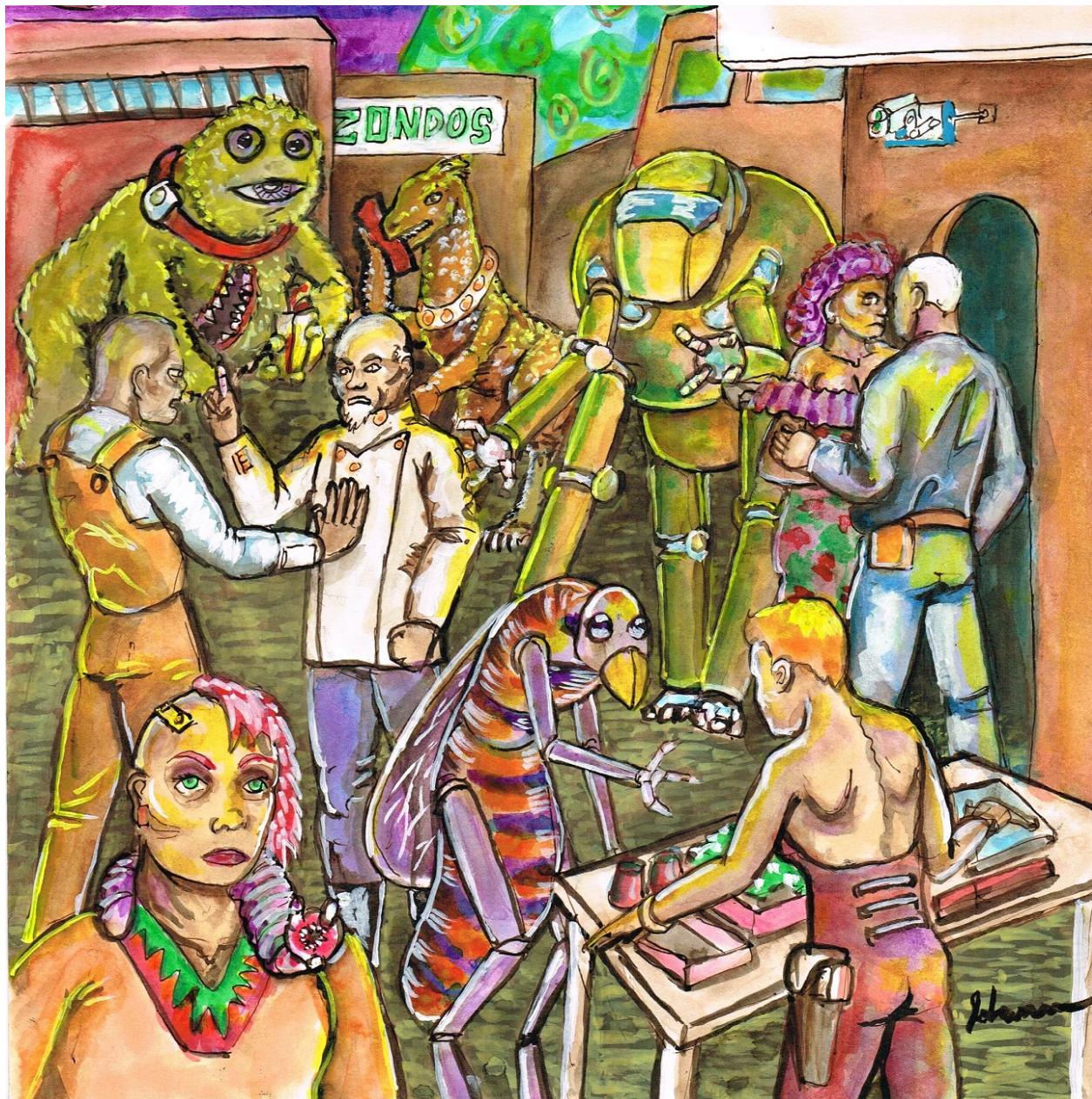


GALAXIES IN SHADOW

Percentile Science Fiction Roleplaying Game

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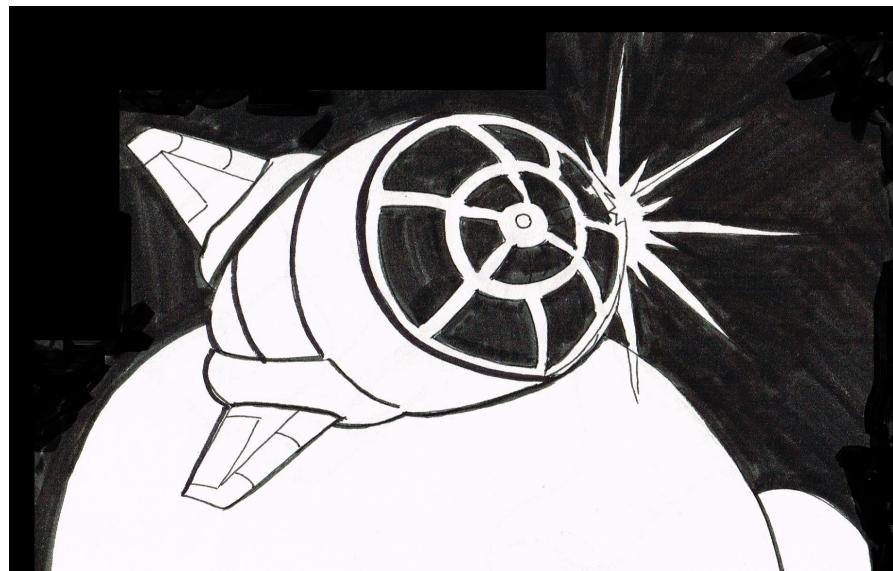
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Introduction

