone. The following guidelines might help with that.

Assigning Difficulties

At the core of every ClusterRPG adventure lies a sequence of tasks that the character must accomplish in order to succeed. The Referee is in charge of assigning the difficulty of these tasks, and then interpreting the outcome. The default is Average (+0). Make a task easier if you want a particular task to be accomplished, but not be everyone. This will highlight characters with skill levels in an easy way. If you want to make a task challenging, but still feel comfortable with giving the players a good chance of success, set the Difficulty to Difficult (-2). Reserve Very Difficult (-4) and Formidable (-6) for very special circumstances, such as attempting the near impossible. As the Referee, you may not want to say "No" except in the most extreme circumstances, but assigning a Difficulty of Formidable (-6) is almost as good, and can create some interesting story developments and a sense of excited accomplishment should the character succeed.

Modifying the Roll or the Difficulty

There are two ways of making a task easier or harder: modify the character's die roll or modify the task's Difficulty. Generally speaking, circumstances affecting a character's performance, like having just the right tools

for the job or being forced to improvise, apply a modifier to the die roll. Circumstances making the task easier or harder to accomplish, like a favorable or unfavorable environment or a particularly demanding task, modify the Difficulty. If a condition applies to the character-- like knowledge, health, equipment, preparedness, and such-- it's usually a die modifier. It doesn't have to be too fine a line, since modifying the die roll or the Difficulty amounts to the same thing in the end: the task being easier or harder to accomplish.

Circumstance Modifiers

Some circumstances make a check easier or harder, resulting in a bonus or penalty that is added to the check result. The Referee can alter the odds of success in two ways:

- If a character has help, such as good tools, competent aids or other beneficial circumstances, she receives a +1 bonus to her skill check.
- If a character is hampered, such as having defective tools, incompetent assistance or other negative circumstances, he receives a -1 penalty to his skill check.

Automatic Successes

Sometimes it is just easier to assume the character automatically succeeds at a skill check. If the character has an applicable skill, and the results of the skill check do not impact the progress of the story, endanger the character, and the actual success or failure is not interesting, just assume the character succeeds and move on. Remember, the 2d6 rules suggest that the Referee should only call for checks:

- When the characters are in danger.
- When the task is especially difficult or hazardous.
- When the characters are under the pressure of time.
- When success or failure is especially important or interesting.

Using Opposed Checks

Opposed checks are a great way to create tension between two individuals. Suddenly, the players can target their attention on an NPC, and that helps with immersion into the game. Should two or more characters seek to do the same thing at the same time, or to resist one another's actions, use an opposed check. The highest check result wins.

That's Not in the Rules

Sometimes in the course of play, things come up that are not covered in the rules. When this happens, the Referee is responsible for these handling situations, making fair evaluations of what the characters do and deciding what happens as a result. As the Referee, you will need to quickly improvise a solution. The easiest way to do so is to simply decide if the suggested action is fun or not, and if it is fun, let it happen, then throw in a complication that adds to the enjoyment of the scene. Some Referees prefer a more mechanical approach. Identify a skill the covers the basic nature of the request, set a Difficulty of Average (+0) or Difficult (-2), and let them try. If nothing comes to mind immediately, ask the player to tell you what skill they would use to accomplish this task. If no skill appears to work, then choose the best characteristic, and have the player roll a characteristic check. However you decide to resolve it, the key here is to quickly address the request and keep the game moving forward.

Solo Play as Referee Prep Work

Many of the ClusterRPG rules can be leveraged for solo play. For Referees, this can turn building a universe of their own into a game in and of itself. What follows is a list of suggested activities that can prove to be fun in

and of themselves, as well as help Referees create new material for their personal adventures and campaigns. In addition, solo play can help Referees learn the rules and become more proficient for when they run games before a group of players. Solo play is not limited to Referees. Players can also learn the tendencies of the 2d6 ClusterRPG rules through solo play in those times when a Referee or gaming group is not currently available. How important is a +2 DM, anyway? Sure, a laser rifle does more damage than an automatic pistol, but how much does that really matter? Every game has its own issues, and knowing when they apply is important for the referee and player alike.

Character Creation

A Referee always needs non-player characters. Use the information in **Chapter 1: Character Creation** to generate new characters. These characters can easily become future patrons, random encounters, enemies, allies or simply background characters for any universe.

