A WORLD-BUILDING SUPPLEMENT FOR CEPHEUS ENGINE

THE UNIVERSAL WORLD PROFILE

ZOZER

This is a revised and adapted edition of the 'World Creator's Handbook' which was previously published under the Traveller SRD licence.

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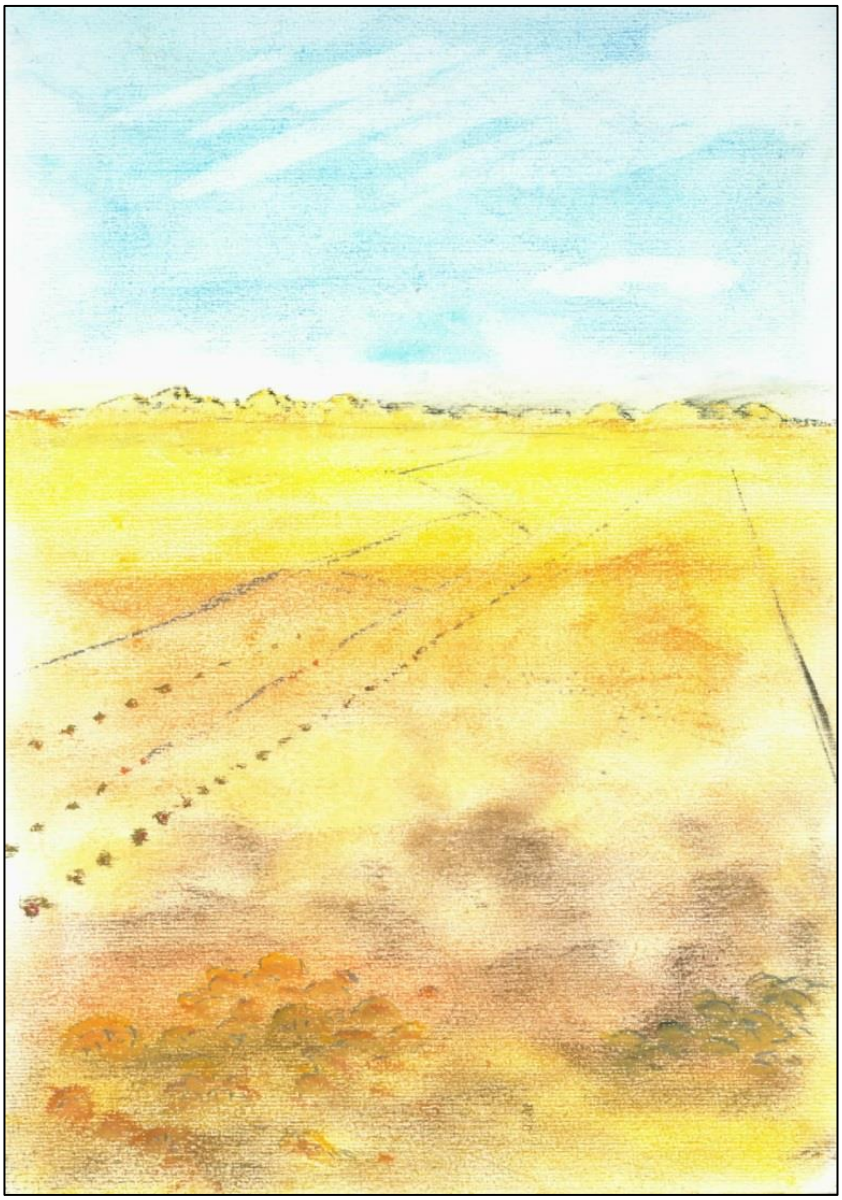
INTRODUCTION

THE UNIVERSAL WORLD PROFILE provides advice and assistance for any referee wanting to flesh out the bones of a Universal World Profile (UWP), to turn a random string of numbers into a memorable and exciting scenario setting. Cepheus Engine and the 2D6-based science fiction game it is derived from, is amazing, it is a tool kit that puts the creation of an entire universe into the hands of the players, allowing them to create heroes and villains, vehicles, starships, sectors of space, alien lifeforms and of course, the planets themselves. The mechanics for world creation, as detailed in the core book, have changed little since the classic era, and have proved robust and useful. However, a good deal of imagination is required to turn the numbers of the Universal World Profile into a unique and vibrant world filled with memorable locations that might harbour the potential for adventure.
This need to extrapolate, to interpret the data and fill in the blanks, has no doubt dissuaded many referees from creating their own subsectors within their own roleplaying universe. Here then is a step by step handbook to world creation and it goes without saying that you will need a copy of the Cepheus Engine Core Book on hand.

Is my advice any good? I am not a planetary scientist or an astrophysicist, but at college level I studied physical geography and human geography as well as geology, later starting a university degree in geological science. I dropped out, however, to begin a degree in ancient history, a subject that I have written many books about since. History and human geography (how societies interact with their environment) are of course key elements in designing a habitable world and this book will provide advice on how to design realistic societies that have been moulded by the landscape and the planet upon which they evolved.
Don't expect a technical treatise on planetary physics, though. You won't be dealing with albedo values, Bode's Law or complex square root calculations to determine the length of the world's orbital period. The push by members of the roleplaying community for extremely realistic methods of star and system generation is laudable. Modelling realistic star systems is virtually a past-time in itself. This book comes at world generation from another angle - from the perspective of plot. The player characters will most likely visit each world in the game's subsector at least once, so what is the hook, that memorable feature that either draws them there, or that they will remember after leaving? For any reader who hears that nagging voice in his head "each world should have a detailed, thorough and exhaustive description of its society and geography..." then think again. Do players really need to know the names of the ten biggest cities, or how many humans live in each one, how the army is organized, or the various levels of world government? The answer is no.

Realistically, how much do you know about an international destination you have visited just once, perhaps on vacation? Let's say you visit Jamaica. After having visited this holiday island for a week, do you know the name of the prime minister, or the names of its major cities and provinces? Do you know its history, decade by decade, the method it uses to elect its judiciary or the national level of literacy? Of course not. Why expect a player to pay the slightest bit of attention to these same facts? There are plenty of 'quick guides' to Jamaica on the internet, imagine if something similar existed for Deneb or Algol ...
The aim of THE UNIVERSAL WORLD PROFILE is to assist the referee in creating short descriptions of his worlds, useful for referees who are putting together a scenario, and for players who want to get their heads around the world quickly, so that they can make informed decisions in-game. There is no set worksheet that must be slavishly filled in by the



world creator because every planet will be unique. On one world its slavery laws may dominate the description, on another it may be a permanent continent-sized hurricane, on yet another a vast volcanic rift valley may be the focus. For each planet the hook will be developed and expanded, forming a core upon which you will build any additional layers of detail. Yet caution is required, although this is certainly not a lesson in astrophysics, we still don't want to fall into the trap of creating a 'jungle planet', an 'ice planet', a 'desert planet' and so on ... The worlds and their hooks must be rooted in good science so that they stand up to scrutiny. We want realistic, memorable and interesting worlds with which to populate our subsectors.

As a final note, the reader should not think he has to start investing in a library of geology, geography and history books, or that he must possess some kind of scientific training in order to build a believable world. The age of the internet has brought vast amounts of learning to our finger tips and you will rarely need to stray far from the pages of Wikipedia. The key to effective world building, addressed later on in this book, is to know what to search for and then, within each article, what to identify for maximum world building potential.

THE UNIVERSAL WORLD PROFILE begins with a short star system design method. It is extremely simple and quick to use, and sketches out the important aspects of the world's star system. Next the mainworld's UWP is explained in real world terms so that a referee can visualise the planet that it represents. What does 'Atmosphere 9' really mean for life on the surface? Will it have any impact on the humans who live there? The second half of the book discusses the procedure used to build worlds and provides three working examples of world-building. The process of creation is thoroughly explained, step by step, so that a referee can see the method in action.

STAR SYSTEMS

Planetary Bodies

Each system contains a minimum of one star and 2d6+2 planetary bodies. These bodies are located in orbits around the central star. To create a star system, first roll 2d6+2 and determine the number of planetary bodies that orbit the star. Make a note of these bodies, starting at Orbit 1, close to the star.

Other Stars

Many systems have two or even three stars and these additional stars orbit the central star either closely, or at a distance - far beyond the orbit of the planets and gas giants. Roll 2d6; on a 9+ the system is binary, whilst a result of 11 or 12 indicates the existence of a trinary (triple) star system. Where can these companion stars be found? For a binary system, roll 1d6. An 'odds' result indicates that the companion occupies Orbit 1, whilst an 'evens' result indicates that it occupies the orbit beyond the system's furthermost planetary body. For a trinary system the procedure is the same; roll 1d6. An 'odds' result indicates that one of the two companions occupies Orbit 1 and that the other sits out on the edge of the system, in the outermost orbit after the last planetary body. An 'evens' result indicates that both the second and third star both occupy the orbits beyond the system's furthermost planetary body.

Mainworld

The mainworld is placed next and its location determines the habitable zone of the system. Roll 1d6 and place the mainworld by counting out from the central star (or a companion, if a second star occupies Orbit 1).

Gas Giants

A star system may have one or more gas giant planets. The presence of a gas giant 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 are relatively common. For each system throw 5+ on 2D6 for at least one gas giant to be present in the system.

If gas giants are present then roll 1d6 to determine their number. A roll of 6 must be rerolled, and one of the rerolled gas giants must be placed into Orbit 1, becoming a 'hot Jupiter' that has migrated toward the Inner System. The other gas giants are placed by rolling 1d6 and counting in from the outer-most orbital body. An already occupied orbit cancels out the current attempt at gas giant placement, move on to the next one. If the orbit is occupied by the mainworld then roll 1d6; on 5-6 the mainworld orbits the gas giant as a moon. Otherwise place the gas giant one orbit further out.

Planetoid Belts

For each remaining planetary body that has not already been identified as a gas giant (or a star), roll 1d6. On a result of 6 the body is actually a planetoid belt. Do not check for the mainworld, these have been pregenerated. Planetoid belts exist in many systems, and are mined by belters for ice, ore and other interesting things. If the primary world of the system

is Size 0, then there's at least one planetoid belt in the system automatically. The Solar System contains a single major planetoid belt – our own Asteroid Belt, between the orbits of Mars and Jupiter.

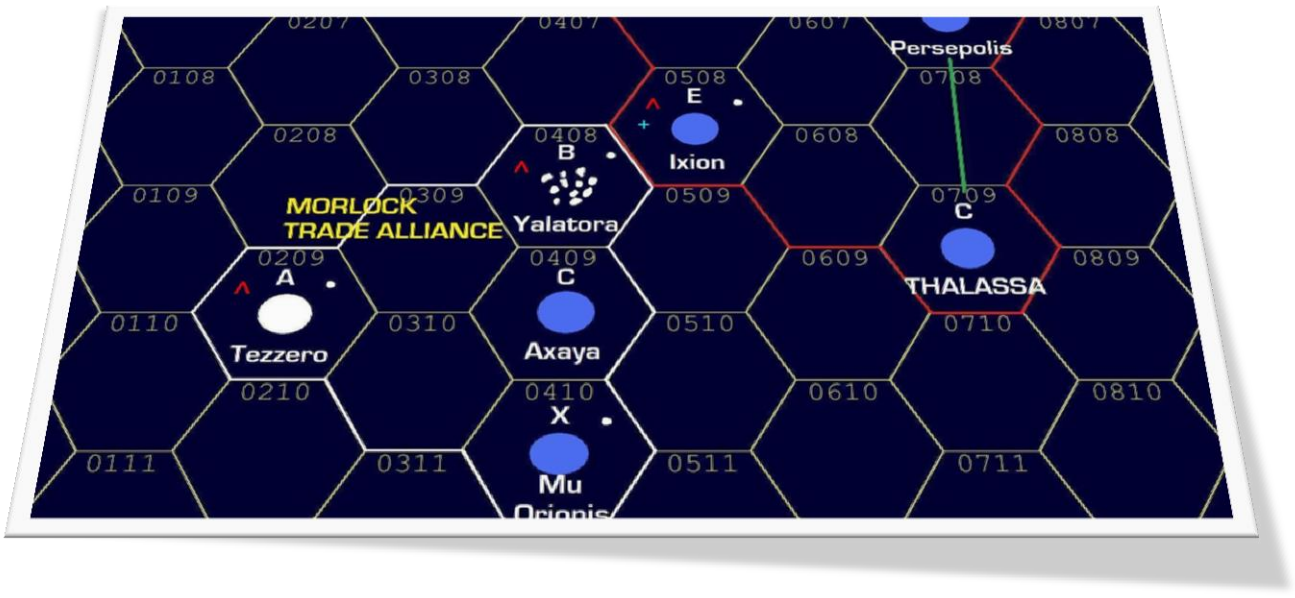
Planets

Anybody that remains after determination of companion stars, gas giants and asteroid belts is a rocky planet. Those within the Inner System (starward of the mainworld) typically have rocky surfaces, whilst those beyond the orbit of the mainworld, inside in the Outer System, are usually covered by sheets of ice. None of these worlds need be given specific characteristics unless they become important to the current game.

Star Mapping

For Cepheus Engine universes, the presence of star systems is marked on hex maps, each hex representing one parsec. For each system, generate a Universal World Profile for the primary world of the system. The smallest astrogation map size, the subsector, measures 8 hexes wide by 10 hexes high. An intermediate map size, the quadrant, measures two subsectors by two subsectors, while the largest map size, the sector, measures two quadrants by two quadrants.

There is a basic one-half chance normally 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 world is present; otherwise, leave the hex blank. The Referee may elect to alter the normal chances of worlds, making them more frequent or less frequent to correspond to specific regions of the galaxy. A 50% density (no DM) is appropriate for the spiral arms of the galaxy. Apply a –2 DM for 'rift sectors', a –1 DM for sparse sectors and a +1 DM for densely populated sectors.



THE U.W.P.

The focus of most scenarios is on the mainworld of a star system. For whatever reason, this single world is important, inhabited and the most regularly visited planet within the star system. The Universal World Profile (UWP) is an elegant method of describing the essential characteristics of this mainworld through the use of a string of letters and numbers. What these numbers represent and how they are generated is clearly explained in the core rules. The UWP typically looks like this:

Danarkis 0305 D5856A7-5 S Ag, NI, Ri RG

Danarkis is the mainworld's name and the four-figure number following it denotes the world's location on the subsector map. The string of letters and numbers that follow represent the various physical and social characteristics of the world. From left to right they are:

Starport Type D (Poor Quality)
Size 5 (8000 km diameter)
Atmosphere 8 (Dense)
Hydrographics 5 (50% surface liquid)
Population 6 (Millions of inhabitants)
Government A (Charismatic Dictator)
Law Level 7 (All firearms are illegal)
Tech Level 5 (industrial, circa 1890-1940)

Following the string of numbers and letters may be a letter to denote the presence of a military base. An S, as above, indicates a scout base on the mainworld while an N indicates that a naval base exists on the planet.

Abbreviations for various trade classifications sit to the right; Ag, NI and Ri stand for Agricultural, Non Industrial and Rich, respectively. Finally, at the far right come the travel zone designation and the symbol for the presence of a gas giant planet within the same star system (valuable, of course, as a source of starship fuel). Danarkis is classified Red - dangerous and restricted. Amber travel zones, representing extreme caution, are designated A, whilst Green travel zones (representing safe) typically require no designation at all. The presence of one of more gas giants within the star system is flagged by the letter G on the far right of the UWP. When planning refuelling stops across a subsector, this particular piece of information may prove crucial for a starship captain.

As you can see the UWP packs an impressive amount of information into a single line of text and gives the referee every key piece of information he needs when planning to visit. It tells him what type of fuel and repair facilities are available at the starport, what the surface gravity will be, whether or not he can breathe the air, if there is land, what the government is like and how repressive it is. It tells him what kind of goods he can buy cheaply there, what he can sell at a profit, if there are likely to be any encounters with the military and whether or not he can scoop free hydrogen from a nearby gas giant. Taken in this vein, the UWP serves admirably as a listing in the spacefaring equivalent of the American Automobile

Association atlas or Pooley's guide to UK Airports. When it comes to describing everyday life on this mainworld, or providing players with a description of its important surface features, then the UWP fails to deliver. It cannot cope with that level of detail and the referee must take over using his wits, his imagination and the THE UNIVERSAL WORLD PROFILE.

Adding detail, that is, taking the numbers of the UWP further, requires a bit more information. What do those characteristics actually 'mean' for life and landscape on the mainworld? How is Size 5 that different from Size 8? So what if the atmosphere is Thin - it has no real impact on the people who live there ... or does it? The rest of this chapter will flesh out the UWP values in an effort to give the world builder an idea of how the numbers affect the landscape, economy and society of the planet in question.

SIZE

The Size characteristic for inhabitable worlds ranges from 0 to 10, and is determined by rolling 2D6–2.

Table: World Size

Digit	World Size	Surface Gravity (gs)
0	800 km (typically an asteroid)	Negligible
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

Density

Let's start with the second number in the UWP, Size. Mainworlds are rocky or terrestrial worlds, like Mars, Venus and Earth, but could also be the moon of a gas giant. In general, the larger the world, then the greater its surface gravity will be. Surface gravity figures listed in the Size Table, below, are typical, but could easily vary. The Jovian moon Ganymede, for example, has a density of around a third that of similar-sized Mercury and so it has a much lower surface gravity, 0.146 G compared to Mercury's 0.38 G. It is probably composed of an ice/rock mix. Some rock types like silicate are of a comparatively low density and worlds made up of these lighter rocks would have lower densities and lower gravities compared to similar sized worlds that contain metal-rich rocks. This game doesn't deal with planetary densities, but the referee can look at the Atmosphere value for a clue. On a world with an Earth-like density, Size and Atmosphere should generally match up. On such planets, iron and other metals will be as abundant as they here.