This is a science fiction roleplaying game designed around simple percentile dice rolls. Characters are created with a background and skills but can also be created from where they are currently with their background being determined as play progresses. While one will find rules for combat here, there are also rules for legal battles in the courtroom, scientific inquiry, technological development, exploration and colonization, trade and commerce, and even political campaigning. There are also structures for creating worlds, species, vehicles, weapons, and more. These have been done with an eye to flexibility and scalability but also try to pay at least lip service to the laws of physics. Where there are deviations from what science currently believes feasible they are labelled as such. There are even rules for psychic powers, partially for the sake of completeness but also to allow the emulation of popular science fiction franchises.

Given its scope, one might guess that this is not a simple game but it does attempt to follow simple core principles and build upon them in a rational and usable fashion. One example of this is the avoidance of acronyms and jargon. You will not need to add your BSC to your PSF to find you TSC here. Clarity and simplicity have also been sought in the distribution of points to skills and characteristics. A point is a point is a point here and while, depending on their origin, there are some restrictions in their use, most things have a single clear rating value rather than a spreadsheet of values. One might note the large number of Characteristics employed herein, this has been done with an eye towards preventing the dominance of one or two characteristics and to reduce the number of special case rules needed to reflect the differing capabilities of non-humans. As much as it has been tempting to apply multiplicative situational modifiers, for the sake of clean scaling, they have been restricted to simple addition and subtraction. This is not to say there is no multiplication or higher math to be found in here but as much as possible it has been kept to multiples of two or ten for ease of use in play.



CHARACTERS

The game universe is populated with characters, but the vast majority of these need no description or characteristics as they will never actually be making an appearance. They are the faceless masses that keep the economy running, crew massive star cruisers, and support interstellar despots in rigged elections. Their race is automatically the norm for the region they are found in and there is nothing else in their appearance that would draw anyone's notice in a crowd.

Should an individual be singled out from the crowd by the players, a d100 roll, modified to eliminate outliers, will suffice to provide any necessary characteristic or skill value. Those in professional capacities can simply be assumed to have met the requirements for their career. Competent individuals will generally have skill ratings equal to their aptitude rating making it possible to reduce a minor character to their characteristic scores and their profession.

Only major characters, such as those used by the players in a roleplaying game, their allies and foes need to be created using the following method. A fully developed character will have ratings for twelve characteristics, a number of skills, a pool of background points, some social connections, and a list of their possessions. Characters can be created proceeding from their youth or at their present age and profession and working backwards. This allows the generation of new player characters of any degree of experience in a moment and the growth of their past as a part of game play.



Characteristics

Your character's innate abilities are rated for ten Characteristics that provide initial and maximum ratings for your character's skills.

Agility indicates the ease with which an individual can move through their environment including balance, grace, and lightness of foot. It is used for physical feats like climbing and dancing.

Dexterity provides an indication of the ease with which small objects can be manipulated and controlled. It is used to fire small arms and work with tools and devices.

Endurance is a measure of cardiovascular fitness and muscular conditioning. It is used to resist injuries and overcome hardships and exhaustion.

Knowledge is a measure of memory and study. It is used to remember information and recall details.

Logic is a measure of problem solving and recognizing disinformation. It is used to test new ideas and deduce solutions to problems.

Special Characteristics

There are two characteristics which work differently than the others, Psi and Class.

Class is a measure of the individual's wealth, fame, and station. While it has little bearing on skills or actions undertaken it opens up access to higher class connections and provides funds, all of which can open the doors of opportunity. Class is rolled for on a straight percentage as it is very much an accident of birth that is not in any way genetic or physiological. Class has no natural boundary and thus no actual maximum rating unless it is imposed by society. Even genetically engineered individuals roll for class as in some societies it is the ruling class that is modified and in others slaves.

Psi is a measure of the character's capacity for psionic powers. It serves as the aptitude for skills involving such abilities and as the amount of force they can bring to bear. Like Class, Psi is generally generated with a flat percentile roll. If psi doesn't exist in the setting it is automatically set at 0.

Perception is a measure of general awareness and sensory acuity. It is used to notice clues and ambushes.

Reflexes is a measure of reaction speed and alertness. It is used to determine the sequence in which actions are resolved and to drive vehicles.

Strength is a measure of overall size, build, and muscular development. It is used to lift objects, bear loads, and strike blows.

Talent is a measure of creativity and originality as well as general interpersonal sensitivity. It is used to originate concepts and ideas .