Personal Combat

Take some characters and use the rules from **Chapter 5: Personal Combat** to practice the combat system. Recreate scenes from science fiction or action movies using the characters, to get a feel for how the rules of combat work in various scenarios.

Starship Construction

Construct some starships and other vessels using the rules in **Chapter 8: Ship Design and Construction**. Build on various scales, to get an idea of how the different elements of starship construction work together. You can even use the information under Starship Revenues in **Chapter 6: Off-World Travel** to determine if your ships would be economically viable without outside assistance.

Space Combat

Take some vessels and pit them against one another using the space combat rules found in **Chapter 10: Space Combat**. Once again, feel free to recreate scenes from science fiction movies using the vessels, to get a feel for how the rules of space combat work in various scenarios.

Subsector Creation

Using the rules found in **Chapter 12: Worlds**, create a subsector and identify the systems within it. Generate and record the UWPs for every system or use try different settings for computer generation. After the worlds have been created, look over the subsector for possible communication and trade routes. If you are inspired, create some background information on the most interesting worlds.

Animal Encounter Creation

Choose a world from a list of UWPs, and expand on it. Create some maps of the planet's surface, and the build encounter tables for each terrain type on the map, using the rules found in **Chapter 13: Planetary Wilderness Encounters**. If you are so inclined, you can then pit some characters against the different animals you've created using the personal combat, so see how they might fare against player characters in the future.

Practice Trade and Commerce

Grab a 200-ton TL9 Merchant Trader and use the **Chapter 7: Trade and Commerce** rules to explore the economic environment of a generated subsector. Use the rules for passengers, freight and even speculative trading to get a feel for them. By tracking the revenue and expenses for the ship, it could give you an idea of where traders will focus their attentions within the subsector. If this is being played as a solo game, keep going until either the ship is paid for or the ship goes bankrupt. This is a good way to validate trade routes, and identify "stepping stone" worlds between strong markets in a subsector.

Patron Encounter Creation

The seed of most adventures within a ClusterRPG universe can be captured in patron encounters. Using the details of a subsector's list of UWPs, create and record some patron encounters using the format found under **Patron Encounters** in **Chapter 14: Social Encounters**. Think about science fiction and action-based movies, television shows and literature, and use those to inspire some of the patron encounters you create.

Chapter 17: Adventures

Players in a ClusterRPG universe are adventurers, plain and simple. They will seek out experiences and exploits, reveling in the thrill and excitement that comes from the pursuit of their goals. Their exploits encompass the entire potential for adventure that can be found in classic era science fiction. The opportunities are virtually limitless, restricted only by the circumstances of the scenario and the capabilities of the characters. The Referee generates and adjudicates encounters that make up the building blocks of these adventures. As the characters move from one adventure to the next, the stories create a campaign, set against a universe of the Referee's creation. Therein lays the core of a great roleplaying game experience.

Conflict

Stories are about conflict. Conflict doesn't have to be violent, but without a struggle of some kind, there is no story, and without a story, there is no true sense of adventure. The key to a great adventure is conflict. As a Referee, you should make sure you have conflict, and that the player characters are directly involved in that conflict. If there isn't any conflict, you lose the impetus for action. If the player characters aren't central to the action they are just watching a story, which sounds more like a movie or a play than a roleplaying game. Conflict doesn't have to be physical combat. It could just as easily be political or corporate intrigue, achieving a specific goal before the protagonist can either get there first or stop the characters from succeeding, handling courtly issues of a noble or legal nature, negotiating a diplomatic resolution to a larger conflict, and much more.

The Plot

The plot of the adventure is essentially the synopsis of the events that will transpire over the course of the adventure. You should be able to sum up the plot of your adventure in one sentence. Knowing your plot before you begin creating the adventure provides focus and direction, and creates context for the scenes you will create for your adventure. If you have problems in coming up with a plot for your adventure, you might look into Polti's "The Thirty-Six Dramatic Situations." It's an extensive list of basic plots that you can use as the basis for your own stories and adventures.

The EPIC Adventure System

The Epic Adventure System provides a way to design and organize adventures, that incorporates enough flexibility that the player characters have the 'freedom to roam' without causing the Referee nightmares. An Epic Adventure is broken down into 6 parts:

- Cast of Characters
- Background
- Minor Scenes
- Plot Keys
- Chapters
- Adventure Checklist

The Cast of Characters

The Cast of Characters describes the major characters encountered in the course of the adventure.