A planet with a low Size but a Standard or Dense Atmosphere probably has a higher than average density, its higher gravity helps it retain the thicker atmosphere. Such a planet is likely to be iron-rich, a miner's dream, with plenty of iron and other useful metals to dig out of the ground. Conversely, a large world that can only cling on to a Thin or Very Thin Atmosphere has a lower than average surface gravity, pointing in turn to a much lower density. These low density worlds are likely to be metal poor - perhaps to the point that they are unable to sustain technological and industrial development. Very low density (silicate)

planets will exist that bare virtually no useful ores or any kind. Of course large worlds, with more gravitational attraction may attract a moon or two, or more!

Vulcanism

The density of a mainworld, suggested by both its Size and Atmosphere, holds further clues for the world-builder. High density worlds will have a molten core, suggesting lively tectonic activity which includes earthquakes and volcanoes. It will also be responsible for a powerful magnetic field that diverts solar radiation and can produce spectacular aurorae at the poles. Metal-poor, low density worlds have less interior heat and little tectonic activity, this results in a weak or non-existent magnetic field - and little protection for solar radiation. Where the Atmosphere and Size characteristics are roughly comparable, the referee can, if he desires, assume a more or less Earth-like geology.

Smaller worlds, dead moons and low density planets might still have active cores. Jupiter's moon Io for example, should not have a molten core, but the huge gravitational influence of its parent world as well as neighbouring moons, push and pull Io so much that internal heating occurs. Impressive volcanoes are matched by an equally impressive magnetosphere. A dead world like Mars might have, if the referee chooses, one or more large moons that have a similar dramatic influence.

Rotation, Axial Tilt and Eccentricity

Unusual worlds can be created simply by varying the speed at which they rotate, the length of their orbit or the tilt of their axis. None of these parameters are suggested by the contents of the UWP, instead the referee has the freedom to apply them when and where they may spice up an otherwise lacklustre planetary description.

So many factors affect planetary rotation that a referee can set the length of a day to anything best fitted to his world design. Humans may prefer a world with days 20 to 30 hours in length, but there are no reasons why a day cannot last six Terran weeks, or six Terran hours. There are some guidelines: larger worlds 'should' generally rotate faster than smaller worlds, older worlds will have had a chance to slow their rotation, planets in the same system will usually all rotate in the same direction, most moons and worlds close to their parent star will have no rotation at all. They are 'tidally locked', with one face permanently facing the more dominant neighbour, just as our own Moon turns one familiar face toward Earth, whilst its far side remains hidden from ground-based observers. Note that M type stars, which are cool and small, may have an Earth-like world within their system, but that it is likely to be so close to the warmth-giving star that it is tidally locked. Be aware also, that a rapid rotation will increase the Coriolis force on the planet's atmosphere, creating strong winds, powerful storms and a dynamic and unpredictable atmospheric weather system.

Axial tilt simply refers to how far a planet leans over while it rotates; all lean to some degree, and this affects how much solar radiation is received away from the equator at certain times during the planet's orbit. These are the seasons. With relatively little or no tilt, there are no seasons. The greater the tilt then the greater the degree of severity of change during the summer and winter months and the longer these extreme seasons will be. Imagine if Earth doubled its tilt to 45 degrees, causing Serengeti-like droughts during the long summer, blizzards and crippling snow-drifts during the similarly long winter. Not only that, but summer days in the far north will be night-free, whilst those in winter will never see the sun. The more pronounced this tilt, then the further south these 'midnight suns' will occur.

Could a world tip completely over? Could a planet have an axial tilt of 90 degrees? In this scenario, the midnight sun, does not creep up slowly, day by day, but is part and parcel of summer. In summer there is no darkness, in winter there is no daylight. Dawn and dusk are long protracted affairs lasting months. Could a world like this exist? Well yes, Uranus has an axial tilt of 98 degrees and its poles endure 42 years of continuous sunlight followed by 42 years of continuous night. Between the two extremes during the Uranian equinoxes, the gas giant enjoys a short Earth-like day and night cycle.

Just as the referee can 'decide' that a world has an unusual rotation or axial tilt, he also has the option of gracing his world with an eccentric orbit. Orbits are generally circular, but that of Mercury could be described as oval, it speeds up as it nears the Sun, then slows down as it makes its way along the longer part of its uneven orbit. If it was Earth-like, the effect of the seasons would be greatly exaggerated, even a planet with no tilt and no seasons would feel the short heat of summer and the long, cold of winter.

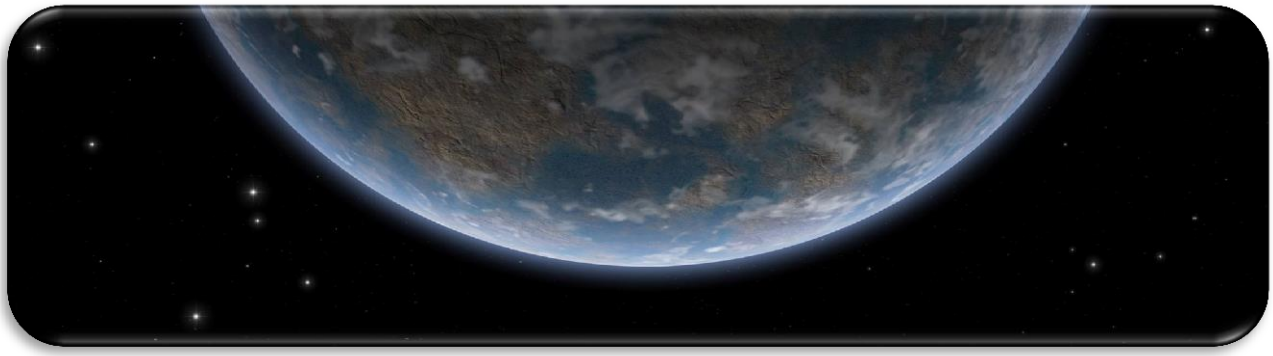
The planet Helliconia, created by writer Brian Aldiss, has a year that is 2500 Terran-years in length and that is extremely eccentric. Civilization itself changes during the course of a year and Aldiss thinks through all of the ramifications of such a monumental seasonal variation, cursing the inhabitants with Fat Death and Bone Fever, diseases that have evolved to remove the weak and to create survivors that will be able to face the coming seasonal cataclysms.

Habitation

High density planets are perfect candidates for mining worlds, either as mining outposts if the population is low, or as fully developed industrialized societies built upon a metal rich economy, if the head-count supports it. Worlds with high gravities (typically those of Size 9 and 10, in excess of 1.25 G) would need some adapting to, colonists having spent a century or more there may have selectively bred for survival traits, traits such as short and muscular bodies, and robust cardiac systems to cope with the immense stresses put on the human body. No-one goes anywhere fast which might create a fairly 'tomorrow-will-do' culture, or perhaps it instead fosters a society of careful perfectionists, deliberate and calculating. We can imagine that buildings will be single storey for the most part and that flight will be restricted or non-existent. Water transport will become particularly efficient compared to land or aerial travel, but at any appreciable depth the density of the water will increase dramatically, shutting off the submarine world from surface-world explorers. If there is native life on the high G world in question, it will be low-slung, close to the ground and powerfully built. Hal Clement's super-world Mesklin was home to foot-long centipede-like creatures that had developed intelligence and enjoyed the fruits of civilization.

Worlds with a Size of 1-4 generally have low surface gravities; simply walking in a straight line may prove to be a problem. Earth's Moon is a Size 2 body and human movement (as we saw during the Apollo missions) consists of what were described as 'bunny hops'; large strides and long jumps are all possible. Mercury is Size 3 and Mars is Size 4. Some worlds will have a Size of 1, equating to a planet the size of one of Saturn's main moons: Rhea, Dione, or Tethys. Movement on a world this small will be particularly challenging. Low G world inhabitants, if they have lived there for several generations, will tend toward the tall and skinny. The construction of tall buildings will be easier than on Earth, and these buildings may look a good deal more outlandish or exotic, since physics and the pull of gravity are so much more forgiving. Flight will often be easier on a low G world (if of course there is an atmosphere to support it!). Contrary to the low-slung native creatures of a high G planet, the local denizens of a low gravity world may include a number of very tall species. Plants and tree analogues may grow to prodigious heights and flying creatures will have an

easier time of it. Coupled with a Dense Atmosphere, flying creatures here may grow to some size … the speculative world titled Blue Moon (which featured in a 2005 TV documentary entitled Alien Worlds) boasted both a low gravity and a dense atmosphere, a combination that was able to support all manner of floating or flying fauna - including the magnificent sky whales.



ATMOSPHERE

A planet's Atmosphere is 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 15(F).

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+	
14 (E)	Thin, Low	0.5 or less	
15 (F)	Unusual	Varies	Varies

The third digit in the UWP identifies the type of atmosphere that the world has. As a rule, only larger worlds have a gravitational field large enough to hold on to an atmosphere, but there certainly are exceptions. An atmosphere is essentially a layer of gas or gasses that cloak the surface of the planet and there are a number of reasons why a world may or may not be lucky enough to have one. As we have already mentioned, a big world has the muscle to keep its atmosphere and the bigger the world, in all likelihood the denser (or thicker) the atmosphere will be. Conversely, moons and small planets with relatively low surface gravities will generally have only trace atmospheres, if they have anything at all.

Other factors also come into play. A world sitting close to the main star might have its atmosphere stripped away by the destructive energy of the star's solar wind sweeping past. The only chance a planet has of retaining its layer of gasses in this situation, is if it also benefits from a molten core that is producing a protective magnetosphere. Compare the Earth, whose atmosphere is shielded by its magnetosphere, with Mars. The red planet has a trace or very thin atmosphere that was considerably thicker in ancient times, but as the planet cooled it first lost its magnetosphere and then its atmosphere.

Yet there are exceptions; in the depths of the solar system, the moon Titan orbits the ringed planet Saturn. Titan is cold, far from the sun and seismically inactive. It has no magnetosphere and with a surface gravity of only 0.14 G should not be able to retain an atmosphere - yet it has a dense atmosphere that is 1.45 times thicker than that of Earth's! Ganymede and Callisto, comparable-sized moons of Jupiter, are of a similar composition but do not have atmospheres. One theory suggests that Titan, being farther from the sun than the moons of Jupiter, was colder during its formation. Gasses were trapped in the ice at those low temperatures and later made their way into Titan's atmosphere.
Pressure

The UWP atmosphere table indicates that there are nine main types of atmosphere: Vacuum, Trace, Very Thin, Thin, Standard, Dense, Exotic, Corrosive and Insidious. This order roughly corresponds to their increasing level of pressure (or thickness). The manner in which the mechanics work attempts to replicate the general rule that small worlds will have thinner atmospheres, whilst larger worlds will boast denser atmospheres. Of course, since it employs random generation, it may throw up an odd-ball like Titan once in a while!

Here on Earth we have little experience of differing atmospheric pressures, and so underestimate how much of an impact this factor may have on everyday life. We are actually living near the bottom of an ocean of air. At sea level, the weight of the air presses down on us with a pressure of 1 kg per squared cm. At higher altitudes, less air means less weight and less pressure. The pressure and density of air decreases with increasing elevation.

Standard pressure is what you are breathing now. The table tells us that Standard has a pressure between 0.71 and 1.49 times that of Earth. Things change at lower pressures and those humans who live or work in mountainous regions can attest to those changes.
At altitudes above 2500m, the air pressure drops to around 0.70 that of sea level. This is equivalent to the Cepheus Engine atmosphere type of Thin. Humans who are not adapted to such conditions can suffer from altitude sickness, with headaches, nausea, extreme tiredness, breathlessness and body pain. Associated high blood pressure can cause complications for pregnant women.

At altitudes above 4000m (such as most of the Tibetan plateau) the oxygen content in every breath full drops almost to 50%, whilst above 7000m (the peaks of the Himalayas) the lack of available oxygen reaches lethal levels. This extreme altitude on the 'roof of the world' is equivalent to the atmosphere type of Very Thin. For most explorers, respirators or oxygen masks will be required in this type of environment.

Low pressure atmospheres will have a variety of effects on life, both native and alien. Air temperature will be lower and the atmosphere will retain less heat; it will also have extreme differences in temperature between day and night. The air in a thin atmosphere will be drier than Standard, forcing both humans and native wildlife to drink more water. A further drawback will be the lack of protection the atmosphere provides from the effects of solar

radiation. In addition, with fewer air molecules to push against, native animal life will find it difficult to get into the air. There will be few, if any, flying creatures on these worlds. Finally, with less oxygen available, humans will struggle physically, and this struggle will be shared by any combustion-engined vehicles. Railway trains in the Andes struggle to cope with some of the serious inclines on the track because the power isn't there - compressors will need to be fitted to engines in order to supply enough air to keep them running. On mid-tech planets (TL 5 to 8) with thin atmospheres, electrical motors might take the place of more inefficient combustion-engined vehicles and power sources.

Worlds with high pressure atmospheres are likely to be teeming with flying creatures, and while most will be equipped with wings, others might be gas balloons, or may be gliders, or 'kites'. An aerial ecology really thrives when a very small planet (with low gravity) has a dense atmosphere. Dense atmospheres also retain a lot of heat resulting in a great deal of highly energetic weather; imagine gargantuan, continent-spanning hurricanes, powerful electrical storms, supersonic winds and football-sized hailstones! Take a weather phenomenon and max it out!

The greatest benefit of a dense atmosphere is the way in which it shields the surface from the effects of solar radiation (which can make-up for a lack of magnetic field). When considering human habitation on a world with Atmosphere of 8 or 9, remember air resistance - vehicle speeds, including both aircraft and ground cars, will be reduced. Winds will pack far more punch, and building designs will reflect this. Skyscrapers might be quite rare and buildings may only be a couple of stories in height. Vegetation, likewise, will be low-growing, or evolve to counter the prodigious strength of the wind.

Airless Worlds

A great many randomly created worlds will have an Atmosphere type of 0 (Vacuum) or 1 (Trace). Although a Trace atmosphere denotes a thin veneer of gasses around a world (such as Mercury), it is of such barely measurable pressures that for the purposes of a roleplaying game, it may as well be a vacuum. Animal and plant life is non-existent on an airless world, although exotic and incredibly rare examples of vacuum life might exist (and certainly be worthy of a mission). Humans must resort to living in bubble cities, underground settlements and other artificial, sealed environments. It can be difficult for the referee to make these vacuum habitats stand out from one another. Try to place these settlements at interesting geographical locations: at the entrance to a huge mine, straddling a small meteorite crater, along the walls of a canyon, inside old lava tubes, in the caldera of an extinct volcano, inside a network of vast, natural caves ... and so on. Airlocks become crucial to gameplay, since they limit freedom, so plan for plenty of airlocks - old, new, dangerously under-maintained, guarded and unguarded, vehicle locks, elevators to the surface and vast airlocks capable of accepting starships.

It's Tainted

The qualifier 'tainted' simply means that the atmosphere in question contains some element that makes it unbreathable. Most likely it is a harmful gas, such as carbon dioxide, methane and/or hydrogen that humans simply cannot breathe, which has serious side effects (such as nitrogen at relatively high partial pressures) or sulphur compounds, possibly resulting from global volcanic activity. Taints may also include bio-hazards such as pollens or alien pheromones. Taints require a filter mask for human survival.

Extreme Atmospheres

Some of the more difficult atmosphere types to explain and describe are the 'extremes', types A, B and C which equate to Exotic, Corrosive and Insidious. Whereas the Very Thin, Thin, Standard and Dense atmospheres are generally Earth-like in pressures with Earth-like gasses in a variety of amounts, the 'extremes' are terribly toxic, horribly lethal and utterly alien. The three types are really grades of lethality, and an A type and C type atmosphere may actually contain the same poisonous gas, just in different amounts. According to the table, Exotic atmosphere requires an air supply, a Corrosive atmosphere is dangerous, requires a vacc suit and will cause 1d6 damage to an unprotected character per round. An Insidious atmosphere is so dangerous that it will defeat a vacc suit after 2d6 hours and kill the man inside it. Venus, with its incredible high pressure, high temperature atmosphere comes into this latter category. Gasses which give an atmosphere an extreme label include carbon dioxide, methane, nitrogen, sulphur, oxygen, hydrogen, ammonia, chlorine and fluorine. Select one active element from the list below, but note that some gasses are often found in combination with others on the list. If the referee so decides, use these combinations, mixing together the dangerous effects in one nasty airborne cocktail!

Carbon Dioxide - Carbon dioxide made up Earth's early atmosphere, and life on such a world (if it supports life at all) must utilize direct sunlight, geothermal heat or chemical reactions for survival, rather than oxygen. At a high pressure and high temperature, this type of carbon dioxide atmosphere is Insidious, so an Exotic world with a CO2 atmosphere must be distant from its star and the pressure fairly low. [May be found in combination with sulphur dioxide, fluorine, nitrogen or chlorine]

Methane - Methane is both odourless and colourless and is extremely explosive should anyone bring oxygen with them down to the world's surface. Leaks from vacc suits or habitats or malfunctioning airlocks could easily mix oxygen with methane and create the potential for a fierce explosion and fire. Methane worlds are usually large and cool and will tend to form very dense atmospheres. Titan is a good example of a world boasting an Exotic atmosphere, although in Titan's case it is so far from the sun that a heat-suit is needed as well as an oxygen supply. [May be found with ammonia, or in a methane-ammonia-hydrogen mix]

Nitrogen - An atmosphere containing nitrogen and oxygen in certain combinations will contain a nitric acid irritant, which on Exotic worlds will require a protective suit, and which on type B and C worlds is the cause of corrosive effects. On these latter worlds, there may be rivers and seas of nitric acid, all fed by an acid rain that can kill. [May be found with fluorine]

Oxygen - Believe it or not, high concentrations of oxygen can be extremely harmful to humans. A planet with a high oxygen content could be either Exotic or Corrosive. At standard pressures, high oxygen levels burn the eyes and throat and fluid forms in the lungs, the explorer becomes breathless and feels pains in his chest; of course there are also the associated dangers of explosion and intense fire which accompany large concentrations of this gas. As a side-note, oxygen 'can' be breathed at levels up to 100% safely, as it was by astronauts in the Mercury and Gemini programmes, but only at reduced pressures.