Willpower is a measure of discipline and resolve. It is used to persevere and impose one's will on others.

Generating Characteristics

Initially Characteristic ratings won't follow a linear statistical model. That is to say that lower ratings tend to be indicative of demographic circumstances like childhood, illness, and old age, which are generally outside of the normal mode of play.

Ordinary Healthy Adults

The Characteristics of those adults in good health and circumstance can be represented by rolling percentile, and adding 30 to rolls under 30. If the individuals are meant to be strictly average, 30 can also be subtracted from rolls over 70. The latter method can also be used to represent individuals from communities with significant inbreeding like lost colonies and hereditary nobility. This rule can be applied after species modifiers.

Exceptional Adults

Heroic individual's Characteristics can be generated by rolling percentile and adding 30 to rolls under 30. This allows some room for weakness and nuance while eliminating useless individuals and increasing the average ratings.

Appearance

Two primary factors to consider when creating a character's description are their general aesthetics and overall reproductive viability within their own species. A human will see a horse or an eagle as beautiful but not as sexy. Aesthetics lean towards symmetry and colouration, while reproductive viability is largely indicated by physical fitness and bearing. As such, one might average their Agility, Strength, Endurance, and Willpower to find a general guideline to a character's attractiveness within their own species but such a number is not required, or used at any point in these rules. One can apply the art skill Fashion to enhance their general aesthetics within their own species and culture but such knowledge is of little use outside of these.

My Character Lacks Charisma

Some experienced role players will probably observe that there are no purely social characteristics. In part, this is because there are already social aspects to Class, Logic, Knowledge, Perception, Talent, and Willpower. Just as no physical characteristic dominates combat, no single mental ability dominates social interaction.

Eugenic Programs

The results of selective breeding programs are generated by spending 550 points with no rating exceeding 100 or falling below 40 as such programs generally cull non-viable offspring.

Genetic Engineering

Like selective breeding, genetic manipulation allows a pool of points to be spent on characteristics. 650 points are available and no rating may be set above 110 or below 50 under most circumstances. Really elaborate things like altering racial traits or creating massive brain slugs are a bit beyond the scope of this option.

Developing Characteristics

Characteristics can be developed to a maximum of the best skill for which they serve as an aptitude.

Cultures

Upbringing is a major factor in a character's development. This is primarily reflected by providing a list of Fundamental Skills which start out with a twenty point bonus. A culture's own language and natural weapons are always fundamental skills. For humans the natural weapons are Punch and Grapple, but a race with claws will obviously have a claw attack skill instead of Punch. Fundamental Skills are awarded at a rate of one every two years plus a language and an innate attack like Punch or Grapple or other physical activity. Members of species with different aging rates have proportionately fewer skills or reduce a number of other skills to a base of zero.

Core Worlder

A species' home world is ideally suited to support them. Core worlds tend to be more bureaucratic and orderly but allow fewer opportunities for adventure.

2 ARTISTIC or PERFORMANCE

Catching
Lying
Mathematics
Own Language
Throwing
Singing
Swimming
Writing

Frontier Worlder

Newly settled worlds provide many opportunities that would be restricted on core worlds.

Axe
Botany
Climbing
Drive Wheeled Vehicles
Foraging
Grapple
Navigation
Punch
Survival
Swimming

Spacer

Children reared in societies that dwell in orbital habitats, generation ships, and asteroid bases require a different skill set to survive.

2 ARTISTIC or PERFORMANCE

Astronaut
Life Support Technician
Own Language
Lying
Mathematics
Newtonian Physics
Pilot Spacecraft
Sensors

War Worlder

Worlds that have fallen under the boot of oppressive regimes are often dependant on the endless war to maintain their hold on power.

Climbing
Drive Wheeled Vehicle
Grapple
Kick
Knife
Lying
Own Language
Punch
Rifle
Swimming

Primitive

The members of Hunter / Gatherer societies spend the majority of their time hunting and gathering. Without these skills they starve. War with other tribes is generally an informal and chaotic matter and disciplined training is non-existent. Primitive characters do not have access to any technologically advanced skills as defaults and must purchase them with Experience Points, not Background points

Climbing
Grapple
Foraging

Own Language
Punch
Stealth
Survival
Swimming
Running

Feudal

Societies which have developed agriculture and metalworking technology are generally led by a warrior elite who offer the farmers, herders, and crafters protection, usually from themselves, in exchange for taxes and service.

Botany
one Craft
Grapple
Lying
Own Language
Punch
Riding
Spear or Blunt weapon

Militant Warrior Society

Some societies manage to do more than cling to the trappings of feudalism and remain monarchies lead by a warrior elite. In practice, this requires a powerful enemy to justify the ongoing military order to take priority over more practical things. Personal honour and valour are the true currency in such a society.

Grapple
Leadership
Logistics
Military Discipline
Own Language
Punch
Strategy
Sword or other Melee Weapon

Utopian

Through the power of science this society has eliminated all social ills, becoming a place of peace and harmony. Sure there are bodies piled beneath the foundations and all the people look the same, act the same, and have never had an original thought but that was the goal all along. Utopian societies are generally xenophobic, arrogant, and ruthless. Fascist societies, left to themselves tend to evolve into Utopian societies once they've hidden all the bodies.