The Background

The Background section provides the Referee with the background information necessary to properly run the adventure, and lays the groundwork for introducing this adventure to the players.

Minor Scenes

Minor Scenes (usually just referred to as 'Scenes') or just Scenes, are encounters or events that involve the player characters in some form. Many are directly related to the adventure, and may provide clues, equipment, or other information and materials needed to eventually complete the adventure. Others are merely to provide diversion and amusement. Scenes, unless noted in their descriptions, do not need to be played in any particular order, and may be sprung upon the player characters when the Referee deems appropriate.

Plot Keys

Plot Keys (or simply 'Keys') make up the heart of the storyline for the adventure. They contain vital pieces to the plot that must be played for the adventure to make any sense to the players in the end. You may play any number of Scenes before and after each Plot Keys, but all of the Plot Keys should eventually be completed in their proper order.

Chapters

A Chapter (or 'Act') is made up of one or more Plot Keys, and probably one or more Scenes. They outline the plot to the Referee, and provide tips and information for playing the Scenes and Plot Keys that are contained in the Chapter. In order to complete a Chapter, each Plot Key within must be completed. Each Chapter must be completed, and played in order to successfully run the adventure.

Because of the 'cinematic' nature of an EPIC adventure, it is easy for the Referee to allow the player characters to temporarily deviate from the current adventure storyline to follow a false lead or pursue another short adventure that has interested them. When the player characters are ready to return to this adventure plot line, simply pick up with the next Scene.

Adventure Checklist

The Adventure Checklist provides the Referees with a recommended guideline of the order in which various Scenes and Plot Keys in this adventure should be presented to the players. As the characters complete each Scene or Plot Key, the Referee simply checks it off the list. When every Plot Key in a Chapter has been played, that Chapter has been completed and the Referee may begin the first Scene in the next Chapter. You will note that not every Minor Scene is included in the Checklist. This allows Referees who would like to use the Checklist, but would like to change things a little bit to swap out scenes, or include their own custom scenes. If you feel comfortable in letting your characters stray from the order of the Checklist, you may determine the 'cinematic' order of the scenes as you see fit, or use a weekly events chart like the Example Weekly Event table to determine the course of events. This example weekly events chart has been created for an adventure in which the characters spend several weeks in the outback searching for lost ruins in the hope of finding historical artifacts.

Table: Example Weekly Event

<u>2d6</u>	<u>Weekly Event</u>
2-8	Play a minor scene/find a ruin
9-11	starport run. The professor has an errand requiring the characters to go to the local starport
12	plot key

Explanation of Example Weekly Event entries:

Play a Minor Scene: Select one of the Minor Scenes and run the scene as directed.

Starport Run: This is an excuse and opportunity to bring in sideline encounters, patrons and scenarios unrelated to this adventure.

Play a Plot Key: Plot Keys should be plays in the correct order for the adventure to make sense to the players. If you change the order of the Plot Keys, you should be sure to adjust the other scenes to ensure that the adventure flows properly and makes sense.

Adventures in Five Acts

Many satisfying adventures have been inspired by the five-act structure of literary and dramatic creations. Made famous by Gustav Freytag's analysis of Shakespearean plays, the five-act structure lends itself well to basic adventures with only minor modifications. At its core, the five-act structure for adventures depends on five major scenes or Plot Keys: the Story Hook and Challenge, the Escalation, the Complication, the Climax and finally the Reward. Even though this structure is based on five Plot Keys, you can easily add or subtract as many minor scenes as the adventure you're creating calls for. Don't be afraid to deviate from this pattern as you become more comfortable with adventure creation.

The Story Hook

The key to the opening scene of any adventure is action. The story hook Plot Key should therefore be an action scene, involving either combat or some form of physical challenge. This draws the characters into the main conflict of the adventure's plot, and introduces the party to agents of the main antagonist. As this scene is wrapping up, you can either provide clues to the direction of the next Plot Key, or introduce a minor scene that ultimately points the party in the direction of the final climax of the adventure.