Hydrogen - A cold world in the outer zone, with an atmosphere made up predominately of hydrogen will qualify as Insidious. Hydrogen is not poisonous, but it is extremely flammable and its atoms are small enough to penetrate suits, seals and vehicles. Hydrogen, with its associated effects, will be found within ammonia and also methane-rich atmospheres. [May be found in a methane-ammonia-hydrogen mix]

Sulphur - Sulphur compounds created by volcanic activity or as a result of run-away industrialization, act as an irritant and in much greater concentrations becomes corrosive. Life might evolve to utilise sulphur rather than carbon, but its low energy yield might limit the organisms' size. [May be found with carbon dioxide, fluorine or chlorine]

Ammonia - Ammonia is another irritant that, if present in low amounts on an Exotic world, would require a protective suit as well. Any leaks will be noticed immediately due to ammonia's pungent odour, which any referee who owned a child's chemistry set will vividly remember. Ammonia attacks the eyes, throat and mucus membranes with a fierce chemical burn that will be blinding and choking (and fatal rather quickly) on Corrosive or Insidious worlds. Ammonia planets will probably be large and cold with dense atmospheres. [May be found with methane or as a methane-ammonia-hydrogen mix]

Chlorine - Chlorine's use as a chemical weapon during the First World War reflects the chemical's toxic nature. It might be present in tiny amounts on an Exotic world - enough to cause persistent irritation, but in any sizable amount will be deadly, and in such concentrations be found on Corrosive and Insidious worlds. The gas has a strong odour and is greenish-yellow in colour, making leaks easy to identify. Chlorine will damage and destroy exposed tissue faster and more effectively than ammonia, and like ammonia blinds and chokes. It is an extremely dangerous substance even in fairly low concentrations. Since chlorine reacts in a similar fashion to that of oxygen, chlorine-based life might well exist on some worlds. And since chlorine is visible, an atmosphere with the gas in its make-up will appear green, sunlight creating a yellow-green haze through which the landscape can be viewed. [May be found with nitrogen, carbon dioxide or disulphur dichloride]

Fluorine - More corrosive, more toxic and more dangerous than chlorine, this gas will only form the atmosphere of a Corrosive or Insidious world. Like chlorine, atmospheres of this type may support bizarre alien eco-systems. [May be found with nitrogen, carbon dioxide or sulphur tetrachloride]

High Temperature - Although not a toxic gas, air temperature on a world with a carbon dioxide, chlorine, nitrogen or Earth-like oxygen atmosphere might be so high as to qualify the world as Corrosive or Insidious. Venus is a prime example with its carbon dioxide atmosphere squeezed to 92 Earth atmospheres and cooked at 460 degrees Celsius.

Temperature & Climate

In the core book, rules are provided for determining a planet's average surface temperature. They are efficient and very workable, but it is recommended that the rules not be used whilst following the system followed in the THE UNIVERSAL WORLD PROFILE. The random roll created will serve to restrict your choices when it comes to the process of fleshing out your world. Note, however, that a world within the habitable zone may be temperate and Earth-like, but could just as easily be in deep freeze or a burn and cracked desert planet. Many factors play a part in the determination of surface temperature and so it is an aspect of world building best left to choice as part of the creation procedure.

HYDROGRAPHICS

Hydrographic percentage is obtained by rolling 2D6–7 and adding the world's Size, modified by the world's atmosphere or size as described in the Hydrographic DMs by Size and Atmosphere table.

Table: Hydrographic DMs by Size and Atmosphere

Condition	DM
Size 0 or 1	Hydrographics must be 0
Atmosphere 0, 1, A, B or C	–4
Atmosphere E	–2

A world's Hydrographics value should never exceed 10 (A), nor may it be lower than 0.

Table: Hydrographics

Digit	Hydrographic Percentage	Description
0	0%–5%	Desert world
1	6%–15%	Dry world
2	16%–25%	A few small seas.
3	26%–35%	Small seas and oceans.
4	36%–45%	Wet world
5	46%–55%	Large oceans
6	56%–65%	
7	66%–75%	Earth-like world
8	76%–85%	Water world
9	86%–95%	Only a few small islands and archipelagos.
10 (A)	96–100%	Almost entirely water.

The Hydrographic characteristic indicates how much of the world's surface is covered with ocean. Each point represents around 10%. As an example, Earth is covered by approximately 70% seas and oceans, giving it a Hydrographic value of 7. Remember that this is an approximation; a planet with 100% ocean coverage might by a Kevin Costner-style water world, or it might be home to hundreds of tiny coral atolls. Be flexible in the description. On most worlds, this value will represent the percentage of 'water' on the surface, but on a planet with an extreme atmosphere the liquid will instead play some part in the chemistry of the world (nitric acid oceans on a world with a nitrogen-rich atmosphere, for example).

Oceans tend to be salty, due to the geological salts leaching out of the bed-rock. The presence of moons will make them tidal. Other bodies, too, can cause tidal effects. If the world is the moon of a gas giant inside the habitable zone, the gravitational interaction between the gas giant and other moons will create very significant tides. Slow-paced tides (measured over months or years) might be caused by the presence of a binary star within the system.

A tectonically active planet will have a complex underwater geography of mid-ocean ridges, abyssal plains and deep-ocean trenches. More benign worlds will have shallow seas with a fairly unremarkable subsea topography, eons of erosion levelling off any submarine mountain chains.

Dry Worlds (Hydrographics 0-3)

The desert planet is a staple of science fiction, from Tatooine and Arrakis, to Heinlein's Klendathu and Forbidden Planet's Altair IV. The true desert world, with a Hydrographics value of 0 (absolutely no surface water at all) is sometimes thrown up by the world generation system. Worlds like Dune, with its gargantuan sand worms and Bruce Sterling's Nullaqua provide us with vivid living and breathing examples; they illustrate just what you can do with a desolate ball of rock lacking water and plant life. Dune's ecology and physical geography are lovingly detailed, realistic and evocative. Meanwhile Nullaqua pushes the concept of a desert one step further, human activity is concentrated in vast dust-filled crater. So fine is the dust that it can be traversed on ships and is home to the enigmatic 'dust whales'.

However, far more common are the 'dry worlds' with hydrographic levels of 30% or below. With little or no rainfall there is a lack of surface water; plant and animal life will struggle to survive and there will be limited opportunities for colonisation and human settlement. You can imagine great seas of sand, an ocean of dunes that spans the globe of one of these dry worlds. However, the creation of worlds for a game universe should be a little more sophisticated than that. Your planet might be a dry desert world, but it's surface is not going to consist solely of sand dunes. Consider Mars, our nearest desert-like world ... there are dune fields close to the poles, certainly, but the rest of the Martian surface is wonderfully diverse, complex and varied. The harshest, driest deserts on Earth are similarly varied.

Hamada is an Arabic term for a bare plain of bedrock, strewn with pebbles, gravel and boulders, while another term, 'reg' is a sandy plain strewn with larger boulders and rocks. Yet another Arabic word, 'erg' describes the familiar sand sea complete with wind-blown dunes. These three types of desert surface would pose very different problems for characters. And then there are salt pans, mountains, mesas, water-cut arroyos (or wadis) and playas, which are the gravel plains at the openings of canyons which are created by extremely short-lived desert rivers. Wind and water can likewise sculpt the rock on a regional scale to create a landscape of sand-blasted pillars, pinnacles and arches similar to those of America's Painted Desert. Or, if the winds are consistent and continuous, an unearthly terrain of long, aerodynamically rock ridges called 'yardangs'.

Most dry worlds will have a small sea or scattered lakes, perhaps a few small rivers and perhaps even a large Nile-like analogue. Around these water sources vegetation will thrive, and there may be forests or intensively-irrigated agricultural areas. The boundary between waterless desert and fairly lush, habitable regions will be composed of semi-arid lands, steppe or savannah, a place where water is scare but available in large enough amounts (perhaps seasonally) that plants and animals tough enough to live there can eke out an existence.

Wet Worlds (Hydrographics 4-9)

When the term 'Earth-like planet' is bandied about, it generally refers to a world with a sufficient level of surface water to support a complex eco-system of plants and animals. Yes, there may be arid deserts and frozen wastes, but with seas and oceans in great quantity and assuming an atmosphere conducive to life, the world's surface will be a riot of climatic zones and vegetation types. With good reason, these lush, fertile planets are more commonly known as 'Garden worlds'. In a roleplaying context, it can sometimes be difficult to make these Earth-like locations distinctive or 'un-Earthly' and you may well fall into the trap-of-least resistance, that is, assuming that the world in question is just 'Earthlike' without any further elaboration. Techniques for world creation described later on in this

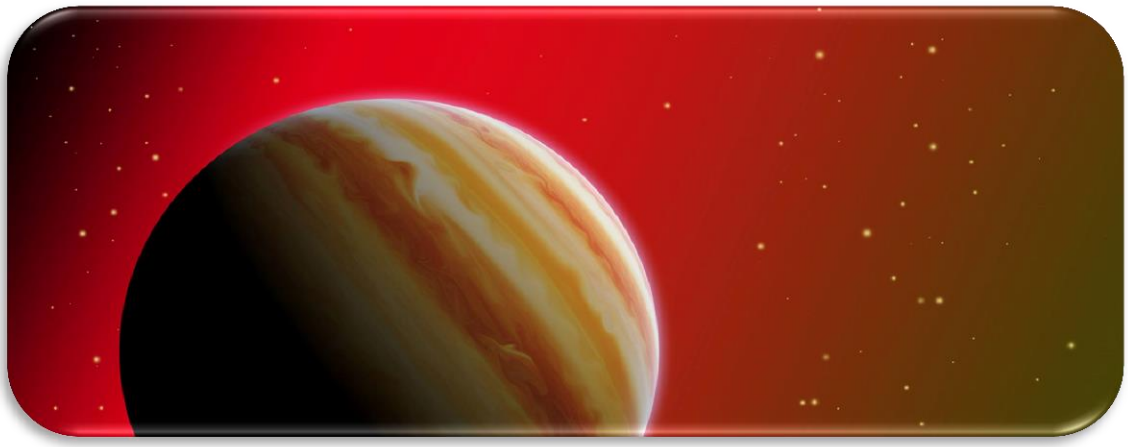
book will provide plenty of methods the referee can use to give a Garden world its own distinct identity.

Waterworlds (Hydrographics A)

A waterworld, a planet with a single ocean and no dry land, may seem unlikely but it has many precedents in science fiction - from George Lucas' Kamino, to 2181 Despoina in Mass Effect 3, and Goodloe and Oltion's Theresa, which was once an iceworld like Ganymede, but that had later been melted during the slow expansion of its red giant star. In 2012, scientists confirmed that the exoplanet GJ1214b had as a thick water vapour atmosphere that suggested it was a waterworld (although one very different to those featuring in movies and sci-fi literature).

Referees creating a waterworld might easily fall into the same 'all desert worlds are sandy' trap. How can such a bland, watery world offer anything to the players or the game? The 100% hydrographic value may not mean there is no dry land, in fact there may well be volcanic island chains, coral reefs, vast tidal sandbanks and so on, and it is on these remote pieces of dry land that starships will land and where the native population will live. Life might easily get crowded, intolerably so, on a waterworld with a million people. Or will it? With sufficient technology humans may decide to move under the waves to create cities beneath the sea, something posited by visionaries and underwater pioneers in the 1960s and 70s. Relying on undersea mining and aquaculture, hundreds, thousands, perhaps millions of people might inhabit the ocean floor in domes and sealed habitats.

This brings a new set of considerations to the table, and these considerations address the physical problems of living underwater. Problems of pressure, temperature, light and remoteness are as important here as they are in orbit around some distant star. Building up a picture of life on the ocean bed could prove difficult. The referee who is unfamiliar with the science of deep water environments might find it helpful to imagine the ocean floor of his waterworld as the surface of an airless moon. There will be colonies or habitats, sealed against the pressure and cold, perhaps built as a series of connected domes or tubes, complete with airlocks. Submarine settlements like this will be located in the relatively shallow waters around continents or large islands, rather than the crushing depths out in the deep ocean. Submarines take the place of aircraft or spaceships, moving people, goods and raw materials between habitats, while self-contained diving suits take the place of vacc suits. There will be mines and aquaculture farms. And not everyone will get along. The Government characteristic will give the referee a very good idea of what is going on - how are these submariners organising themselves? Some of the technical aspects of working on the seabed for extended durations are nicely illustrated in two sci-fi movies: The Abyss and The Sphere.



POPULATION

A world's Population is 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). If a world has a population of 0, it is uninhabited and the world also has a Government, Law Level and Technology Level of 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

Table: World Population

Digit	Population	Range	Comparison
0	None	0	
1	Few	10+	A tiny farmstead or a single family
2	Hundreds	100+	A village
3	Thousands	1,000+	
4	Tens of thousands	10,000+	Small town
5	Hundreds of thousands	100,000+	Average city
6	Millions	1,000,000+	
7	Tens of millions	10,000,000+	Large city
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+	

The population digit should be read as a number of zeroes following a one, so that a population of 3 indicates a population in the thousands (1000). If the standard method is used for generating this digit then a subsector will have many worlds populated by hundreds of thousands or millions of people. Some worlds will be home to only a few thousand, while one, or sometimes two, may hold up to a billion people. Unless the referee wants to cap the population digit at 8 (which is something the author does in his own game universe) that single world of a billion souls should by rights dominate every aspect of life in the subsector, since its manpower exceeds by many times that of all the other worlds in the subsector put together. Economically, socially, politically and militarily, that one world is a powerhouse.

By contrast, those planets with populations of 6 or less could be considered colonies or satellite worlds, or perhaps outposts or stations. They have insufficient populations with which to form a self-sufficient technological base and must have all of their finished goods imported from elsewhere. Meanwhile, those worlds that are home to many millions of people (Population 7-8) are considered to be totally self-sufficient, quite capable of manufacturing goods from raw materials and feeding their own people.

Low Population Worlds (Population 6-)

Every subsector contains a healthy scatter of low population worlds. Since, to a greater or lesser extent, these are dependent on the high population planets of the region, the referee might want to explore that relationship. A low population might be a group of exiles (forced

or voluntary), they might be the members of a failed colony or a newly established colony, they might be miners or convicts, scientists or bold frontiersmen, they might be employees of a megacorporation, the staff and hangers-on of a large base or facility, family and servants of a wealthy recluse, perhaps even the thriving descendants of a crashed starship. Whilst the inhabitants of a high population world just 'live there' and probably have done for centuries, those of low population planets need a raison d'être, a reason for being there. This reason, once established, gives the planet an identifiable hook that should differentiate the world from its neighbours.

It's usually the low population worlds that provide all the fun. They are the backwaters, the wilderness areas, the out-of-the-way places where bad people do bad things and where lost things need finding. The sci-fi canon is replete with these frontier worlds, these worlds of adventure. Setting a scenario on a high population world can be a little more difficult, there is less freedom, fewer areas to hide or for things to get themselves lost, more surveillance, more people and more rules. In truth the adventures are there, waiting to be played out, but those on high population planets are of a different nature.

Typical scenarios can be divided into those that force the characters to interact with a physical threat and those that force them to interact with members of a planetary society. Situations that pit the player characters against some faction or group of locals are fairly easy to engineer since we have an easily understood model of how humans organise and behave all around us. The problem with taking social cues from early 21st Western society is that it feels just a bit too familiar, and not at all alien. Many times this Classic game's interstellar society has been described as 1970s USA in space (since the game has its origins in the late-70s). With only a modicum of effort worlds can be given their own spin to make them more distinctive and memorable. This is covered later on in THE UNIVERSAL WORLD PROFILE.

High Population Worlds (Population 7-A)

Referees should identify any planets with populations in the billions as the core worlds of the subsector. If there are none, then worlds with populations of 7 and 8 will instead take that role. Any world of population 6 or less is likely to be a little visited, peripheral planet. The islands and peninsulas of South-East Asia provide a real world analogy. Dominating the regional economy are the high population giants, cities like Hong Kong, Singapore, Jakarta and Manila, while cities such as Surabaya, Kowloon, Medan and Brunei play their part. Scattered between these high population giants are the smaller towns and villages, that exist in abundance across the region.

Fashion, food, cultural norms and fads, new technologies and media all spread out from these high population hubs into the region as a whole. This is a numbers game. A powerful high tech, high population world will make up the 'norm' and its citizens, if able to travel, will disseminate that planet's culture and methods throughout the subsector. There are always exceptions of course, but in human history, smaller settlements have tended to be dominated, culturally and socially (as well as politically) by larger centres of population. Even if these smaller populations do not adopt the ways of the billions next door, there may be some imitation.

This process only works when the very high population planet is of a technological level sufficient to spread its influence. If the billions are slaves governed by a ruthless elite, then their influence off-planet will be non-existent. Likewise, if the billions are at tech level 6 or less and do not have access to a top level starport, then the trappings of their culture and society will go unrecognized by members of neighbouring worlds. Consider Communist

China - its population reach one billion around 1980 yet the global fashions and trends of the day were not influenced by what these billion Chinese were thinking, eating, wearing or producing.

Life can be tough on these mega population planets, resources will probably be in short supply, as will living space. Under such pressures the society might be forced to find ways to cope with over-population. Enforced euthanasia, which crops up in Logan's Run, could be one response. Another might be the use of capital punishment rather than imprisonment, in order to reduce the excess population and provide organs for transplantation for the billions left behind. On Frank Herbert's Dosadi, a population of 89 million is crammed into one city, violence is rife and mind-altering drugs become a tool used to maintain control. Depending on the planetary tech level and law level, a high population world might resemble a '1984' Orwellian nightmare or an ultra diverse, fast-paced society caught in a perpetual overdrive. In a free society, fads, memes, crazes, fashions, cults and movements cycle frequently and perpetually as the hundreds of millions, or billions, of citizens struggle to find their own identity. Mega City One, home to 2000AD's Judge Dredd, is a perfect example of this super culture phenomenon. Games, novels and movies with a cyberpunk vibe can also provide a great source of ideas for the ultra-urban world.