Computers
Dancing
Own Language
Mathematics
Philosophy
Play Instrument
Running
Swimming

Skills

If you take a look at the Skill List, you'll probably wonder what the various skills do in game terms. All skills increase your character's chance of succeeding when they do that sort of thing. They don't have any other effects. S.f.% is a sufficiently complex game that it really doesn't need a bunch of special case rules hiding in the skill descriptions.

Italicized Words In Skill Names

Race Medicine is one of many skills that has part of its name in italics. This means that it is a "Cluster Skill" and that actually covers many skills. These skills are created by substituting a specific word for the italicized part of the name. For instance Dog Medicine, Gryph Medicine, and Human Medicine are all appropriate *Race* Medicine skills. Note that *CULTURE* is a group of categories, that aren't related to each other. French Culture may give you some help in cooking French dishes or knowing French customs but it really doesn't help much with Chinese cooking or Chinese law.

Aptitudes

Each skill has a characteristic or skill shown in parentheses after it on the skill list. This determines its initial rating and how many points can be spent on it and thus its maximum rating.

Learning Opportunities

Careers and education provide opportunities to develop skills beyond the limits of background knowledge and personal study. Having a learning opportunity allows a skill to be developed up to its aptitude. Fundamental skills for a character's culture always have a learning opportunity available.

Training Points

A character receives 36 points per year. For each full increment of their racial Aging Factor 12 points per year are lost to atrophy and aging. In reality these points are lost from skills and characteristics and are repurchased through study and practice but that's not much fun to play out. It is quite possible for young characters to be highly specialized and competitive as can be seen in international sporting events like The Olympic Games.

Training and Certification

Education provides professional certification which can be used to obtain employment. It doesn't matter what your skill rating is, without that piece of paper you can't work in the field, though it may be possible to earn a living as a freelance consultant. Of course, an education costs money rather than earning it. There is a provision to borrow the money but in the end, education must be paid for. One of the great advantages of upper class characters is that they will have the money to get an education without having to earn it first.

Related Skills

If a skill from the same category has a rating at least twenty-five points higher than a default, it gives a 5 point bonus to the available learning experience. It probably should added to the default rating but that makes a dreadful mess of the accounting.

Developing Skills

A character receives thirty-six training points per year or three points per month. As time passes more and more time is needed to maintain their capabilities. For every full multiple of their racial Aging Factor after attaining maturity, one additional point per month, or twelve per year must be spent on maintaining their general capabilities resulting in an overall lower amount of training points.

Default Skill Ratings

Due to primary education, media exposure, common knowledge, and life experiences, skills found in the character's culture start out at half their Aptitude. Characteristics can only be raised if there is a skill for which they are the aptitude that has a higher rating. In essence the aptitudes for Characteristics are the skills for which they are aptitudes. Skills from another culture's *CULTURE* category do not benefit from a default rating.

Personal Study

Outside of educational and occupational opportunities, skills can be developed through personal study. This allows an additional five training points to be spent on skills with ratings of 80 or less and one point on skills of 81 or higher each year. This allows skills to be increased beyond their aptitude and thus to serve as learning opportunities for characteristics.

Future Opportunities

Careers have natural ties to other careers. If a character moves on to one of these, they can carry their ranks over.

Prior Experience

There's no need to start playing your character as an inexperienced youth. They can be skilled and educated adults with past experiences. The price of playing an older character is quite simply that they're older. They have more standing commitments and less time to keep at the top of their game, their joints start to ache, they may even suffer serious injuries that impair their abilities. It's important to remember that aging represents the effects of failing to train when life gets busy just as much as it represents physical deterioration due to age.

Occupations

For a character to enter an occupation they must buy the skills it requires, rolling for events as necessary, they then obtain the gear and the title specified for the career. Rank and position may be modified by random events. Of a necessity the careers listed here are based on a more or less modern human society. Others can, of course, be envisioned but are best left to specific species and settings.

Gear

Each profession has a list of equipment a character in that field can be reasonably expected to possess. Some items will have a skill prerequisite listed in parentheses which must be met to obtain them. The rest are automatically gained after the character finishes their first year. The gear is assumed to be of the standard Technology Factor for the setting.

Aging

Every year after your character's racial Aging Factor plus Maturation Rate, they lose one point from each Characteristic. After their age is double their Aging Factor they lose two points and after it is triple their racial Aging Factor they lose three points from every Characteristic, every year, and so on. Of course, this isn't much fun so it is assumed that the character is making a constant effort to maintain their abilities and thus the number of Training Points awarded each year is reduced instead. If the player would rather have the points they can accept the decline and receive the skill points.

Event Roll

Each year after spending their points, the player must make a roll on the Event Table. The usual catastrophe is loss of their job or expulsion from school with sufficient prejudice to ensure they'll never get into an equivalent position again. Each occupation skill at the rating required for the next rank adds one point to the roll. Each occupation also has a career specific event and benefit

Family

The close ties of early life experiences are a powerful economic and social resource. Depending on the reproductive strategy of the character's race they will have a number of family members that can be contacted for help. If abused these relationships will decline in strength but are assumed to be positive and trusting in the beginning.