The Escalation

Now that you've met the needs of your more action-oriented players, you should create a series of roleplaying scenes or puzzle challenges that further escalate the plot, leading ultimately to a Plot Key that helps the players form a plan of attack for reaching the climax of the adventure. This allows non-combat characters an opportunity to shine. Investigation and information gathering make for excellent scenes in this regard. In addition, it provides the full roleplaying experience to the players, emphasizing why the group is playing a roleplaying game instead of a board game.

The Complication

Nothing is ever as straight-forward as it seems. The third major Plot Key introduces a complication to the party in fulfilling the needs of the plot. This Plot Key often requires the characters to expend resources, forcing them to decide on whether to spend their resources on this particular challenge or the big climactic challenge that is coming up next. In addition, this scene often introduces a plot twist or restriction that makes the resolution of this challenge and/or the climax that much harder.

The Climax

This Plot Key is the final showdown, the final fight with the primary antagonist of this story and his minions. This scene is most often a big fight or confrontation, but under the right circumstances, it could be a social or mental challenge instead. This is the big scene where everyone should have a chance to shine. It is suggested that this scene require a challenge more complex than "kill everyone", even if it's as simple as "kill everyone without any collateral damage to property or other persons". If the climax is a combat scene, the site for the climax should also include at least two different terrain features, to provide for some interesting situations that make such scenes memorable. While you don't want to overdo yourself, you also want to make this scene feel more exciting or important than the other scenes in the adventure.

The Reward

This scene is the dénouement, where the plot is wrapped up and the characters receive their reward for their victory, or experience the consequences of their failure, on those occasions where things didn't necessarily

work out. Often in ClusterRPG adventures, the reward is monetary. However, characters might instead earn titles, receive ship shares, gain political support, earn some form of social advantage, recover lost or hidden information, or even learn a campaign secret that could change the face of the world forever. Sometimes, there's a final plot twist here, such as a secret guardian guarding the reward or a false reward serving as a distraction from the true reward of the adventure. If you have ideas for a future scenario you'd like to offer the players, you can even drop the first hints of things to come in the reward scene, giving the characters motivation to pursue the clues that may well lead to their next daring adventure.

Other Suggestions

When creating your own adventures, keep things dense and concise. You will find that players have a knack for complicating things all by themselves, so don't feel a need to include a lot of false leads and irrelevant details. You can always improvise the additional of extra scenes as the need arises, but it is hard to work around a large number of required scenes if the adventurers suddenly take the adventure in a totally different direction.

The Three-Dimensional Campaign

Unless you're running a "one-shot" adventure, put in the effort to keep your setting, plot and adventure three dimensional. That is, even if your campaign has a very strong overarching plot, not everything has to be tied in to it directly. For example, if your campaign revolves around a massive struggle between two interstellar polities, there should be some NPCs, sub-plots, protagonists and even organizations that don't work directly (if at all) for any side of the overarching conflict. Not every protagonist in your game has to serve the enemy government, and not all good guys have to get along together very well.

The reason for this, besides realism, is that both you and your players will eventually want to take a break from the main plot and do something else, especially during a long campaign. Sometimes you'll want, say, to steal a high-tech prototype, and that research facility belongs to a third interstellar government that remains outside the overarching conflict; sometimes you'll just want to explore an old, forgotten ruin uncovered in the wilderness of a backwater planet, a place unrelated to the main plot. Besides, making two factions work together against a common enemy despite hating each other with a passion could be a cool adventure, and so could be playing one opposing faction against another without getting caught.

The Rule of Three

As a general rule of a thumb when creating background elements involved in conflicts, such as organizations, factions, political figures, etc., you will best be served by creating three of them. For example, when you're designing a power struggle in an interstellar government, you should probably have three factions. The typical war can be created with three opposing sides, even if one of them is simply a large band of pirates with goals at odds with the two "official" sides. Creating three elements vying for the same goal creates a greater degree of dynamic complexity, allowing for adventures that explore the different relationships between the three elements without reducing the conflict to a simple "black-and-white", two-dimensional confrontation. Three sides give you plenty of opportunity to explore shifting alliances, subversive practices, negotiations, alternate paths to personal success and greater variety in your scenarios.