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 determined by rolling 2D6-2. 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. 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 the Referee generates a Population Modifier of 4 for a world with a Population code of 8, then he knows that (4x108, which is…) 400,000,000 people live on that world.

GOVERNMENT

The Government characteristic is 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.

Table: World Government

Type	Government
0	None
1	Company/Corporation
2	Participating 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

Whilst the Population characteristic does give us important information about life on the planet under construction, it is eclipsed in importance by both Tech Level and Government. That statement might seem surprising. A traveller on Earth could visit Chile, France, Bahrain and Thailand and still have little clue as to what the government system for those countries are, or how they differed. Would the space traveller be any different?

In truth, most peaceful worlds tick over like clockwork and their inhabitants get on with their day-to-day lives. Governments whatever their form, whether Iranian religious dictatorship or Egyptian military junta, typically work behind the scenes. Periods of crisis, however, are different and have direct and immediate effects on natives and travellers alike, whether it is economic depression, street anarchy, war, the outbreak of a disease or natural disaster. None of these situations are dependent upon a particular government type though and could strike any nation (or planet). So why is the Government characteristic so important to world builders? It provides some form or shape to the lump of clay that is Population. It gives the referee clues and ideas, and helps to put the society into some sort of context. What has happened so far? And what is going on 'now'? Who is in charge? What effect has this government type had on the population as a whole?

Don't mistake the government type for the official title of the agency in charge. What a political institution calls itself and how it actually operates are often unrelated. The United Kingdom is actually a representative democracy and although the Supreme Soviet of the USSR claimed to operate as a representative democracy, it more accurately resembled an impersonal bureaucracy. Gibraltar is a British Overseas Territory and might be considered to be a captive government, but it has its own parliament of elected representatives. The recent military coup in Thailand illustrates how confusing labels can be. Officially titled the Kingdom of Thailand, both the army and the monarchy have frequently intervened in the

nation's democratic constitution. In game terminology modern Thailand (circa 2014) could be said to be under the sway of a Charismatic Oligarchy. Slapping a label on Iran is much harder since it resembles a representative democracy with a president, yet it has a Supreme Leader with great power and authority. He in turn is elected by an Assembly of Experts made up of Islamic theologians. Is the Iranian government classified as type 4, A, B or D?

To be of any use to the world creator, we must consider only the impact that the government has on its citizens and on the society at large. How do the inhabitants of a world see their leaders? Imagine an elected president riding a huge groundswell of public support and backed by corporations and the armed forces that is leading his planet through some great catastrophe. In game terms an elected official like this might be considered to be a Charismatic dictator. Nazi Germany in the early 1930s was a representative democracy and Adolf Hitler was legitimately elected to the post of Chancellor by the voting public. But upon taking power in 1933 we can consider that the government type switched very quickly and very blatantly to that of Charismatic Dictator. This could happen without any constitutional change whatsoever.

Let's go through the different government types and look for ways in which they might make our worlds memorable and interesting places to visit:

0 - None

This can indicate a complex society that has broken down into absolute anarchy, but even in these situations, strong men, clans, gangs and warlords will quickly move in to fill the power vacuum. A world with a Government type of 0 will probably not resemble some Mad Max post-holocaust wasteland. Instead it indicates the lack of any large scale authority. Gangs, clans, tribes, families, co-operatives and other smaller, less formal organisations instead fill that human need for government and order.

Small, newly established colonies could get along with informal assent and regular meetings. Independent prospectors and miners would also be able to get along without any interfering regulation. It becomes harder to picture lack of government, however, when it comes to higher population worlds. Technically the highest population value capable of maintaining a 0 level government is 5 - hundreds of thousands. Is this post holocaust survival? Or is it a new model of society, self-sufficiency in a post-industrial future? Even more bizarre explanations might suggest themselves. The inhabitants cannot group together for some reason, and remain apart and self-reliant, due to religion, taboo, some biological danger or ancient law.

1 - Company/Corporation

Every time this comes up during world creation I can't help but be reminded of the movie Rollerball in which large corporations share global power between themselves. During the 1980s this theme, of multinationals wielding powers greater than most nation states, was explored in countless books and movies. Should 'Multi-Tech Incorporated' (or whoever) actually take over planet Earth, though, we would more likely categorize that government as a participating democracy, a civil service bureaucracy or some other type, depending on the type and level of interaction that citizens have with it. Type 1 government indicates a much smaller corporate base, station, outpost or colony, where everyone really does work for the company, not just the miners but the janitors, mechanics, nurses and police officers. Peter Hyams' gritty movie Outland featured mining station Con Am 27 where even the hookers and the drug dealers were paid for and brought in by the company.

2 - Participating Democracy

Also known as Athenian democracy, this form of government is organised and administered directly by the citizens without any intermediaries - no politicians. The key to an interesting world, however, is the identity of the citizens. In Athens only adult men born within the state boundaries were able to participate, vote and stand as magistrates. Women, slaves and foreign-born folk had no say. Foreign mercenaries served as the police force and official duties were carried out by elected citizens. The army was all volunteer, a militia in which every free man served. Rome's Republic likewise held free elections and offices of state were eagerly contested, but only the landed aristocracy of Rome were able to participate in this system. So - who has the vote?

Obviously with citizens themselves sharing out the onerous business of government between themselves, direct democracy favours low population worlds. Could a planet with billions live like this? Online voting and digital self-representation is a likely and welcome future trend, but despite the more immediate involvement of citizens, a large state apparatus with professional, full-time politicians will almost certainly still be required.

Note that decisions made by the Athenian assembly were instant and sometimes spur of the moment. At times the citizens regretted their quickly-made decisions. In 427 BC the assembly voted to execute all the menfolk of the city-state of Mytilene and enslave the women and children. A war galley was dispatched with the orders. The next day many of the Athenians regretted their decision and the assembly met again, this time voting to reprieve the citizens of Mytilene. A second ship was hastily dispatched with two crews and, rowing without a break, managed to reach Mytilene just in time to save the population. A high tech world operating like this might be fast moving, with a fluid culture and a schizophrenic society - policies and laws changing with the influence of global media.

3 - Self-Perpetuating Oligarchy

An oligarchy is rule by a small, unelected elite and the masses have little or no input in affairs. Members of the oligarchy have no intention of giving up the reins of power, and instead hand it on to their heirs. Although there are benign oligarchies, most are oppressive and disliked by those they rule. The elite may be a hereditary caste, a group of privileged families, a royal dynasty, a clique of wealthy and influential men sharing power between themselves (much like Russia's modern billionaire oligarchs), an educated elite or a corporate hierarchy. Rule by an elite minority features in several science fiction novels, the Ender's Game series had its Starways Congress, whilst George Orwell created the sinister Inner Party in his novel 1984.

Oligarchies are generally unpopular which naturally suggests the growth of (outlawed) opposition parties, saboteurs, rebellions and terror groups. They may only be fledgling groups, an idea held by a small number of disillusioned conspirators, or they may be part of a world-spanning counter-culture that seeks to overthrow the oligarchs at every turn. Since this is science fiction, it is entirely appropriate to have high technology or some aspect of the planet itself, play a role in the social division. Although there is no mention of a government in Andrew Niccol's movie Gattaca, the society depicted is one based on genetic selection and manipulation (eugenics). We can imagine that the rulers of such a world are the genetic elite, bred for their role. For a less subtle, but no less interesting take on this idea, we can consider the planetary rulers of the floating city Stratos, in an early Star Trek episode called The Cloud Minders. These superior intellectuals depended on raw materials that were supplied by the Troglytes, a caste of miners living on the planet's surface that have been forced into servitude. Harmful zenite gas in the mines had stunted the Troglytes

mental abilities and served as the justification for their enslavement. Naturally some of the miners fought back and these rebels were known as the 'Disruptors'.

4 - Representative Democracy

There is probably little to say about this government type since there are hundreds of examples on Earth today. The various regions of the planet will send their own representatives to a planetary assembly where votes are cast and policies made. All of the problems and quirks of the system here on Earth will be repeated amongst the stars including entrenched political parties, extremist ideologies, personality politics, the power of lobby groups, corruption, vote rigging and so forth. This type of government is great for scenarios featuring competing factions, with political groups vying for power and using the player characters as tools in their plans.

5 - Feudal Technocracy

This baffling government type seems to have no precursor - what does it mean and where is it from? The term actually originates in H. Beam Piper's novel Space Viking and was the preferred method of government in Piper's Sword Worlds. In it, noble houses own and operate large industrial sectors of the economy in an interlocking relationship. Lady Elaine Karval of Karval House, for example, is heir to the prosperous Karval Steel Mills. The Great Houses of Dune that make that novel so memorable could also be classed as a feudal technocracy - the emperor himself assigning a planetary fief to a house according to the assets and talents of the noble house in question. The feudal implication suggests that the noble houses sit in a ladder of obligation, both militarily, socially and economically. In Piper's Sword Worlds the means of industrial production - from farming and light industry to oil drilling and starship construction - were held as noble fiefs embedded in an interlocking system of feudal relationships based upon inheritance, marriage, and of course, more traditional business contracts.

Feudal technocracy can be a difficult concept to get your head around. For game purposes, simply imagine each noble house as a typical cyberpunk megacorporation, with a diverse portfolio and fingers in many pies. Its many subsidiaries are actually minor houses owned by lesser nobles all of whom owe fealty to the great noble. The various great houses are bound together in interlocking relationships that ensure they do not compete directly and as a result force each other out of business. There are no shareholders, and the planetary government is made up of representatives of the great noble houses. Since the feudal houses supply many of the services normally provided by a government, there is very little government apparatus - which greatly appealed to H. Beam Piper! Military forces were supplied by each house, which maintained its own troops and guard units.
In many ways the noble houses of the feudal technocracies somewhat resemble the Japanese keiretsu or corporation, which are are large economic entities like Mitsubishi and Honda. Some of the keiretsu are virtually self-sufficient, with their own subsidiaries established to supply the production aspect of the business with vital raw materials, legal advice, banking, supply chains and retail outlets. Everything is kept 'in house'.

6 - Captive Government

Providing an endless number of adventure opportunities, this government type is a godsend. A previously free world has been taken over by another, more aggressive state, either recently or in the distant past. The inhabitants do not rule, they have no government and no representation. All decisions are made light years away.

Immediately our brains conjure up thoughts of Nazi troops in Paris, Soviets in Afghanistan or stormtroopers on Bespin Cloud City. Military occupation, jackboot authority, despotism and exploitation provide a slew of adventure ideas. Resistance fighters need help, they need supplies, transport and guns! In the short term, of course, a foreign occupation is hated and resisted, but over time, perhaps over decades and centuries, the relationship settles down to one of mutual advantage. The world builder is free to decide on the nature if the relationship between occupier and occupied. Were the invaders invited in by a faction? Was the world given to the invaders as a gift or bequest (which is how the powerful city of Pergamon fell into Roman hands)? Did the invaders arrive with good intentions to either protect or free the locals from some threat, but stay on - indefinitely? The term 'captive government' may not simply mean that invaders from other stars are driving tanks down the main street.

For the planet builder, key questions need answering. Why did the invasion take place? Was it to seize resources needed by the invading world, or was it to prevent a neighbouring world from falling into the hands of rebels or insurgents? Were the invaders invited in by a desperate local government with its back to the wall, or was this a surprise attack? Decide on the state of the resistance - if any. Think carefully about the long term aims of the invaders. When are they going to pull out? Soon? In the near future? Never? Finally, is the invasion a cover, perhaps, for something else?

7 - Balkanisation

When the Ottoman Empire lost control of the Balkan peninsula after 1817, a number of small independent states were established in the region. The term Balkanisation was coined at this time. Of course, today, it is more often used to refer to the break up of any large state into small, self-ruling nations. The Cepheus Engine definition explicitly refers to 'rival governments [that] compete for control'. In essence this is our 21st century, disunited planet Earth, a planet divided by nation state rivalry, war and political competition. Referees might want to roll several more times in order to determine the type of government employed by the largest nations on the planet in question.

Creating a world like Earth with 200 plus sovereign nations should be done sparingly, if at all. Instead give a balkanized world 2-7 (1d6+1) major nations, this way you will be able to get to grips with their relationships with one another and assess the likely front runners - who has the strongest state, and which are the planetary superpowers? Is there a reason for balkanization? Has the population grown up from several competing colonies, or has the first flush of colonialism waned and the emergence of differing attitudes and agendas resulted in division, rivalry and discord? There are many models of national rivalry to emulate, from USSR versus USA, to China and Taiwan, the attempt at an Arab League, the European Union, the spread of Communism in South East Asia in the 1960s, illegal migration of unskilled West Africans across the Sahara into southern Europe, or the regional isolation of states like Israel or Apartheid South Africa.

This type of government throws up some important questions, and finding answers to these adds further detail and depth to that planet. In which nation is the starport located? Why?

Does the Tech Level refer to the major nation, or is it typical of most of the nations on the planet? Do all the nations feel the same way about interstellar visitors, fuel scooping from oceans and the spread of interstellar trade goods? When Rome invaded tribal Britain the tribes were divided, some already traded in Roman luxury goods and welcomed the newcomers, others were hostile and resisted with violence, some were easily placated and co-operated with the Romans. This they did to avoid being attacked and destroyed, and also to ally with the new invaders against their hated neighbours! The arrival of starports and starfarers and megacorporations might elicit a similar response avross a balkanized world.

8 - Civil Service Bureaucracy

Red tape and a multi-layered and stultifying administration are the hallmarks of the civil service bureaucracy. Here the bureaucrats hold all the power and while there might be a parliament or king or an assembly of elders, it is the professional civil servants that hold the levers of power. Perhaps the machine of government is so complex and arcane that only those who work within it can understand it. H. Beam Piper gives us the planet Aditya by way of example; here the nominal government is the Convocation of the Lords-Masters, an oligarchy. But all of the crucial decision-making is made by an extensive class of highly educated slaves. They form the civil service, and the many millions of inhabitants of Aditya are also slaves, organized into a complex hierarchy of servitude. On Aditya judges don't even know how to get to their own courtrooms - they are represented in court by their own chief slaves. This is a colourful extreme, but indicates how a civil service bureaucracy might operate.

9 - Impersonal Bureaucracy

Government agencies which are insulated from the governed masses can be described as an impersonal bureaucracy. Citizens have little or no say, and often a wide disconnect exists between government policy and daily life. This can produce inefficient and frustrating or even farcical and sometimes tragic situations. Look to Terry Gilliam's bureaucratic nightmare in the movie Brazil. The government is well meaning but the disconnect between it and the people it rules results in a catalogue of mistakes, resulting in an innocent man being tortured to death. Similarly, in Franz Kafka's book The Trial, Josef K. is put on trial by an impersonal and remote authority. K is never even made aware of what it is he is being accused of.

There are other examples of impersonal bureaucracies, such as the administration of a decaying empire or an entrenched caste of bureaucrats. The wheels of government rumble on, oblivious to the coming and going of the heads of government or the changing situation within society. Outdated rules and regulations no longer apply or are totally misplaced and revolution may be in the air. Although the rules do not judge the merits of any of its government types, an impersonal bureaucracy has a good chance of getting things wrong and creating frustration and inefficiency.

A - Charismatic Dictator

The charismatic dictator is a revolutionary leader or a 'man of the people'. Today the word dictator is associated with oppression and brutality - a more apt label for the game would perhaps be 'charismatic authority'. Earth history is littered with names of these charismatic leaders, from Juan Peron of Argentina to Ho Chi Minh and Fidel Castro. They rise to prominence (usually during a period of crisis) and gather a following, typically seizing power

and overthrowing the established political authority. Paul Muad'Dib was one such leader, carried along by the religious fanaticism of Dune's Fremen tribesmen. The series of books called the Bio of a Space Tyrant, by Piers Anthony, charts the rise of Hope Hubris, a naval officer who becomes the supreme leader of Jupiter. Anthony's governmental system echoes Heinlein's Terran Federation, with its sense of civic duty, common sense and the needs of the collective justifying the suppression of individual needs. Hope Hubris' world espouses strong, charismatic leadership, allowing him to rise to supreme power.

Life on a world ruled by a charismatic leader will be influenced by the nature and personality of his or her character. Pol Pot ruled Cambodia as a totalitarian dictator, after he gained power he was utterly ruthless and without mercy, and responsible for violence, torture and murder on an unprecedented scale. Juan Peron, on the other hand, was an elected president (for several terms of office) and although he dominated the politics of Argentina, he was a popular figure, and even seen as a hero by large segments of the population. The best loved of charismatic leaders will be those who have risen in the wake of some repressive government, although that love may not last for long ... Personality cults will typify this type of government. The leader rules by force of personality and his portrait may be ubiquitous, his name used often and his everyday life and actions reported in the media. Perhaps the leader might die, but his death kept a secret, and his personality cult continues simply in order to retain the loyalty of the populace.

Other leaders may blur the distinction between government and religion. An enigmatic figure like Jim Jones or Shoko Asahara and who commands a religious cult, could capitalize on that popularity to become a global figure. With such power the cult becomes the society and the cult leader is able attempt to transform society into something new (and probably bizarre). Akhenaten, the Egyptian pharaoh, attempted to do this, rebranding himself, replacing the traditional gods with one of his own creation, and building a new capital city. This radical transformation lasted only during his lifetime and provoked some bitter opposition.

B - Non-Charismatic Dictator

A previous charismatic leader has been replaced by a leader through normal channels. This means that a popular individual took control and has since died or given up power; now those that follow in his footsteps rule in a similar fashion. A line of hereditary monarchs fits this description well, from Roman emperors to Saxon kings and Russian tsars. But this type of government can also be more transitory. Mao Tse-tung ruled China for twenty seven years as a charismatic dictator and after his death a canny vice-chairman called Deng Xiaoping rose to power. He lacked the 'cult of personality' created by Mao, but yet had access to all of the levers of power that Mao had created. Deng quickly began reforming the Chinese system to more easily operate within the global economic market, his changes were radical and important. Deng's rule lasted until the late-1980s and the form of government that survived him was transformed. China was no longer ruled by a dictator, charismatic or not.