Skill Substitutions

If wheeled vehicles have been supplanted by gravitic, hover, or vectored thrust vehicles it is appropriate to replace the skill with the more common skill. In similar fashion, pistol and rifle skill can be replaced with energy pistol and energy rifle where appropriate to the common technologies of the setting.

Rank Qualifications

In order to qualify for an event bonus a character must meet the qualifications for the next rank. To qualify for the bonus they must have at least one occupational skill per rank with a rating greater than $35 + 5 \times$ the next rank.

Personal Vehicle

Some occupational benefits entitle a character to an appropriate vehicle, this will be a wheeled or floatation vehicle, it can be an individual vehicle like a motorcycle or a four person automobile or work truck or boat if preferred. It can be an aircraft if the character is a skilled pilot or it can be an anti-gravity vehicle if those are commonplace in the setting.

Injured

The character is involved in an accident and suffers a debilitating injury. They lose one year to recuperation and have a permanent scar, limp or other reminder of their misfortune.

Wounded

The character is hit in combat and loses a limb or an eye. The body part can be replaced with a cloned or mechanical device but it takes a year to recuperate.

Character Creation Example

In order to demonstrate how all this fits together,

Species

This character will be an ordinary human. This means there are no modifiers to their characteristics.

Generating Characteristics

Our character will be an ordinary adult, so a percentile roll is made for each characteristic with 30 being added to their rating if the roll is less than 30 and 30 is subtracted if the roll is greater than 70.

Agility: $85 - 30 = 55$

Dexterity: $99 - 30 = 69$

Endurance: $87 - 30 = 57$

Knowledge: $96 - 30 = 66$

Logic: 57

Perception: $10 + 30 = 40$

Reflexes: $85 - 30 = 55$

Strength: $80 - 30 = 50$

Talent: $25 + 30 = 55$

Willpower: $89 - 30 = 59$

Well, that really dragged down some fantastic rolls, but that's what it's there for. We weren't looking for a mighty hero at the moment.

Class and Psi are just flat percentile rolls. Psi is entirely optional. Many settings don't have it at all and many more limit it in one way or another. As this fellow is from a hard sf setting we won't really be using psi anyhow.

Class: 19

Psi: 80

So, we've got a pretty average guy from a lower class family. He's only got 19 Savings units to work with. Since this is a Technology Factor 40 setting that works out to 760 units in cash but that's not used in character creation anyhow.

At 18, coming from a capitalist society he gets some fundamental skills start out with a twenty point bonus. We'll make his language German since that comes up.

Economics (Logic): 48

Grapple (Agility): 47

History (Knowledge): 53

Lying (Talent): 46

German Language (Knowledge): 53

Punch (Dexterity): 54

Wheeled Vehicles (Reflexes): 47

Writing (German): 53

Savings: 17

Since he doesn't have the money to go to school and there's a war on (isn't there always?), he'll enlist in the Ground Forces. His Agility, Endurance, and Strength are all over 50 so he's in. The first year has to be spent in the infantry to represent basic training. Occupational skills are Climbing, Grappling, Punch, Rifle, Swimming. We'll make his specialty Supply so he'll also need Logistics, Shipping, and Wheeled Vehicles. If this was a space opera setting we'd probably want to trade out Rifle for Energy Rifle and Wheeled Vehicles for Antigravity Vehicles.

That's a lot of skills. In the first year he puts 7 points into Climbing, Logistics, Shipping, Rifle, and Swimming as they are career skills that aren't fundamental and only have ratings of half their aptitude. The remaining point goes into Punch, just to even it up.

Climbing (Agility) $27 + 7 = 34$
Economics (Logic) 48
German Language (Knowledge) 53
Grappling (Agility) 47
Logistics (Knowledge) $33 + 7 = 40$
Lying (Talent) 46
Punch (Dexterity) $54 + 1 = 55$
Rifle (Dexterity) $34 + 7 = 41$
Shipping (Strength) $25 + 7 = 32$
Swimming (Endurance) $28 + 7 = 33$
Writing (German): 53

He rolls a 3 for an event, just the usual grind. Once he gets those skills up to 40 we can add one to those rolls. Rank one increases his savings by one to 18. Not exactly getting rich here. The next year, there's 48 more points to spend, enough to add 5 to 8 skills and 8 to one more.

Year 1
Rank: 1
Savings: 18

The next year he moves into the mechanized branch of the ground forces, the cavalry. The career skills are Ballistic Gunnery, Tracked Vehicles, and Missile Gunnery, he'll put twelve points into each of them.

Ballistic Gunnery (Reflexes) $27 + 12 = 39$
Climbing (Agility) 34
Economics (Logic) 57
German Language (Knowledge) 53
Grappling (Agility) 47
Logistics (Knowledge) 40
Lying (Talent) 46
Missile Gunnery (Reflexes) $27 + 12 = 39$
Punch (Dexterity) 55
Rifle (Dexterity) 41
Shipping (Strength) 32
Swimming (Endurance) 33
Tracked Vehicles (Reflexes) $27 + 12 = 39$
Writing (German): 53

After rolling another 3 on the event table and this boring fellow moves on with a total savings of 19.