The Cepheus Engine Compatibility-Statement License (CSL)

1. You must state on the first page where you mention Cepheus Engine that “Cepheus Engine and Samardan Press are the trademarks of Jason “Flynn” Kemp,” and that you are not affiliated with Jason “Flynn” Kemp or Samardan Press™.
2. If you’re using the license to commit legal fraud, you forfeit the right to continue using the license: specifically, if you are claiming compatibility with the rules of Cepheus Engine, the claim must not constitute legal fraud, or fraud in the inducement, under the laws of the State of Texas. Note that this requirement is almost impossible to violate unintentionally—it’s largely intended to keep me out of trouble, not to restrict legitimate statements of compatibility.
3. You must comply with the terms of the OGL if the terms apply.
4. Your cover must include the words “House Rules” or “Variant Rules” or “Alternate Cepheus Engine Universe” near the title if the document is a full, free-standing game that includes modifications. Feel free to contact the author if you wish to use a different form of disclaimer.
5. Selling a full version of this game with your house rules incorporated into it is perfectly permissible, but you may not sell an effectively unchanged copy of the rules for money.
6. If your document is a private house rules document, not being sold for profit or general use, you may scan and use artwork (including the cover) from the printed version, published in print under the title of **Cepheus Engine Core Rules**, provided that the cover contains the words “House Rules,” near the title, and that the artists are appropriately credited.
7. Your rights under this CSL cannot be revoked, and are perpetual, unless you breach the terms of the license, in which case your rights terminate.
8. If you comply with the above, you may state that your resource is “for use with the Cepheus Engine Core Rules”, “compatible with the core rules of Cepheus Engine” or “with the Cepheus Engine Core Rules.”

Declaration of Open Game Content

The following material has been released as Open Game Content:

- All text and tables in this document, with the exception of material specifically excluded in the declaration of product identity, is Open Game Content.

Declaration of Product Identity

The following material is considered Product Identity, and as such, does not fall under the Open Game License:

- any reference to M317 Cluster, its races, planets, subsectors, organizations, and religions

Open Game License Version 1.0a

The following text is the property of Wizards of the Coast, Inc. and is Copyright 2000 Wizards of the Coast, Inc (‘Wizards’). All Rights Reserved.

1. Definitions: (a) ‘Contributors’ means the copyright and/or trademark owners who have contributed Open Game Content; (b) ‘Derivative Material’ means copyrighted material including derivative works and translations (including into other computer languages), potation, modification, correction, addition, extension, upgrade, improvement, compilation, abridgment or other form in which an existing work may be recast, transformed or adapted; (c) ‘Distribute’ means to reproduce, license, rent, lease, sell, broadcast, publicly display, transmit or otherwise distribute; (d) ‘Open Game Content’ means the game mechanic and includes the methods, procedures, processes and routines to the extent such content does not embody the Product Identity and is an enhancement over the prior art and any additional content clearly identified as Open Game Content by the Contributor, and means any work covered by this License, including translations and derivative works under copyright law, but specifically excludes Product Identity. (e) ‘Product Identity’ means product and product line names, logos and identifying marks including trade dress; artifacts; creatures characters; stories, storylines,

plots, thematic elements, dialogue, incidents, language, artwork, symbols, designs, depictions, likenesses, formats, poses, concepts, themes and graphic, photographic and other visual or audio representations; names and descriptions of characters, spells, enchantments, personalities, teams, personas, likenesses and special abilities; places, locations, environments, creatures, equipment, magical or supernatural abilities or effects, logos, symbols, or graphic designs; and any other trademark or registered trademark clearly identified as Product identity by the owner of the Product Identity, and which specifically excludes the Open Game Content; (f) 'Trademark' means the logos, names, mark, sign, motto, designs that are used by a Contributor to identify itself or its products or the associated products contributed to the Open Game License by the Contributor (g) 'Use', 'Used' or 'Using' means to use, Distribute, copy, edit, format, modify, translate and otherwise create Derivative Material of Open Game Content. (h) 'You' or 'Your' means the licensee in terms of this agreement.

2. The License: This License applies to any Open Game Content that contains a notice indicating that the Open Game Content may only be Used under and in terms of this License. You must affix such a notice to any Open Game Content that you Use. No terms may be added to or subtracted from this License except as described by the License itself. No other terms or conditions may be applied to any Open Game Content distributed using this License.