Military dictatorships also fall into this category of government. A military leader gains the trust of the people and seizes power (government type A); his successors inevitably lack that original popular support. Often the regime becomes more heavy handed as the population begins to become disaffected with a string of unelected and out-of-touch leaders. Real world examples include Argentina (the most recent of numerous military juntas ended in 1983), Burma (from 1988 till 2010) and Pakistan, which has had several military

governments since independence. These juntas often claim (falsely) to be neutral arbiters that have stepped in to save a nation from corrupt or unpopular politicians.

Stargate Atlantis featured a military dictatorship that ruled the Genii. Living underground in bunkers and shelters, the society looked to the military to provide an effective resistance against a species of predatory aliens. Heinlein's Terran Federation could be seen as a military dictatorship since it was established by veterans and only those who had served a few years in the military had the right to vote or work in government. Although the Federation had a military flavour, it allowed its citizenry to vote, making it more if a democracy than a dictatorship.

What about Big Brother, the mythical face of Oceania in George Orwell's 1984? Although we originally described the government of Orwell's dystopia as a self-perpetuating oligarchy, to the down-trodden citizenry, they may well describe their government as a charismatic dictatorship, with all loyalty directed to a single omnipotent figure. Science fiction novels like Neal Asher's Gridlinked or Godard's movie Alphaville, even show us a universe in which entire worlds are controlled and governed by powerful artificial intelligences. The possibilities for chaos and catastrophe are endless when a heartless machine is the utterly logical dictator in charge if millions of lives.

C - Charismatic Oligarchy

Those in power within a charismatic oligarchy are a select group that are members of an organization or class, that has the overwhelming confidence of the citizenry. These small groups typically rise to power as a reaction to an unpopular regime. The Bolshevik revolutionaries in 1917 Russia and the military junta that overthrew the elected Egyptian president Mohamed Morsi in 2013 were both charismatic oligarchies. They do not remain charismatic for long, and are more successful as some sort of transitional government. Think of them as a force for change, and a sign that a planetary government (and perhaps society at large) is in a state of flux. Members of these small groups pick up on a groundswell of revolution or dissatisfaction and then instigate a coup or revolution against some unpopular regime. They know they have the backing of the people, but once they have achieved their aims and have dislodged the leaders of the previous regime, the oligarchs may find their services no longer needed. Clutching on to power, this type of government may be become a self-perpetuating oligarchy, or some other type of government entirely.

Science fiction is replete with popular uprisings against unwanted governments, from Heinlein's The Moon is a Harsh Mistress to Spinrad's The Men in the Jungle and Kim Stanley-Robinson's Mars Trilogy.

D - Religious Dictatorship

When powerful religious groups take control of the government, the society they control follows the dictates and beliefs of that religion. A planet ruled by such an authority may sometimes seem perplexing to interstellar explorers. Religious law will prevail, with the governing faith's deity or deities standing as the absolute authority, and his priests and soothsayers serving as his mouthpiece. In-game, such governments may well exist amongst pre-industrial pre-scientific societies. Medieval Europe was made up of a series of hierarchical religious dictatorships. The Pope in Rome had power over kings, princes and lords in many matters, and the general population was governed by a set of strict religious edicts.

This form of government has appeared several times in works of science fiction. The invaders of primitive planet Kwanwoon in the short story Oomphel in the Sky, for example, must deal with the entrenched beliefs of the local world religion; but a religious dictatorship may still appear in a mid or high tech world. Margaret Atwood's novel The Handmaid's Tale is set in a near-future Earth where a Christian fundamentalist nation has replaced the USA. Modern day theocracies inevitably create tension between the religious hierarchy and those citizens who value freedom and scientific knowledge. At higher tech levels a religious dictatorship may provoke an extreme reaction and even violent resistance.

Referee's can really play with this government type. The priesthood of a world could actually be the mouthpiece for a clandestine alien race, or for some faction of off-world humans; it might even utilise high tech equipment imported from off-world to replicate divine 'miracles'. Any religious hierarchy will be suspicious of interstellar visitors, fearing they might bring in new ideas and faiths, perhaps even using scientific teachings to undermine the religious tenets of the theocracy. Because of this, dealings with off-worlders might be restricted to a select few, at a certain location. A religious dictatorship with a powerful following and access to interstellar travel could threaten the security of the sector. Paul Muad'Dib's Fremen and the Necromongers from The Chronicles of Riddick both wage an interstellar jihad that aims to conquer and convert the inhabitants of other worlds.

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.

Table: Law Level

Digit	Descriptor	Not Allowed
0	No Law	No restrictions; candidate for Amber Zone status
1	Low Law	Poison gas, explosives, undetectable weapons, weapons or mass destruction
2	Low Law	Portable energy weapons (except ship-mounted 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; carrying weapons discouraged
7	High Law	Shotguns
8	High Law	All bladed weapons, stunners
9	High Law	Any weapons outside one's residence; candidate for Amber Zone status
10(A)+	Extreme Law	Any weapons allowed at all; candidate for Amber Zone status

Planetary law level provides a rough idea of how many regulations, laws and security checks a traveller from off-world will encounter. Although the table above breaks these numbers down to establish what type of weapons can be carried and what possessions are illegal, the world builder is best served by taking the Law Level to be more of a guideline.

No Law

Anarchy is the term usually used to describe a society without law, and this term typically means a chaotic and unstable society. In some cases this should be true and with a planet with a high population, the anarchic situation may be the result of state collapse similar to that of Somalia and Afghanistan in the 1990s. Government is fragmented or non-existent, warlords operate where they feel safe, resources are fought over, and without law, order, transport links or commerce, the population struggles to survive.

Zero Law Level may mean something different amongst low populations, however. Small groups may create their own laws and be willing to change and adapt them to suit their situation. American frontier associations, for example, moved West at a rate that far outpaced the spread of formal state and federal governments. Instead, law and legal systems were established by land claim clubs, cattlemen's associations, wagon trains, and mining camps. Israeli social communes, the kibbutz, provide a neat model of how a small population might operate without established law and law enforcement. These groups work under a consensus, managed by regular meetings, people do what needs to be done, and tasks are shared out equally. At one time kibbutzim were mainly agricultural, but the modern kibbutz dwellers can just as easily earn their living through light industry and manufacturing. The Free Territory of Ukraine that was established after the First World War, proclaimed itself to be a form of anarchy, within the Free Territory up to seven million Ukrainians lived without central government, their society was based upon independent local communities making their own decisions, the kibbutz writ large.

Low Law

We can place the law level of a typical Western nation at around 2 or 3 (Low). This equates to a society where many freedoms are recognized. However, there are laws governing extreme behaviours and a large body of law that protects the rights of individuals, groups, corporations and governments. Citizens can walk around safely and generally avoid harassment from law enforcement.

Moderate Law

The freedoms we take for granted are not universal and the citizens of a moderate Law Level world are constrained in some way. There may be minor travel restrictions or a series of laws regarding public behaviour. Curfews may be in place at certain times, and the security forces are more visible. These aren't the hallmarks of a totalitarian state, but instead suggest a society under stress, from terrorists, food shortages, rioting, over-population, disease pandemic, civil unrest and so forth. Or they could indicate a peaceful and contented population that naturally accepts a large amount of government intrusion in its life. This is 'the way things have always been'. Any out of the way nation on today's Earth could reasonably be said to have a moderate Law Level: Nicaragua, Vietnam, the Central African Republic, Algeria and so on.

High Law

There are nations on Earth today where the state has much more control over its citizens than any of those in the West. Freedom to travel, to work or to communicate have all been curtailed to some degree. North Korea, East Germany and Mao's China all have high Law Levels. Its citizens will find their movements restricted and their identity papers frequently checked. Suspicion is in the air and security forces are often visible. There may be spies at large, working for the government, and security checks will be frequent and time consuming. Any activity veering from the norm will instantly fall under suspicion. The police force will probably be uncompromising, tough and brutal. The justice system will likewise be extremely severe, very unfair and skewed heavily in the favour of government prosecutors, not defendants.

Extreme Law

Extreme Law Level represents a totalitarian society that carries out routine surveillance on its own citizens. George Orwell's 1984 and George Lucas' THX 1138 both feature repressive, stifling societies where not just movement but speech and even thought are monitored and controlled. Justice is mechanical, unfair and liable to lead to torture and execution. Governments with this kind of power can rewrite history, they can make individuals (and families) disappear from the records and can instil absolute obedience in the population through the application of absolute terror.

Could a government operating at this Law Level actually be benign and well meaning? For this to happen there must be absolute trust between citizens, and an unbreakable trust in the authorities. Perhaps San Angeles, the 'utopia' that features in the 1993 movie Demolition Man, might serve as an optimistic model for a benign totalitarian state. The setting is pure satire - weaponry, drugs, alcohol, bad language and other undesirable behaviours are prohibited or regulated, while personal behaviour is monitored through implanted transceivers. A population believing that thought control and extreme behavioural modification are good things will reinforce the power of the state, and in effect police itself.

TECHNOLOGY LEVEL

The Technology Level (also called "tech level" or TL) of the world is determined by rolling 1D6 and adding DMs per the Technology Level DMs by UWP Values table. A world's Technology Level may not be below 0.

Table: Technology Level DMs by UWP Values

Value	Starport	Size	Atmosphere	Hydrographics	Population	Government
0		+2	+1	+1		+1
1		+2	+1		+1	
2	`	+1	+1		+1	
3		+1	+1		+1	
4		+1			+1	
5					+1	+1
6						
7						+2
8						
9				+1	+1	
10 (A)	+6		+1	+2	+2	
11 (B)	+4		+1		+3	
12 (C)	+2		+1		+4	
13 (D)			+1			–2
14 (E)			+1			–2
15 (F)			+1			
X	–4					

Certain world conditions must 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 14(E), Hydrographics is 10(A)	7

Technology Level, along with Government, is key to designing a planetary society - there are few other cues available to the world builder. Tech Level (TL) might represent the technological base that a world is capable of, i.e. it tells us what the planet can produce and at what level the economy functions, OR it tells us what technology is generally in use, without reference to its origins. In THE UNIVERSAL WORLD PROFILE, we favour the latter; TL shows the referee and the players what is currently in use, whether manufactured locally, or imported from off-world. This becomes helpful when dealing with those poorly populated but high tech planets representing outposts and colonies. Two thousand people living at TL 9 cannot produce almost any of the items they use and almost everything has to brought in by starship.

Evaluating the TL and using it to create an interesting and workable society can be tricky, because Tech Level is not a historical timeline - it is a guideline. TL 5 roughly equates to the period 1900 to 1939, but that only means that some or all of the technology on the world in question is of a similar level. There may actually be something in everyday use in that

society from TL 4 or from TL 6, the referee should not be afraid to mess with the technological base. More often than not, such 'mixing up' will be forced on a planet by its resources. A world without fossil fuel reserves may cling to inefficient wood-burning steam engines, while a planet with a dense atmosphere may invent the dirigible airship at TL 3 rather than TL 4.

The biggest danger is in looking at TL 5, seeing that it represents 1900-1939 technology and then assuming that life on planet X must be similar to 1920's America or Edwardian England, with all of the cultural and social baggage that comes with it. There are certainly good reasons for assuming a historical society is the product of the technology around it, but doing so creates clichéd planets that remind us of Star Trek episodes like A Piece of the Action (mobsters in space) and Patterns of Force (Nazis in space). Instead, try to divorce the technology from the timeline, it happens all the time in the developing world. I have seen Masaai herdsmen on the edges of the Serengeti, driving along their cattle while talking on a mobile phone and there are villages in India and Nepal, little changed from the 17th century, that now boast wind turbines and solar power arrays.

Whatever the TL, it must suit the planet on which it exists. In fact, TL is the way in which the unique landscape of the world being created can be brought to life, particularly by emphasizing one particular piece of equipment or technology. What follows are individual Tech Level descriptions:

TL 0 – Stone Age

This society depends on muscle power and stone tools, transport available is limited to carts, canoes and rafts. Weaponry is limited to clubs, bows and spears. While tribes of savage cave dwellers are associated with the Stone Age, in fact there were many societies later in history, that used stone tools, but which lived in small villages, farmed the land and herded cattle or sheep. Co-operation can achieve great stone structures and building projects and the communities, although quipped with primitive tools, may still have complex and interesting societies. Note that some cultures, especially in Polynesia, where flints and obsidians were rare, used animal teeth as tools, an example of which is the shark-tooth sword of the Maori warrior. In a post-holocaust scenario, scrap metal and scavenged parts might replace stone as the working material.

TL 1 – Bronze/Iron Age

Tech Level 1 represents the technology of the first societies and city-based cultures. Muscle power is now supplemented by the water wheel. Tools are now made of metal, leading to more efficient production of crops and the ability to feed larger populations. Transport now includes large wagons, oared galleys and small sailing ships. Weaponry now includes daggers and swords, axes, crossbows and military catapults. Beacon fires, heliographs, medical instruments and the abacus are also available. This is the technology of ancient Greece and Rome. When one considers the huge cities of the Roman Empire, with villas, public baths, sewers, aqueducts and heated rooms, a TL 1 planet certainly does not have to be primitive or uncivilized.

TL 2 – circa 1400 to 1700

The biggest change from TL 1 to TL 2 is in science. The invention of the printing press helps to disseminate learning in chemistry, physics, astronomy and biology. Wind power now supplements muscle, and weaponry now includes early cannon (including matchlock and wheelock muskets and pistols), two handed swords and crossbows fitted with powerful winding devices (cranequins). Metal plate armour is also available at this tech level.

TL 3 – circa 1700 to 1860

The very beginnings of the industrial revolution are represented by TL 3. Of greatest significance is the invention of large steam engines used as power plants in the newly established factories. The growth of cities accelerates as the new industries need large amounts of labour, some of which is skilled, requiring the establishment of schools for the masses. Innovations in transport include the hot air balloon and the sophisticated multi-mast sailing ship, capable of trans-global voyages. Street lighting first appears, powered at this TL by coal and oil gas. The first electrical telegraph is invented at this TL and new weaponry includes the flintlock musket which, although developed later on in TL 2, dominates warfare and hunting in TL 3.

TL 4 – circa 1860 to 1900

Tech Level 4 represents the full development of industrial manufacturing, with coal burning steam technology now advanced enough to power railway engines and ocean-going steamers. Airships are invented within this tech level and used for passenger transportation and warfare. Innovations in medicine include anaesthetic and the discovery of germs and microorganisms. Electrical power generation allows public street lighting to replace gas and the telephone supplements, then replaces the telegraph. Flintlock muskets are replaced on the battlefield with percussion rifles which use preloaded powder cartridges and efficient percussion caps, to increase the shooter's rate of fire. Rifled barrels also extend the weapon's range and accuracy. They are soon supplanted by breech loading rifles using brass cartridges, supplemented by revolvers. Sophisticated artillery guns and hand-cranked machineguns now appear on the battlefield. The elevator and the steel-framed skyscraper come into limited use at TL 4.

TL 5 – circa 1900 to 1939

TL 5 heralds mass production, the introduction of the production line, the internal combustion engine and the aeroplane. The development of the light-weight combustion engine paves the way for cars, tanks and propeller-driven aircraft and accelerates road-building and oil extraction. As a result, the plastics industry develops significantly during TL 5. Diesel-electric submarines become feasible, as do aircraft carriers. Electrification spreads to businesses and private homes. Radio is invented, as are mortars, modern rifles, self-powered machineguns, automatic pistols and submachineguns. Large analogue computers using vacuum tubes first come into use for a variety of specialised tasks. In the medical world, antibiotics are first discovered and the X-Ray machine is invented, while law enforcement is able to use fingerprinting to identify criminals. Development of steel and reinforced concrete frameworks allow skyscrapers to be built more easily.

TL 6 – circa 1939 to 1969

Mass production continues at TL 6, and although the automobile continues to dominate ground transport, there are innovations in jet aircraft and helicopters. The concept of an all terrain as well as an amphibious vehicle is created. The battlefield now sees the arrival of the automatic rifle, the light machinegun and the missile launcher. Fission power is harnessed to allow the construction of power plants as well as atomic weapons, although cost prevents nuclear energy from replacing coal and oil fired power stations. Ships, submarines and large aircraft are now able to be powered with small nuclear reactors. Computing technology leaps forward as transistors replace vacuum tubes, although computers are still very large and expensive pieces of equipment. Television emerges at TL 6.

TL 7 – circa 1970 to 2000

With TL 7 we enter the realms of the modern world. New methods of transport include supersonic and wide-bodied passenger aircraft, hovercraft and tilt-rotor aircraft. Space capsules that are capable of reliably reaching small orbital stations now exist, as do reusable space planes. The nuclear thermal rocket is invented early on in the Tech Level and is capable of sending manned crews to planets within the solar system. On Earth, lack of funding and political will prevented such expeditions, but there is no doubt such a vehicle could have been produced and tested before the end of the Twentieth Century. Tentative manned exploration of neighbouring planets is now made possible. Computing reaches the microprocessor stage and its development from then on accelerates almost exponentially, bringing powerful computers on to citizens' desks, laps and into their hands. Cellular phones become feasible at TL 7 and soon become almost indistinguishable from hand-held computers (tablets).

Robotics enter mainstream industry and create efficiencies in manufacturing, and a global computer network is established later on in the Tech Level. A complex world-wide communication network now allows for global credit and debit card services to be established. Solar, tidal and wind turbine projects begin generating electricity at this Tech Level. In warfare, ballistic body armour, grenade launchers and assault rifles enter service with regular troops. Medical breakthroughs include organ transplantation and DNA profiling.

TL 8 – 2000 to 2050

No-one knows quite when Earth will reach TL 8. In Cepheus Engine, the primary TL 8 development is fusion power which scientists today predict will become feasible 'in a few decades'. Without this invention, Earth probably reached TL 8 at the turn of the century with the wholescale adoption of the Internet by personal, commercial, academic and military users. This coincided with the rise in smartphones, mobile computing, electric aircraft and the commercial adoption of electric road vehicles. Since 2000 there have been other breakthroughs, including the deployment of ship-based laser weapons. Medical breakthroughs have included the mapping of the human genome and the invention of an artificial heart implant.