Year 2
Rank: 1
Savings: 19

The next year, looking to get some bonus points on event rolls , he decides to continue building up the same skills, putting 11 into Ballistic Gunnery, Missile Gunnery, Tracked Vehicles, and 3 into Rifle, just in case.

Ballistic Gunnery (Reflexes) $39 + 11 = 50$
 Climbing (Agility) 34
 Economics (Logic) 57
 German Language (Knowledge) 53
 Grappling (Agility) 47
 Logistics (Knowledge) 40
 Lying (Talent) 46
 Missile Gunnery (Reflexes) $39 + 11 = 50$
 Punch (Dexterity) 55
 Rifle (Dexterity) $41 + 3 = 44$
 Shipping (Strength) 32
 Swimming (Endurance) 33
 Tracked Vehicles (Reflexes) $39 + 11 = 50$
 Writing (German): 53

With a roll of 9 and the three career skills over 40 giving a + 3 to the event table he finally gets a promotion.

Year 3
 Rank: 2
 Savings: 21

We could go on for a while, but he's 20 already, can drive a tank and fire the guns and he's pretty much shown how character creation works at this point.

There's just a few details to work out:

$$\text{Mass} = 80\text{kg} \times 50 \times 50 / (58 \times 57) = 60 \text{ kg}$$

Free Load = 2500g
 Monetary Units = 21 Savings x
 Technology Factor 40 = 840

21 year old human
 Rank 2
 Cash On Hand 840mu
 $\text{Mass} = 80\text{kg} \times 50 \times 50 / (58 \times 57) = 60 \text{ kg}$
 Free Load = 2500g

Characteristics:

Agility:	55
Dexterity:	69
Endurance:	57
Knowledge:	66
Logic:	57
Perception:	40
Reflexes:	55
Strength:	50
Talent:	55
Willpower:	59

Skills:

Ballistic Gunnery (Reflexes)	50
Climbing (Agility)	34
Economics (Logic)	57
German Language (Knowledge)	53
Grappling (Agility)	47
Logistics (Knowledge)	40
Lying (Talent)	46
Missile Gunnery (Reflexes)	50
Punch (Dexterity)	55
Rifle (Dexterity)	44
Shipping (Strength)	32
Swimming (Endurance)	33
Tracked Vehicles (Reflexes)	50
Writing (German):	53

Characteristics

Agility Perception	Dexterity Reflexes	Endurance Strength	Knowledge Talent	Logic Willpower
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Ordinary Adults: d% +30 to rolls under 30, -30 to rolls over 70

Exceptional Adults: d% +30 to rolls under 30

Eugenics: 550 points (40 -100)

Genetic Engineering 650 points (50 -110)

Special Characteristics

Class = d%

Psi = d%

Figured Characteristics

Mass = Racial Base x (Strength² / (Agility x Endurance))

Free Load = Strength²

Monetary Units = Savings x Technology Factor

Training Points = 12 x Age - 12 x Age / Racial Aging Factor

Initial Skill Rating

Exists In Own Culture	Aptitude / 2	Event Roll
Fundamental Skill	+20	0 -2 Lose Job, Spend One Year
Related Skill 25 higher	+ 5	Unemployed
Unknown	0	3 - 5 Just the Usual Grind 6 Catastrophe

Development Limits

Personal Study	Maximum	7	Life Event
Rating 0 - 80	Current Skill + 5	8	Career Event
Rating 81+	Current Skill + 1	9	Career Benefit
		10+	Promotion +1 Rank

Learning Experience Characteristic

Aptitude	+1 per qualification for next rank met
Associated Skill	-1 negative reputation
	+1 positive reputation

Points Per Year

Age	Training	Rank Qualification:			
Maturity	36 / year	Occupational Skill Rating 35 + 5 x Rank			
Maturity + Aging Factor	24 / year				
Maturity + 2 x Aging	12 / year				
Maturity + 3 x Aging	0 / year	Rank	Qualification	Rank	Qualification
Maturity + 4 x Aging	-12 / year	1	40	6	65
Maturity + 5 x Aging	-24 / year	2	45	7	70
Maturity + 6 x Aging	-36 / year	3	50	8	75
		4	55	9	80
		5	60	10	85

<u>Catastrophes</u>		<u>Random Occupations</u>	
1	Debilitating Illness	1	Education
2	Terminal illness 1d10 years to live	2	Corporate
3	Negligence causes 1d10 deaths	3	Government
4	Public scandal	4	Fringe
5	Declared Dead	5	Freelancer
6	War Disrupts Career 1d10 years	6	Renegade
7	Blinded (-30 Perception)	7	Ground Force
8	Lose an Arm	8	Space Force
9	Lose a Leg (-30 Agility)	9	Law Enforcement
10	Public Scandal destroys life	10	Criminal