3. Offer and Acceptance: By Using the Open Game Content You indicate Your acceptance of the terms of this License.

4. Grant and Consideration: In consideration for agreeing to use this License, the Contributors grant You a perpetual, worldwide, royalty-free, non-exclusive license with the exact terms of this License to Use, the Open Game Content.

5. Representation of Authority to Contribute: If You are contributing original material as Open Game Content, You represent that Your Contributions are Your original creation and/or You have sufficient rights to grant the rights conveyed by this License.

6. Notice of License Copyright: You must update the COPYRIGHT NOTICE portion of this License to include the exact text of the COPYRIGHT NOTICE of any Open Game Content You are copying, modifying or distributing, and You must add the title, the copyright date, and the copyright holder's name to the COPYRIGHT NOTICE of any original Open Game Content you Distribute.

7. Use of Product Identity: You agree not to Use any Product Identity, including as an indication as to compatibility, except as expressly licensed in another, independent Agreement with the owner of each element of that Product Identity. You agree not to indicate compatibility or co-adaptability with any Trademark or Registered Trademark in conjunction with a work containing Open Game Content except as expressly licensed in another, independent Agreement with the owner of such Trademark or Registered Trademark. The use of any Product Identity in Open Game Content does not constitute a challenge to the ownership of that Product Identity. The owner of any Product Identity used in Open Game Content shall retain all rights, title and interest in and to that Product Identity.

8. Identification: If you distribute Open Game Content You must clearly indicate which portions of the work that you are distributing are Open Game Content.

9. Updating the License: Wizards or its designated Agents may publish updated versions of this License. You may use any authorised version of this License to copy, modify and distribute any Open Game Content originally distributed under any version of this License.

10. Copy of this License: You MUST include a copy of this License with every copy of the Open Game Content You Distribute.

11. Use of Contributor Credits: You may not market or advertise the Open Game Content using the name of any Contributor unless You have written permission from the Contributor to do so.

12. Inability to Comply: If it is impossible for You to comply with any of the terms of this License with respect to some or all of the Open Game Content due to statute, judicial order, or governmental regulation then You may not Use any Open Game Material so affected.

13. Termination: This License will terminate automatically if You fail to comply with all terms herein and fail to cure such breach within 30 days of becoming aware of the breach. All sublicenses shall survive the termination of this License.

14. Reformation: If any provision of this License is held to be unenforceable, such provision shall be reformed only to the extent necessary to make it enforceable.

15. COPYRIGHT NOTICE

Open Game License v 1.0a Copyright 2000, Wizards of the Coast, Inc.

High Guard System Reference Document Copyright © 2008, Mongoose Publishing.

Mercenary System Reference Document Copyright © 2008, Mongoose Publishing.

Modern System Reference Document Copyright 2002-2004, Wizards of the Coast, Inc.; Authors Bill Slavicsek, Jeff Grubb, Rich Redman, Charles Ryan, Eric Cagle, David Noonan, Stan!, Christopher Perkins, Rodney Thompson, and JD Wiker, based on material by Jonathan Tweet, Monte Cook, Skip Williams, Richard Baker, Peter Adkison, Bruce R. Cordell, John Tynes, Andy Collins, and JD Wiker.

Swords & Wizardry Core Rules, Copyright 2008, Matthew J. Finch

System Reference Document, Copyright 2000, Wizards of the Coast, Inc.; Authors Jonathan Tweet, Monte Cook, Skip

Williams, based on original material by E. Gary Gygax and Dave Arneson.

T20 - The Traveller's Handbook Copyright 2002, Quiklink Interactive, Inc. Traveller is a trademark of Far Future Enterprises and is used under license.

Traveller System Reference Document Copyright © 2008, Mongoose Publishing.

Traveller is © 2008 Mongoose Publishing. Traveller and related logos, character, names, and distinctive likenesses thereof are trademarks of Far Future Enterprises unless otherwise noted. All Rights Reserved. Mongoose Publishing Ltd Authorized User.

Cepheus Engine System Reference Document, Copyright © 2016 Samardan Press; Author Jason "Flynn" Kemp

Cepheus Engine Vehicle Design System, Copyright © 2017 Samardan Press; Author Jason "Flynn" Kemp

Flynn's Guide To Alien Creation, Copyright ©2009, Jason "Flynn" Kemp.

ClusterRPG Rules, Copyright ©2022; Author Frank Miskevich