TL 9 – Pre-Stellar

The Cepheus Engine universe really begins at TL 9, it is at this stage that gravity manipulation is developed. Anti-grav vehicles then become possible and grav drives allow faster and more reliable space travel. This research eventually leads to the invention of the interstellar jump drive in prototype form. Society is transformed, with the rich having access to early flying cars. Helicopters are made redundant by a variety of light grav vehicles. In warfare laser rifles are introduced, spurring on the development of ablative armour. Tracked laser tanks also enter the battlefield in small numbers, and these are fitted with beam or pulse lasers. Medicine now allows the regeneration of human limbs.

TL 10 - Early Stellar

The jump drive comes of age and allows routine travel to the stars, giving the world the ability to colonise neighbouring star systems. Orbital stations and space colonies become more numerous as space travel drops in cost. Medical developments include early biological augmentations and cybernetic enhancements, a variety of slow and fast drugs, and the medical cryoberth. Portable fusion generators are introduced at this TL. On the battlefield soldiers now carry advanced combat rifles (ACRs). Grav tanks now supplant tracks and are armed with either mass drivers or lasers. In the civilian sphere, clothing can now hold a computer weave and remain clean with smart fabric technology. Crystaliron, manufactured

in zero gravity, revolutionises structural engineering. Information storage is now standardised into the credit card-sized data wafer.

TL 11 - Early Stellar

Advanced computing leads, at TL 11, to the introduction of artificial intelligence - robots are now partially self-aware. Gravity manipulation now extends to civil engineering, with some structures suspended by an integral gravity field. Holographic projection is perfected and finds use in a number of different applications. Soldiers now wear combat armour and carry ACRs, while military grav vehicles are now capable of free flight and no longer restricted to ground effect. The capability to augment weaponry and other items with intelligent software now exists, giving these items limited self-awareness. Stealth technology can now provide spacecraft with a radar absorbent, heat dispersion hull that reduces the craft's signature, in addition the powerful meson gun is developed for use by large military craft. Advances in medicine now allow for damaged organs in the human body to be replaced with artificial versions. Brain transplantation into a donor body is feasible at this Tech Level.

Tech Levels 12 to 15

In this game, the Tech Levels 12 to 15 are closely related, and could be seen as subdivisions of a single TL. There are developments in weaponry, in starship technology and gravitics, but none of the new innovations seem to change the nature of society in quite the same way that earlier Tech Levels did. With the invention of grav technology, society takes a new turn, cities are redesigned with flying vehicles in mind and planets spread their populations out into orbit and beyond. Control of the environment is assured at these Tech Levels and humans can live in extreme climates and terrains with ease. The information net is ubiquitous and accessed by everyone all the time, limited only by time lag when connecting with citizens living off planet.

TL 12 - Average Stellar

Weather modification is perfected at TL 12, revolutionising agriculture and transforming the business of planetary terraforming. In military circles squad-level plasma weapons enter service, replacing grenade launchers and rocket launchers. Infantry are issued with gauss rifles and some scout troops are equipped with newly developed grav belts. In the world of communications, real-time multi-lingual translators are now in use. Stardrives capable of jump 3 are introduced, along with nuclear damper fields, meson screens and fusion guns. Medically, it is possible to keep a brain alive away from a body at this TL.

TL 13 - Average Stellar

Grav vehicles merge with orbital spacecraft since most grav drives are now powerful enough to reach low orbit. Entire buildings, and even cities can be suspended in mid-air through the use of (very expensive) grav motors, while a new generation of jump drives are capable of jump 4. Humanoid-shaped robots with limited self-awareness are available at this TL. Elite troops have access to powered armour (Battle Dress) and support from grav gunships carrying heavy hitting plasma guns. Data Display/Recorders, personal heads up displays become ubiquitous at this TL and are used by individuals in thousands of professions for data analysis on-the-move. Cloning is now used to grow and replace defective or damaged human body parts.

TL 14 - Average Stellar

At TL 14 bonded superdense materials are developed, these have molecular structures reinforced and strengthened in a powerful artificial gravity field before having its internal electron bonds strengthened by a small induced electrical current. Bonded superdense

materials allow for almost impregnable starship hulls and amazing feats of engineering that were previously impossible. Stardrives capable of jump 5 are introduced, and the increasing numbers of battle dress-wearing soldiers now carry a plasma gun into battle. Support is provided by a man-portable fusion gun. Genetic engineering reaches its full potential at this Tech Level, as does reliable memory erasure. Floating cities are now able to move, but expense precludes use.

TL 15 - High Stellar

At TL 15 the new generation of stardrives are capable of jump 6. Frontline troops are almost universally equipped with powered battle dress and portable fusion guns. Meson communicators are developed which allow communication through solid objects. Anagathics, or age retarding drugs, are introduced, but expense restricts their use to the wealthy. Advances in bio science pave the way for the invention of the universal bioscanner as well as the portable neural activity scanner.

STARPORT

Many worlds have starports, their presence being essential to interstellar trade and commerce. To determine the world'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. Each starport class offers different levels of service. The Starport Class Services table provides more specific details.

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

Table: Starport Class Services

Class	Descriptor	Best Fuel	Annual Maint.	Shipyard Capacity	Possible Bases
A	Excellent	Refined	Yes	Can construct starships and non-starships	Naval, Scout
B	Good	Refined	Yes	Can construct non-starships	Naval, Scout
C	Routine	Unrefined	No	Can perform reasonable repairs	Scout
D	Poor	Unrefined	No	None	Scout
E	Frontier	None	No	None	None
X	None	None	No	None	None

Class A Starport

Treat this like one of today's airport hubs, places like Chicago O'Hare, Dubai International and Heathrow. They are vast in scale, with the workforce and complexity of a small city. Hundreds of starships can be accommodated and both crews and passengers can spend time in hotels, restaurants, lounges and other entertainment facilities at the port. It can provide refined fuel, top quality maintenance facilities and a prodigious cargo-handling service. Ships can be bought and sold here, and new ships are being constructed at integrated shipbuilding yards. All A class starports include a high port, a huge space station in orbit that transfers goods, equipment and people between surface and orbit. Like any hub, ships leave here for less glamourous destinations, or ship passengers travelling longer distances between hubs. All interstellar shipping lines will operate at this type of port. The class A is busy, cosmopolitan, a high energy, non-stop transportation machine.

Class B Starport

The class B resembles an international airport that does not serve as a global hub. It will therefore be sited close to the planetary capital. It will have a shipyard capable of building non-starships and small craft and is able to provide refined fuel. There are good

maintenance facilities present that can carry out a starship's annual maintenance if required. Nearly all class B starports include an orbital high port. The navigation aids, traffic control and emergency services are top notch and usually extremely reliable. There will be hotels and other leisure facilities at the port, though not quite as elaborate as those of a typical A class. Airports like Portland International in Oregon, or Albuquerque's Sunport are good comparisons in terms of their size in relationship to the big international hubs. Capable of supporting international flights, a good portion of these airports' traffic is domestic. A class B is often home to a shipping line, which uses the port as a base.

Class C Starport

The type C starport is found in great numbers and although small in size and with limited facilities, most see a large and steady flow of traffic. This is probably the lowest class of port that can be 'depended on' to provide an efficient and service, with class D and E ports being extremely hit and miss in quality and efficiency. Generally only reined fuel is available, but there are repair yards that are able to address most maintenance issues. Comparing the starport to a modern airport, Hillsboro airport in Oregon or Leeds-Bradford airport in the UK might be good analogies. Traffic control and starship handling will be able to cope with several landings and take-offs simultaneously and ships can often expect to see hangers, as well as landing pads that are able to accommodate ships up to 5000 tons. Some class C ports have an orbital high port, but these are not the floating cities of a class A hub, but simply docking stations able to provide fuel, repair and transfer facilities. Smaller shipping lines, serving only subsector routes might establish their operations centre at a type C, out of the way of the big hubs and high density trans-sector lines.

Class D Starport

The class D is the smallest landing facility that would be clearly recognisable as a starport. It is a minor port, with a handful of landing pads, a cluster of buildings and a very modest traffic control system. There will still be a security fence surrounding the facility. Only unrefined fuel is available, and there are no repair facilities to speak of. Minor work might be carried out, but anything requiring major parts will need to be done off-world, or equipment and spares shipped in after a considerable delay. Class D ports are often established to serve a particular need, perhaps the shipping of mineral ores, tourism, or the importation of supplies for a colony or settlement. In airport terms, the class D is equivalent to a busy general aviation facility, such as Friday Island in Washington state or Scotland's Kirkwall, which links up the remote islands of the Orkneys.

Class E Starport

When there is no starport, but a place has been designated as an authorised or recognised landing spot for starships, a class E facility exists. There is no fuel and no repair yard, no real landing pad or traffic control, no navigation aids or perimeter fence, no hotels or terminals … not a lot really. I landed at a couple of airstrips in Kenya that serve the safari lodges at Amboseli and Masai Mara. Those airfields have no runway lights or tower, no staff or perimeter fences. Animals can wander across the runway unexpectedly. The only buildings (where they do exist) are simple sun shelters, with a primitive toilet out back if you are lucky. One or two busier strips that I visited, like Seronera in Tanzania, had a couple of people on duty, one was a caretaker who kept the toilets clean, and there was a guy with a radio in a hut who liaised with the nearby Serengeti visitor's centre to arrange for jeeps to pick up passengers. While I took a toilet break at Seronera, my guide and jeep driver used the phone inside the hut to contact his HQ in Arusha town. I passed a few airstrips in East Africa that were simply dusty lengths of orange dirt, with only a windsock to advertise their use. At Lake Manyara, a couple of children were playing in the middle of the dirt runway. I

see class E ports in this vein. They are a marked touch-down spot (a pad, rather than a runway) that is agreed upon, where passengers can transfer to local forms of transport. There might be a caretaker in some semi-permanent or prefab building or there might not be.

Class X Starport

There is no agreed landing ground. There will undoubtedly be many places on the world that a starship might be able to touch down, but these are ad hoc arrangements, each with their own potential dangers. Uninhabited planets are routinely given the designation of class X starport.

Starports as Plot

Starports are crucial SF gaming, second only to starships. They are not just places for ships to land and player characters to disembark; they are the first contact point for that planet and its civilization. In many scenarios, the player characters may not even leave the confines of the starport, merely refuelling, loading up new cargo and shipping out. As a referee I try my hardest to get the players away from the starport and into the wilderness or the society of the world that they have landed on. What's the point of Travelling if you just hop from one port to another? I do this by locating cheap cargos away from the port, at the seller's location of choice. To make a purchase and get it to the starport, the players have to 'get out there and have an adventure!'

If this approach isn't possible and the game does jump from one starport to the next, then the other possibility is to drag the world into the starport. The Mongoose book Starports is a fantastic resource and full of additional information plot hooks and ways to customize your port setting. Within the Third Imperium, the Starport Authority manages all of the civilian starports on major worlds. This organisation provides a level of uniformity and standardisation but also ensures that imperial ports are run efficiently, safely and fairly. However, considering the vast number of worlds with enormous differences in climate, topography and society, these starports are going to all be different in some way. To a much lesser extent, this is true of airports on Earth, particularly at the smaller airfields where the mass transit of cargo and passengers hasn't brought with it the necessary (and usually very similar) terminal buildings, nav-aids, and service areas.

Try to infect the starport with some memorable aspect of the world that it is found on. There is certainly no need to go to great lengths, a simple statement about the architecture or some facility found at the port, or a unique type of encounter, will set the scene quite nicely. On a frozen planet, imagine if some of the port buildings were cut out of the ice, like Sweden's amazing Ice Hotel at Jukkasjärvi, or the tunnel complex on Hoth in The Empire Strikes Back. The tech level of a planet may also affect how it looks or operates. At very low tech levels you could see beasts of burden on the landing pad, bringing in cargo or taking away passengers. Local materials, brick, wood, sandstone blocks might be used in the starport construction. As the port gets bigger and moves into the class C category, these materials will be replaced with concrete and glass, but it would be evocative to have the earlier design reflected in the new buildings in imitation of the past. Te most sensible place to build a large starport is on flat, well-drained and stable land, but this is science fiction and a starport will benefit immensely from a unique location – at the base of a sandstone cliff (with hangers cut into the rock), on an island in the middle of a large river, on a plateau in mountainous terrain, raised on stilts in a mangrove swamp, over the sea on an artificial island, at the centre of a vast city, with underground hangers and repair facilities, etc.

TRADE CLASSIFICATIONS

Trade codes are assigned based on a world's UWP values, as noted in the UWP Values for Trade Codes table.

Table: UWP Values for Trade Codes

Classification	Code	Size	Atmos.	Hydro	Pop.	Gov.	Law	TL
Agricultural	Ag		4–9	4–8	5–7			
Asteroid	As	0	0	0				
Barren	Ba				0	0	0	
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					

Trade classifications are broad labels that tell the players and referee what kind of goods might be bought cheaply on-planet and what might be sold at a profit. More than that, though, the classification gives us a look at the broad economic base of the planet. Does it import or export? What do people do? How does the world make its living, and how does it fit into the economy of the subsector? This label is extremely valuable to the world creator and should certainly be kept in mind throughout the process. But what does each classification mean?

Agricultural

Assume an agricultural world is able to produce a huge surplus of food that can be shipped out through the starport. Whether grain, cattle, edible fungi, exotic tree-analogues, vegetables, fruit or whatever, the economy is heavily focussed on farming. Organisation of the economy could vary tremendously, from free and independent small-holders, to vast corporations, to nobles and their tenant farmers, to latifundia (Roman-style slave farms). There are other aspects to the economy as well, but a good deal of it supports agriculture. A world of this nature will have some key advantage, perhaps a vast fertile river valley, much like the Nile or Euphrates. Perhaps it has vast prairies watered by regular onshore winds. It may benefit from extensive forests, slowly being replaced with cash crop plantations, or a a single year-long growing season caused by a lack of planetary tilt. At higher TLs, farmers are not backwoods yokels. At TL 7 they are savvy businessmen and mechanics as well as farmers, at TL 11 and up they may be experts in genetic modification, robotics and life support recycling. Asimov's Solaria is an Agricultural world where millions of robots tend vast farming estates owned by only tens of thousands of humans. Meanwhile, Anne McCaffrey's agricultural planet Botany is populated by slaves and criminals.

Asteroid

Asteroids are often mining colonies that produce various ores and crystals for use in industry, but others may be small colonies, prisons, private retreats and factories. An example of asteroid mines include Io from the movie Outland, and the Icarus mining station, from the Space Above and Beyond episode titled The Dark Side of the Sun.

Barren

Barren worlds have no population and no economy. Example: any wilderness location.

Desert

The desert planet, as we discussed earlier in this section, will not be all desert. There may be rocky highlands, dry prairies and mountains too. However, to qualify for this classification, the planet has to have zero Hydrographics percentage - no standing water. An economy based on a true desert world like this will be concerned with survival first and foremost. Water will be a top resource, either taken out of the air or drilled from aquifers deep underground. In desperate situations, water may even be shipped in. At lower Tech Levels, animals can be herded on dry grasslands, crops farmed around boreholes to create civilized oases scattered across a seas of sand. Frank Herbert's book Dune is filled with wonderful details that would bring any true desert world to life: the water-seller in the market-place, the dew collectors at work each morning, the Resentment citizens have for date palms growing on a nobleman's estate, the wonderful stillsuits, which capture and recycle bodily moisture and of course the way in which the Fremen recycle water, boiling down their dead in underground stills. The best example of a desert economy has to be Frank Herbert's Dune.

Fluid Oceans

Fluid Oceans are planets with oceans not made up of water, but of other liquids (liquid methane, ethanol, etc.) such worlds will be very different from Earth, but will certainly have things to offer the interstellar community. Petrochemical fuels and precious metals will be found in abundance and exported. off-world in exchange for food and other consumables, as well as any technologies related to life support. Arthur C. Clarke's depiction of Titan in his novel Imperial Earth, could be classified as a Fluid Ocean world; its economy depends on the sale of atmospheric fuel scooping to passing hydrogen-powered spacecraft.

Garden

The Garden world is Earth-like, blessed with a temperate climate, wide oceans and fertile soils. It will also have a diverse biosphere of plants and animals. Self-sufficiency is the watch-word here, since the inhabitants of the Garden planet will not have need of imported foodstuffs or medicines and they will have all the ores and other raw materials that they need.

High Population

These worlds will often be importers of materials - in particular foodstuffs. They will also need a steady stream of manufactured goods and luxuries, some legal and some not. Drugs, spices, art works, jewellery, rare foods and fine liquors will all be sought after. Frederick Pohl and Cyril Kornbluth's Earth in The Space Merchants gives a gripping account of an overpopulated world where power, water and other resources are in short supply. Vat meat is cultivated for the masses, and this meat feeds on processed algae that farm labourers harvest from ponds in long, poorly paid shifts. The 1973 movie Soylent Green also describes an overpopulated world dependant on processed food sources.

High Technology
Advanced manufactured goods, such as robots, vehicles, weaponry, medicines and electronic items are exported from these worlds. Thriving high-tech economies like this do, however, require raw materials - the more exotic the better. Rare metals, crystals and radioactives will all be required for these advanced economies.

Ice-Capped
Ice-Capped worlds are cold and dry worlds with their abundant surface water locked up as frozen ice. Mining and drilling will probably be crucial to the local economy, metals, petrochemicals and crystals exported to high tech worlds for use in manufacturing. Of course goods such as food and medicine will be imported, in return.