<u>Random Life Events</u>		<u>Random Personality Traits</u>	
1			
2	Gain a random Connection	01-03 Passive	59-60 Aggressive
3	Lose a random Connection	04-06 Calm	61-62 Temperamental
4	Lose a Family Member	07-09 Contented	63-64 Greedy
5	Gain a Family Member	10-12 Empathic	65-66 Cruel
6	Gain A Hobby	13-15 Generous	67-68 Miserly
7	Offend a Family Member	16-18 Honest	69-70 Dishonest
8	Lose Savings	19-21 Industrious	71-72 Lazy
9	Gain Savings	22-24 Modest	73-74 Sleazy
10	Offend a Connection	25-27 Patient	75-76 Rude

<u>Random Relationships</u>			
1	Patron	31-33 Brave	79-80 Cowardly
2	Mentor	34-36 Cheerful	81-82 Depressed
3	Follower	37-39 Diplomatic	83-84 Offensive
4	Student	40-42 Friendly	85-86 Antagonistic
5	Ally	43-44 Gentle	87-88 Sadistic
6	Disciple	45-48 Humble	89-90 Proud
7	Stalker	49-50 Loving	91-92 Hateful
8	Rival	51-52 Outgoing	93-94 Shy
9	Nemesis	53-54 Physical	95-96 Cerebral
10	EnemyFamily	55-56 Practical	97-98 Imaginative
		57-58 Thrifty	99-00 Wasteful

ARTISTIC

Cinematography (Talent)
Drawing (Perception)
Fashion (Talent)
Painting (Drawing)
Photography (Perception)
Printing (Logic)
Sculpting (Perception)
Writing (Language)

ATHLETIC

Astronaut (Agility)
Catching (Dexterity)
Climbing (Agility)
Diving (Swimming)
Jumping (Strength)
Parachuting (Willpower)
Riding (Reflexes)
Running (Endurance)
Stealth (Agility)
Swimming (Endurance)
Swinging (Agility)
Shipping (Strength)
Throwing (Strength)
Tumbling (Agility)
Weight Lifting (Strength)

BIOLOGY

Biochemistry (Chemistry)
Botany (Knowledge)
Ecology (Knowledge)
Genetics (Logic)
Race Physiology (Knowledge)
Race Gene Therapy (Genetics)
Race Forensics (*Race* Physiology)
Race Surgery (*Race* Physiology)
Race Medicine (*Race* Physiology)
Zoology (Knowledge)

CULTURE

Accounting (Logic)
Business Law (Language)
Cooking (Perception)
Criminal Law (Language)
Diplomacy (Willpower)
History (Knowledge)
Logistics (Knowledge)
Military Discipline (Willpower)
Philosophy (Logic)
Subculture (Knowledge)
Language (Knowledge)
Leadership (Willpower)
Lying (Talent)
Management (Willpower)
Salesmanship (Talent)
Teaching (Willpower)

DRIVING

Air Cushion Vehicles (Logic)
Flotation Vehicles (Reflexes)
Legged Vehicles (Reflexes)
Powered Armour (Agility)
Tracked Vehicles(Reflexes)
Wheeled Vehicles (Reflexes)

ENVIRONMENT

Survival (Knowledge)
Fishing (Willpower)
Foraging (Knowledge)
Navigation (Logic)
Tracking (Perception)
Trapping (Willpower)

MELEE WEAPON

Arm Lock (Grapple)
Choke (Strength)
Grapple (Agility)
Kick (Agility)
Punch (Dexterity)
Sweep (Grapple)
Tackle (Strength)

Axe (Strength)
Blunt (Strength)
Knife (Dexterity)
Spear (Dexterity)
Sword (Dexterity)

PERFORMANCE

Acting (Perception)
Choreography (Dancing)
Compose Music (Logic)
Dancing (Agility)
Oration (Talent)
Pickpocket (Dexterity)
Play Instrument (Perception)
Singing (Perception)
Stage Magic (Dexterity)

PHYSICS

Astrophysics (Newtonian Physics)
Atomic Physics (Chemistry)
Chemistry (Mathematics)
Geology (Knowledge)
Mathematics (Logic)
Newtonian Physics (Mathematics)
Quantum Physics (Statistics)
Statistics (Mathematics)

PILOTING

Fixed Winged Aircraft (Reflexes)
Anti Gravity Vehicles (Reflexes)
Rotary Winged Aircraft(Reflexes)
Space Craft (Newtonian Physics)
Submersibles (Logic)
VERTOL Vehicles(Reflexes)

SMALL ARMS

Energy Pistol (Dexterity)
Energy Rifle (Dexterity)
Pistol (Dexterity)
Rifle (Dexterity)
Support Energy Weapon (Strength)
Support Weapon (Strength)
Weapon Autofire (Weapon)

SOCIOLOGY

Advertising (Talent)
Anthropology (Psychology)
Archeology (Willpower)
Criminology (Perception)
Economics (Logic)
Embezzlement (Accounting)
Politics (Willpower)
Psychology (Perception)
Strategy (Talent)