Industrial
The game's definition of an Industrial planet is actually a 'super' Industrial world, a world dominated by vast manufacturing centres and cities supporting the workers needed in these centres. The scale is huge, only worlds with populations in excess of a billion people can qualify as an Industrial world. It is taken as read that the atmosphere is unbreathable, either due go natural contaminants, or ruined during the long road to planetary industrialisation. These worlds are massive exporters of electrical goods, all kinds of appliances, manufactured goods, weaponry, vehicles, advanced materials and alloys and robots. In return they will require vast amounts of raw material. Industrial worlds are also High Population worlds.

Low Population
Worlds supporting small numbers of individuals are usually dependant on outsiders for everything, including foodstuffs, vehicles, manufactured items and medicines. The worlds they inhabit may hold ample raw materials, but they may not have the industrial capacity to be able to extract it.

Low Technology
Low tech worlds will crave various high tech items that they can use without any attendant infrastructure. In other words they desire things like high tech medicines, electronic items and petroleum fuels that have no strings attached. The government may quite like a squadron of hypersonic attack jets, but a huge network of mechanics, engineers, trainers and pilots would be needed as well as spare parts, specialized buildings and tailored ammunitions. This isn't just about expense; a steam-age society does not have the technical or economic infrastructure to support such an acquisition. Most of Firefly's Rim worlds could be classified as Low Technology planets. There, all the modern conveniences of the Core worlds are far more expensive and citizens make do without, they farm with hand tools, resort to entertainment that doesn't require power and ride beasts of burden.

Non-Agricultural
The Non-Agricultural world has many mouths to feed, but lacks the climate and water resources needed to feed them. It is dependent on outside sources for its food, textiles and other organic products. The rules assume a good reason for the colonisation of such a planet and the Trade table suggests that light industry thrives on these Non-Agricultural worlds.

Non-Industrial

Any world with a population between 10,000 and 9,000,000 is classified as Non-Industrial, which indicates that there are too few people to support an adequate manufacturing economy. Consequently many types of factory-made goods will need to be imported from off-world. This makes the Non-Industrial world something of a backwater or 'developing nation' reliant on high tech imports to maintain its economy. Most early colonies obviously fall into this category. Although these worlds demand sophisticated products that they cannot manufacture themselves, the Trade tables suggest that they themselves have little to offer the interstellar community.

Poor

The Poor world really is a backwater, a place few visit, it has a thin atmosphere and insufficient water resources to support a strong economy. In all likelihood the Poor world is covered by extensive deserts. This is a dry and unattractive world, its inhabitants can produce enough food to survive, but rely on imports for any sophisticated or high technology items. The fractious and desperate lives led by the citizenry on some Poor worlds may explain why the Trade table lists these worlds as prime markets for illegal weaponry (just behind Amber and Red Zones). Star Trek's Nimbus III would be classified as a Poor world.

Rich

The Rich world is a desirable destination, a luxurious retreat that boasts innumerable diversions, entertainments and attractions. Wealthy individuals may make a Rich world their home; its economy will generally be self-sustaining, but it will rely heavily on imports to satisfy its inhabitants' insatiable craving for luxury items. Star Trek's pleasure planet Risa is an example of a Rich world.

Water World

Citizens of a waterworld inhabit a planet filled with resources. Aquaculture and fishing provide food, whilst seabed mining and oil drilling supply fuel, building materials and other resources. Exotic chemicals and drugs might also be sourced from the oceans. Waterworlds are a common theme in science fiction. Jonathon L. Howard's planet Russalka features a conflict between rival submarine cultures, whilst Poseidon, created for the roleplaying game Blue Planet, is dominated by a struggle between greedy colonists and adapted 'natives'.

Vacuum

Planets without atmosphere must shelter their populations within airtight habitats and domes. Although food can be grown hydroponically, there will still be a great need for consumables from off-world. Mining will typically form the bulk of any exports from a vacuum world.

BASES

The presence of military bases is noted on the UWP after the Tech Level characteristic. Possible installations include scout bases, naval bases, scout way stations, naval depots, imperial research stations and imperial prisons. 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 vessels can obtain refined fuel and supplies here. If a world possesses a Class-A or Class-B starport, throw 8+ on 2D6 to determine the presence of a naval base in the system. There are a variety of types of naval base, and the referee can decide what will best serve the world. The base might be huge, the equivalent of the US Navy's Naval Station Norfolk, Virginia. As the world's largest naval station, Norfolk supports 75 ships and 134 aircraft with 14 piers and 11 aircraft hangars. Four aircraft carriers are based at Norfolk, it is a vast naval city, a nerve centre, supply base, training centre and maintenance yard. A naval base of this size will dominate, not just the world it sits on, but also its neighbouring worlds and indeed the subsector. Like a Type A starport it will include a large orbital station where carriers and cruisers can dock. Most naval bases be of smaller scale, equivalent to Naval Station Maryport, Florida, which serves as home to a single carrier and its attendant vessels and units. Others will have a dedicated mission, such as Naval Station Portsmouth, Maine, which focuses on the overhaul and repair of submarines.

Some naval bases then, might be fairly modest affairs (similar in size and capabilities to a Type C starport) that focus on running patrol ships throughout the subsector, yet rarely see anything bigger than a frigate or destroyer. Any base commander will have political clout equal to the size and reach of his base. The local government may be happy to host the base, since it helps the economy, provides good relations with the interstellar power, and ensures a level of security from star-faring criminals. Other worlds may not be so keen, Naval Station Guantanamo Bay is fiercely contested and its legality disputed by the Cuban government. These governments may be powerless to do anything against the base, or, like the Spanish reaction to RAF Gibraltar, may continually infringe the bases territory, harass and impede workers or personnel entering or leaving the base, and generally try to make life difficult.

Scout Base

A scout base or outpost offers refined fuel and supplies to scout ships. 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. Like naval bases, scout bases vary in scope and size, only more so. Scouts perform a large variety of missions and many scout bases will be modest affairs that try to support those missions, from ship maintenance, survey, contact and exploration and of course communication. Small bases also exist, dedicated to a single task, such as surveying a single system or conducting long-term exploration within a single system or on a single world. Other scout bases may simply serve to overhaul and maintain the scout fleet, train scouts, conduct research into new technologies or perfect and practice survey methods. There are some of these bases with a handful of staff, deployed to some airless, icy moon and waiting for visiting ships to break

the monotony. The smaller the base, the less formal the structure, regulations, dress code and work ethic will be. Big scout way stations have all the efficient buzz of a large naval depot, but smaller, more remote, stations might not even be recognizable as a scout base – they certainly will not look similar to other bases. The scouts deployed there create the atmosphere and working ethic of the base they are stationed at, this isn't helped by the lack of strong leadership and the shared team-ethic of the scouts.

Pirate Base

A pirate base serves as a haven for interstellar pirates. 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. If marked on the UWP we can assume that a pirate base is suspected within that system. Is it there now? Is it seasonal? Where is it? Have the navy attempted to eradicate it? Rather than the code spelling out the existence and location of a pirate base, perhaps the referee will find it more useful to treat the code as a 'flag' that denotes extremely high pirate activity in this system, suggesting a base or links with the system government. In this way it resembles a 'zone of piracy' marked on modern maps that indicate likely regions of attack by modern-day speedboat pirates, such as those off the coast of Somalia and in the South China Sea.

Base Codes

The presence of one or more bases is designated on the hex map with a base code in the upper-left of the world hex. The Base Codes table identifies which note-worthy bases, if any, are present.

Table: Base Codes

Code	Description
A	Naval Base and Scout Base/Outpost
G	Scout Base/Outpost and Pirate Base
N	Naval Base
P	Pirate Base
S	Scout Base/Outpost

Usually the presence of a base will have little impact on a high tech, high population planet. Things are different, however, when the local populace numbers only a few thousand - or less. Are these people workers on the base? Or are the personnel of the installation counted separately from the planetary population? It is probably best not to stick to a hard and fast rule but make decisions on the fly during world creation. On a sparsely inhabited planet a large base will make a significant impact and alter the flavour of the world. The local economy will see the personnel on base as a source of income, as natives did outside Roman forts, or the South Vietnamese outside US Army bases. A lot of people may work on the base, or for the base, or know people who do. The existence of a large military population on-planet should certainly become a factor in the world creator's thinking.

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. 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. These worlds are struggling with revolution, social upheaval or some natural threat and the local situation holds dangers for off-world travellers. Plenty of science fiction writers have created worlds that humans should not visit, like Terra 11, a failed colony ravaged by biological warfare and civil war that featured in the movie Spacehunter: Adventures in the Forbidden Zone. James Cameron's Pandora is a lethal world, full of hostile native tribes and belligerent wildlife.

Red Zone

Red worlds are interdicted and travel to them is forbidden. Interdictions are usually enforced by the Navy. Red zones can indicate that the world is too dangerous or too sensitive to allow visitors. The Referee assigns Red worlds at his discretion. Red Zones may or may not hold some danger for characters, but they are classified as quarantine planets. Interstellar authorities blockade these worlds for whatever reason and they dispatch military vessels to prevent unauthorised landings. Why do they do this? The planet may well be dangerous, but it may hold secrets of a sensitive nature, or a top-secret military base (Kamino), or a people that must be protected from human contact (Star Trek: Insurrection), or a newly discovered alien race, or a fabulous new mineral unknown to Mankind (Avatar), or a biological entity escaped from a laboratory, or an enigmatic artefact (2001: A Space Odyssey), or a damning piece of evidence that could bring down the regime (Serenity), or an amazing but little understood new material or resource, or .... the reasons are many.

How does interdiction work? It should vary, keeping the players guessing at each new Red Zone. Undoubtedly they will be hired by some desperate patron to penetrate the blockade and get down to the world's surface. The navy could establish a permanent patrol in-system, maybe one or two non-jump patrol craft based at a small orbital station, or a more costly frigate or cruiser that sits on station for several weeks before being rotated back to base when its relief arrives. Alternatively, the interdiction might be more ad hoc, with patrols regularly 'dropping by'. Some worlds might instead suit a network of spy satellites that are capable of automated response, perhaps launching missiles or a barrage of lasers at the interloper. Such a satellite network might take no action, but simply inform the next visiting naval patrol of the players' activities and the registration of their ship. If the subject of the interdiction is quite localised (perhaps an alien ruin on the surface) then the naval presence might actually be on the ground, at a fortified base, complete with fighters waiting to be scrambled. Or … there may be no blockade, funds have dried up and the navy has quietly pulled out of the system, but left the Red Zone classification in place as a deterrent. This last situation lends itself to some other force (pirates? rebels? smugglers?) setting up their own base on the interdicted and rarely visited world.

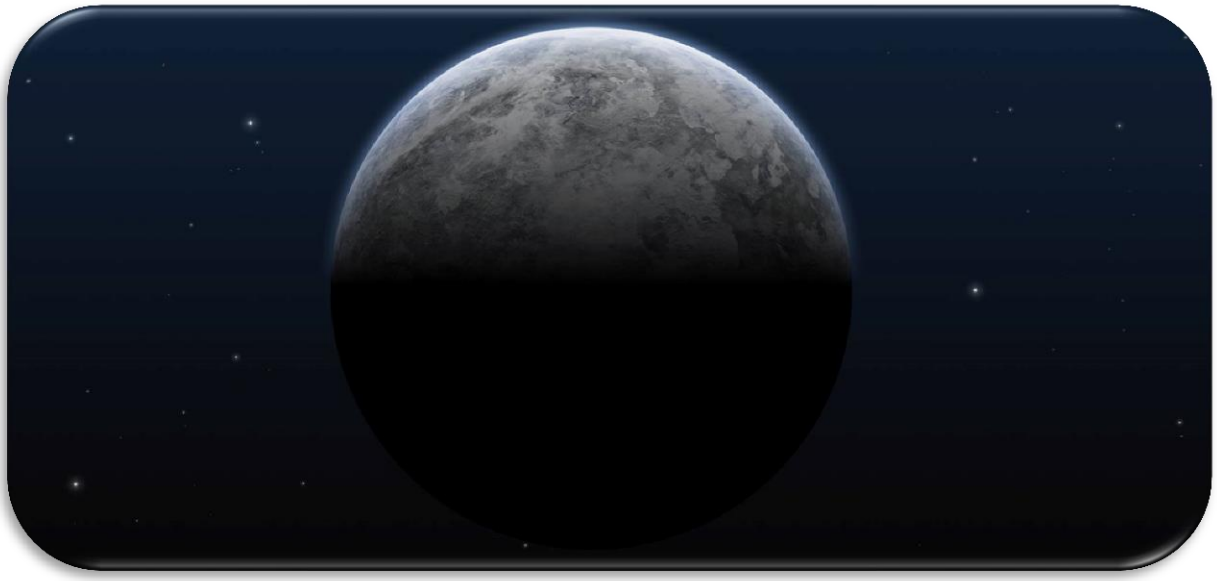
Getting past the navy might be down to luck, or skill. We all remember Han Solo faking an ID pass in an Imperial shuttle to fly effortlessly past Lord Vader's super stardestroyer in Return of the Jedi. Yes there might be a blockade, but experts, government agents, repair personnel, scouts, surveyors, military teams, supply drops and others still need access. Can the PCs fake a pass? Or can they determine patrol schedules accurately enough that they can get in before the local patrol sweeps through the area. If there are satellites, there must be an ID code. And for the right price, I'm sure it's for sale. Just pray that it is ***this month's*** code, and not last months …

What the navy actually does to the characters, should they be identified or caught, probably varies from game universe to game universe, and from Red Zone to Red Zone. At a Red Zone that is fiercely defended, characters may lose their ship and end up in prison to keep them quiet, but this plot isn't great for roleplaying, instead the navy might 'cut them in' and ask for their assistance and the employment of their unique skills, to solve a problem on the Red Zoned world that the navy itself cannot deal with. John Carpenter's movie Escape From New York seems to capture this plotline nicely! Getting caught shouldn't thwart the characters, but lead to more drama. What if the 'threat' is about to overwhelm the navy, and the characters are hauled on board at the very moment that everything hits the fan! Pitch Black anti-hero Riddick finds himself in custody when the ship he is on crash lands on an incredibly hostile world. Naturally the crew and passengers require his murderous skills to survive. The player characters, imprisoned inside a navy brig might find their talents equally useful to the naval crewmen on the ship, overwhelmed by the threat from the Red Zoned planet.

If the referee is using pregenerated UWPs then some of the worlds will be categorised as Amber Zones and one or more will be Red Zones. These categories mark out those planets as trouble spots. When creating his own worlds, however, the world builder should refrain from assigning a travel zone until the very last stages of the process.

INTERSTELLAR GOVERNMENTS

Worlds may be independent, or part of a larger interstellar government that spans a system or more. These governments or states 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. Borders should be drawn on the map. Note that larger interstellar nations will usually have sub-domains, which should also be marked.



COMMUNICATION AND TRADE ROUTES

Within the 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.

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.

Table: Trade Route Worlds

First End Point	Second End Point
Industrial or High Tech	Asteroid, Desert, Ice Capped, Non-Industrial
High Population or Rich	Agricultural, Garden, Water World

"It is my job to create universes as the basis of one novel after another. And I have to build them in such a way that they do not fall apart two days later."
Philip K. Dick

The process I use for creating interesting and believable worlds is made up of four parts. In **Part 1** I look at the first three physical characteristics listed in the UWP, and decide what each one means. I try to conjure up a picture of what the planet itself may be like, even though I have only three pieces of evidence to go on.

In **Part 2** I assess the four social characteristics of the UWP (Population, Government, Law Level, Tech Level) and factor in the Trade Code too, if it has one. What type of society is this? Does it remind me of anything from Earth's history? Do any ideas spring out immediately from that initial scan?

Part 3 involves playing tennis, flipping back from the physical stats to the social stats, and then back again. The aim here, if at all possible, is to try to explain the social characteristics by looking for answers in the physical ones.

In Part 4 of the world creation process we create a unique hook for the world. Not every planet needs a hook, but they are certainly useful devices, particularly when the social and physical characteristics don't seem to match up.

Part 1 – The Physical Stats

What is this world like? Review the first three characteristics: Size, Atmosphere and Hydrographics. A typical world thrown up by the world generation system will have Size 7, Atmosphere 6, Hydrographics 7. That means its going to generally Earth-like, a Garden world where humans can breathe the air, they can tolerate the gravity and there are oceans, fresh water and (typically) a lively ecosystem.

When numbers veer away from this comfortable norm there needs some explanation and the 'Earth-like world' becomes a little less familiar. Try to look at all three numbers together. I'll roll some dice and create a set of physical characteristics to illustrate this process.

Planet A Size 2 Atmosphere 2 Hydrographics 0
Planet B Size 6 Atmosphere 5 Hydrographics 4
Planet C Size 4 Atmosphere 4 Hydrographics 3

Planet A is the size of our Moon, but it has a tainted and very thin atmosphere. It is bone dry - so, not a vacuum world, but a tiny planet with a thin layer of (unbreathable) atmosphere. If it has an atmosphere, maybe there are volcanoes spewing out gasses, like Jupiter's moon Io. That would explain the taint, and perhaps there's so much volcanism that the dissipating atmosphere is being continually replenished. Or, the gasses remain around Planet A because it has a magnetic field, and therefore a hot core.

It sounds a little more like Io, which is squeezed by Jupiter's gravitation so much that its core remains molten. Planet A might be the moon of a gas giant, or a planet orbiting close in to a type M red dwarf star. A volcanic world like this would be covered with thick deposits of sulphur, creating a landscape of yellows and browns. There would be extinct volcanic mountain chains and also dangerous areas of new activity. Perpetual clouds of ash and smoke would darken the sky.

Planet B is smaller than Earth, yet bigger than Mars and it has a breathable, though thin, atmosphere. There are lakes and seas on this world - which is a Godsend! Planet B just about qualifies as a Garden world. But our deliberations probably end there ... is it partially frozen in an Ice Age, is it tropical and warm, or is it a sun-blasted desert world, with barren and rocky continents separated by lifeless oceans? We must wait until we see what the social stats tell us about the people who live there. We need more clues, more information.

Planet C is somewhat Mars-sized and is lucky enough to hold on to a thin but tainted atmosphere. It also has seas, but only 30% of the surface is covered by water. It could stand in as a nice 'Mars-when-it-still-had-water' analogue, a small planet with a few seas and a thin atmosphere. Let’s postulate a carbon dioxide taint, just enough to make the air bad and dangerous to breathe for more than a few minutes. Planet C is classified as a Poor world at the moment (only when the social stats are determined can we properly create a Trade Code). So, we know this world is marginal with few viable resources. We don't want to create a 'past-Mars', so we tentatively picture a world of vegetation, with scrubland and desert away from the coastlines, but with jungle clustering around the life-giving seas. We will know more about Planet C when we have the social stats.

Part 2 – The Social Stats

So, we have some basic idea about the physical side of our three planets, but we still have too much leeway, the landscapes and climates of worlds B and C could be anything. We need more data, more inspiration, more ideas ... Let's roll a few more dice and complete the creation of the UWP.

Planet A Population 8 Government A Law Level 9 Tech Level 9 Starport D
Planet B Population 2 Government 5 Law Level 2 Tech Level 4 Starport D Planet C Population 8 Government 8 Law Level 9 Tech Level A Starport B

Without referencing the physical characteristics (which we will do in Part 3) let us go over the social stats. What kind of societies do we have here?

Planet A has a healthy population with hundreds of millions of people that are served by a small D class starport. That's a major nation here on Earth and this group of people is ruled by a charismatic dictator, a single leader who rules through agencies who are under his direct control. Security is tight, however, akin to a modern-day police state, so our dictator is probably not very popular and maintains a personality cult that aims to cultivate his image. Secret police will be active amongst the citizenry. Perhaps the tiny starport is tiny for a reason, the dictator isn't keen on interstellar contact and does not want to foster too much trade with other worlds.

Planet B also has a D class starport, but only a few hundred people live on this world. They are ruled by agencies that are selected for their technical expertise - a feudal technocracy - and live at a low law level. These people enjoy many of the freedoms that we have here in the Western world. Interestingly, this world is at Tech Level 4 (equivalent to Earth between 1860 and 1900). Here we have a small colony depending on steam power, but with such a tiny population, big projects such as railways and steel manufacturing are out of their grasp. Perhaps the leaders of this society are the engineers and mechanics who are able to keep the steam engines (and the society) running. The small D type starport is easy to explain - this is a small colony with few imports and even fewer exports.

Planet C has a population of several hundred million, much like the USA today, and these millions are ruled by a civil service bureaucracy. Like Planet A, they live at a high law level, without many of the freedoms and rights that we take for granted today. With such a high law level, we can assume the bureaucratic government is disliked and difficult to deal with, the resulting law level represents the government's reaction to its population's unhappiness.

Part 3 – Linking Physical & Social Stats

Can the physical stats we created throw some light on our social stats, or vice versa? Logically, the society that lives on a planet must be affected by the landscape and climate of that planet. Why is the population so high? Is it a fertile Garden world? I may not get the answers I need, so I jump back to the physical characteristics: could I reinterpret these numbers in a way that would explain the growth of the society sketched out by those last four numbers?

We do this because societies are intimately linked with their landscapes, particularly when those landscapes are harsh. Consider northern Alaska, where the sun just doesn't get above the horizon for a couple of months every year. The darkness is depressing and alcohol provides such an easy and dangerous escape that (in places) it is banned and criminals resort to smuggling it inside innocuous packages. Suicide rates there are seven times the national average. Most important work outdoors, in particular construction, has to be done in the warmer months since the ground freezes solid and cannot be dug over. Anyone who has lived in Alaska will probably be able to identify many more differences between life on the Arctic Circle and life in suburban Middle America.

The environment may determine where people live: some of the farmers along the Yellow River live in cave-houses that have been carved out of the sandy, and easily worked, cliff sides. Many traditional houses in lowland Thailand are built on stilts to mitigate against seasonal flooding. The environment may also determine what industries dominate the local economy: away from the Libyan coast, for example, oil drilling forms the largest industry and surrounded by harsh desert there is no room for tourism or agriculture. In the forested wilds of Brazil and Scandinavia, logging has become a primary industry, with entire towns springing up to service it. The environment may determine how people travel: by snow mobile or bush plane in the Arctic, by boat or airboat in the Florida Everglades and by train in flat and poor northern India. The environment will determine how its inhabitants generate power: English coalfields kick-started the Industrial Revolution, and the largest solar power stations on the planet are located in sun-drenched California and Arizona. In past-times, Scottish homes burned dried peat, cut from the moorlands and bogs, as fuel. Modern Egyptians (as well as their ancient ancestors) use dried animal dung in their cooking fires.

The essential lesson here is that people use what they have around them. Even though new technologies may later develop (or arrive from off-world) the poor will still continue to use what the environment offers, and this inevitably becomes a part of that local culture as social tradition. Of course, as someone attempting to create a world that is interesting for characters to visit we are actively looking for these unique and quirky ways of doing things. If everyone lives in suburbia, flies an air/raft and relies on fusion power, then our universe will be a bland one indeed. The more hooks that a referee can sink into the local climate, landscape, resources and environment, the more real and vibrant and alive that planet and its society will appear. It will truly appear to belong there.

Planet A (ISHTAR) D2208A9-9

Let's give our worlds names, so we don't get them confused. Planet A is known as Ishtar. You will remember that it is a Moon-sized planet with a tainted and very thin atmosphere, and no standing water. We considered that it might be highly volcanic and perhaps the satellite of a gas giant. Our social characteristics indicate hundreds of millions of people living in a police state at a near future (TL 9) level of technology. This society is governed by a 'charismatic' dictator. Can we link the world with its inhabitants, somehow? What do the people do for food, and what kind of industries thrive here? I Google volcanic soils, and see that the ash from volcanoes is actually full of nutrients and is great for agriculture, but after Googling the moon Io, I also find out that Jupiter's moon is 90% sulphur and 10% useless rocky material - no nutrients there. What about sulphur? I Google uses for sulphur and discover it makes brilliant fertiliser, so Ishtar might depend on super crops that are grown in vast greenhouses and fed on sulphate fertilisers. I remember mentioning dark volcanic ash clouds - won't they obscure the sunlight to these greenhouses? Maybe ... I remember reading about Iceland's use of geothermal power, so Ishtar could do the same, generating electricity from geothermal steam powerplants.

Since I can't see any mining going on, why don't we say that Ishtar exports its top quality sulphate fertilisers to other worlds, particularly to large space stations, asteroid colonies and vacuum worlds. The D class starport is just about the perfect size for this task. That's the economy covered. Lava tubes are old tunnels cut through the rock by molten lava, and would make a fine setting for some of Ishtar's underground cities.

Who is this dictator? Could he be the man who transformed Ishtar's sulphate extraction into a subsector wide export business? That might make him quite a popular fellow, so maybe the police state isn't there to oppress a rebellious populace, instead it might be a draconian series of edicts to maintain the safety of the public. Everyone is, after all, living on a super-volcanic planet with a toxic atmosphere, one mistake and hundreds or thousands of citizens might well end up very dead.

I can see this world now and I am beginning to imagine a visit from my characters. Cities can be seen on approach from orbit, with vast greenhouses laid out like the petals around a flower. Accommodation for the characters will be found in an underground hotel, built within a series of twisting lava tubes, and where the ends of these tubes end at a rock outcrop, large picture windows have been installed, so that the guests can see volcanoes erupting on

the distant horizon. There are notices and warning signs everywhere, and tariffs for government fines are listed on walls. Rather than a tour guide, which you might hire when visiting a new city on Earth, characters on Ishtar are legally obliged to hire a government licenced 'safety consultant' (who might double as a tour guide).

I recheck Ishtar's Trade Codes and find that it is classified as both a desert world and a non-agricultural world. This matches my conception of the planet quite well. Yes, it is self-sufficient with regards to food, but it does not export it, and Ishtarites will welcome meat and animal products, as well as luxury foods and luxury goods, from other worlds.

Planet B (RAVENNA) D654252-4

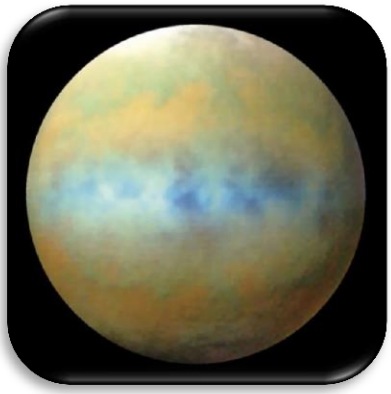
Planet B will go by the name of Ravenna. We determined that it was a small garden world with a thin atmosphere and seas covering 40% of its surface. This leaves the door wide open; Earth-like worlds are great, but if they are to be memorable, they need to possess some unique characteristic - they require some focus. Hopefully, by looking over the social stats will provide this focus.

Ravenna's tiny population lives within a steam age society. It is governed by technical experts, probably the board of engineers that maintains the power systems designed to keep the society running. Government is light, and the few hundred citizens live remarkably free lives. Why, though, if this is a fertile garden world, are there not hundreds of millions of inhabitants? Perhaps habitable land is at a premium, it could be that the thin atmosphere label only applies to a small portion of the planet, while other regions are blanketed by a very thin, unbreathable, atmosphere. This would mean the thin air in the habitable zone is lower down, perhaps in a very deep crater or series of canyons. Alternatively, the planet might be extremely hot or cold, leaving only a sliver of temperate land near the equator, or, if the planet is tidally locked to its star, near one of the poles.

I like the idea of a series of deep canyons, perhaps created by ancient tectonic activity. These rift valleys are deep and thin air pools at their floors. We know there are seas or large lakes on Ravenna, and can assume that these canyons also carry within them, rivers. In this way our little colony will have breathable air and fresh running water and going further, we can assume that vegetation grows easily along the river banks. Beyond the deep valleys, on the high plateaus that cover the rest of the planet, air is too thin to breathe and plant life only grows as mosses and algae and tough grasses. It is doubtful that the colonists ever visit these harsh uplands.

Why are these humans here? If mining was lucrative, there would be many more miners! Perhaps a small group of prospectors came here looking for precious metals and its descendants have remained on Ravenna ever since. The fact that the people live at TL 4 suggests a period of stagnation, perhaps the mining colony was much bigger initially and the prize of great mineral wealth attracted plenty of immigrants. If most of these folks left when the spoils of the planet did not materialise, the culture would be plunged into a great recession and many high tech luxuries would be difficult to maintain. So, this might be a make do and mend culture, living within their means and mining coal with which it powers its steam-driven society. Looking at the Trade Codes, Ravenna is classified as a garden world, a non-industrial world, and both a low population and low technology world.

Planet C NAKURU B443889-A



Planet C is named Nakuru and as we have already determined it is fairly dry and small with a thin atmosphere (tainted with carbon dioxide). It resembles 'Mars-when-it-still-had-water', but we decided that our planet has scrub vegetation out in the wilds and fertile regions of jungle clustering around its few lakes and seas. It is a well populated world, with hundreds of millions living under a harsh, and quite restrictive bureaucratic government. Why? Why do so many people live here? Looking at the most applicable Trade Codes, we see that Nakuru is a poor world which would imply that it lacks the resources or viable land to be anything other than a marginal colony.

I'm having troubling linking up the social characteristics with the physical ones. Nakuru is a real backwater, although it boasts a type B starport, something you might not expect on a frontier world of this nature. Obviously there is traffic, but nothing in the physical stats seem to suggest a reason for this interstellar traffic. Perhaps the world sits at a communication nexus or is home to a naval or scout base, either of these suggestions might warrant the establishment of a large starport with an attendant service population. But we are not going to factor in such things here. We could turn to mining again, but this seems unlikely, Nakuru does not have an unusual surface gravity and hence density. And mining should certainly not be the default 'get-out' when struggling to decide why a population has settled in a planet.

At times like this, the referee needs to move to 'The Hook'.

PART 4 - THE HOOK

Often it is possible to create an interesting and believable world by marrying the physical part of the UWP with the social aspects. Although it may take some head scratching or reinterpretation, vivid and living worlds can spring from the bare bones of a UWP.

But that may not always be the case. Sometimes the referee needs a 'hook', a one-off signature aspect to the planet that will make the destination an unforgettable one. The hook might be related to the world's physical form or to the society and culture that inhabits it. It will be something unique.

In the Zozer Games' series of PDF books titled 'Planetary Tool Kits', each world was designed with its own, very memorable, hook. The 760 million people of ocean world Korinthea are squeezed uncomfortably onto an island the size of Sicily, with terrible repercussions. On the desert planet Ubar, settlement thrives inside a deep meteor crater with a pool of breathable atmosphere. Mazandaran is famous for its World River, which rises within a high mountain range, and, like a super-Nile, snakes its way around three-quarters of the planet's circumference - civilisation has developed along its fertile river banks as the river snakes through thousands of kilometres of desert. Antioch is an ocean world that was struck by a colossal asteroid in eons past, leaving a single circular continent (the remains of its vast crater) for humans to colonise. A rich ecology thrives within the crater and competing nations squabble over the rights to mine the awesome mineral and petroleum reserves left behind by the impact.

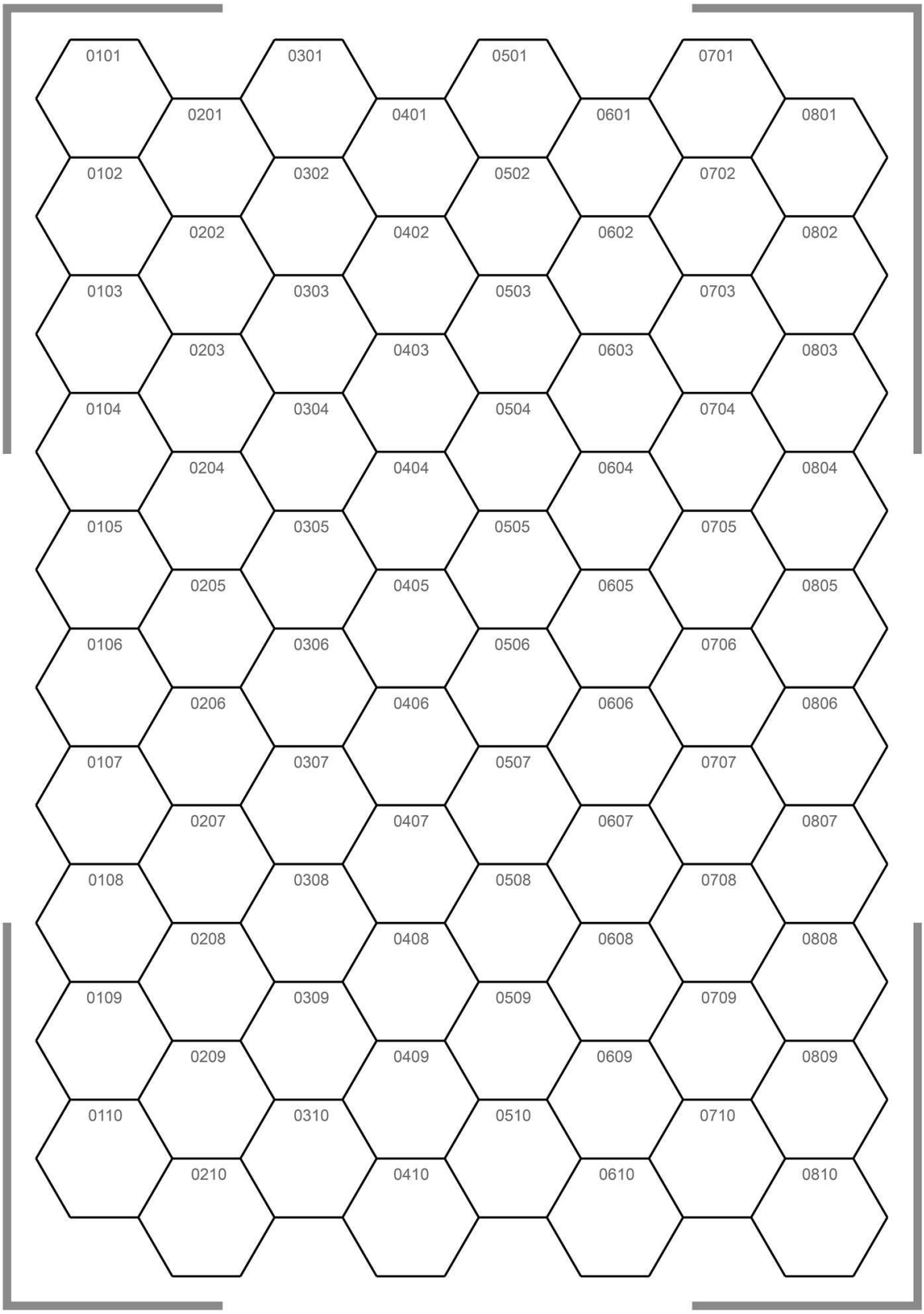
The danger of overusing the use of hooks exists. They are, essentially, gimmicks, although ones that may be grounded in good social or physical geography. But when the hook is all encompassing and world-spanning, care must be taken to limit its use.

Each hook is inspired by something found here on Earth, but simply pushed to its extreme. The World River of Mazandaran was inspired by the Nile - what would happen if the Nile wrapped itself almost around the entire planet? Korinthea was inspired by a documentary I saw on Manila, one of Earth's most densely inhabited cities. What would an even denser city look like, and how can I achieve that?

Hooks are inspired by something here on Earth, and it will sometimes be the case that the implementation of the hook will necessitate changing one or more numbers of the UWP. Alternatively, the referee will find himself with a fantastic idea for a hook and a set of UWP characteristics that go with it, and he finds himself scanning the UWPs of his subsector, looking for a world that might fit the bill. This is something referees are particularly good at. They come across a fabulous scenario that is set on a particular planet, and for the sake of continuity within their own role playing campaign, they hunt for a world with a similar UWP in their own game universe that might serve as a location for that scenario. Hooks can be dropped in like that, from above, or they can be built onto a UWP, by looking at the string of characteristics and coming up with a suitably memorable feature to match.

E N D

Subsector Name _____



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