TECHNICAL

Architecture (Drafting)
Ballistic Gunnery (Reflexes)
Communicators (Logic)
Computers (Logic)
Computer Programming (Computers)
Construction (Strength)
Demolitions (Dexterity)
Drafting (Dexterity)
Energy Gunnery (Logic)
Forward Observer (Sensors)
Intrusion (Dexterity)
Machinist (Computers)
Missile Gunnery (Reflexes)
Sensors (Computers)
Survey (Mathematics)
System Engineer (Appropriate Physics)
System Technician (Knowledge)

Generic Alien Species

Animal people are the elves and dwarves of science fiction. They provide easily recognizable concepts that are easily understood without reading volumes of background information. They are particularly appropriate to science fiction as modern fable. The races presented here are deliberately generic, they are mainly assumed to hail from Earth-like worlds and may well be genetically engineered from terrestrial stock. The reason for this is simply that this core book is generic and more unusual species are generally specific to a given setting and its assumptions. If characters are being randomly generated the +30 to rolls under 30 rule can be applied after the race's modifiers as long as the -30 to rolls over 70 rule is also applied. Races with shorter gestation periods may have a reduced list of cultural Fundamental Skills or an equivalent number of skills that start at zero instead of half their aptitude.

Humans

Native To:

Sol GV-3 Terra

1G

Breathable Atmosphere

Plentiful Water

Kingdom: Animalia

Phylum: Chordata

Class: Vertebrata

Order: Mammalia

Family: Primates

Genus: Hominidae

Species: Sapiens

Size: 0

Average Mass: 80kg

Structure: Bilateral Endoskeleton

Features: Head, 2 Arms, 2 Legs

Dietary Strategy:

Hunter / Gatherer

Reproductive Strategy:

2 Genders

Live Bearing

Gestation Time: 9 months

Maturation Time: 18 years

Aging Rate: 18 years

Traits:

Building

Cultivation

Hands

Characteristics:

Agility: +/- 0

Dexterity: +/- 0

Endurance: +/- 0

Knowledge: +/- 0

Logic: +/- 0

Perception: +/- 0

Reflexes: +/- 0

Strength: +/- 0

Talent: +/- 0

Willpower: +/- 0

Apes

It's possible that these muscular brutes will one day replace humanity causing Charlton Heston no small consternation.

Base Mass: 100 kg
Structure: Bilateral Endoskeleton
Features: Head, 2 Arms, 2 Legs
Dietary Strategy: Gatherer
Reproductive Strategy: Live Bearing
Sexes: 2
Litter Size: Small (1-2)
Gestation Time: 15 months
Social Structure: Large Groups
Maturation Time: 19 years
Aging Rate: 24 years
Move: run 120 m
Sight: 40 m
Hearing: 20 m
Smell: 10 m
Target Size: +2

Traits:

Awareness
Building
Hands (Arms and Feet)
Hoarding

Characteristics:

Agility: 0
Dexterity: -10
Endurance: 0
Knowledge: +10
Logic: 0
Perception: +10
Reflexes: +10
Strength: +20
Talent: -10
Willpower: 0

Bats

A rare, flying race, bats are nocturnal by nature and are known for their sonar ability. They are often a more primitive species encountered by explorers.



Size: -3

Structure: Bilateral Endoskeleton

Features: Head, 2 Wings, 2 Legs

Dietary Strategy: Hunter

Reproductive Strategy: Live Bearing

Sexes: 2 Genders

Litter Size: Small (2-4)

Social Strategy: Large Groups

Gestation Time: 13 Months

Maturation Time: 9 years

Aging Rate: 13 years

Move: run 60 m, Fly 180m

Sight: 40 m

Hearing: 20 m

Smell: 10 m

Size: -4

Traits:

- Awareness
- Echo Location
- Hands
- Diminished Legs
- Fur
- Sharp Teeth
- Wings

Characteristics:

- Agility: +20
- Dexterity: -10
- Endurance: +20
- Knowledge: -10
- Logic: -10
- Perception: +10
- Reflexes: +25
- Strength: -40
- Talent: +10
- Willpower: 0

Bears

Like their namesake these are broad of shoulder and barrel chested, short legged, long armed, and have long claws and a muzzle full of sharp teeth. Being a less social race, they are often less advanced than humanity. They are always hungry and often cantankerous but are also generous and fiercely loyal to their few friends.



Traits:

Awareness
Debating
Hands
Claws
Fur
Sharp Teeth

Characteristics:

Agility: -10
Dexterity: -10
Endurance: 0
Knowledge: -10
Logic: 0
Perception: +20
Reflexes: -10
Strength: +40
Talent: -20
Willpower: +10

Base Mass: 120 kg

Structure: Bilateral Endoskeleton

Features: Head, 2 Arms, 2 Legs

Dietary Strategy: Hunter

Reproductive Strategy: Live Bearing

Sexes: 2

Litter Size: Small

Social Structure: Solitary

Gestation Time: 13 Months

Maturation Time: 14 years

Aging Rate: 17 years

Move: run 120 m

Sight: 40 m

Hearing: 20 m

Smell: 10 m

Size: +4

Blobs

Soft and amorphous, this unusual species resembles a partially deflated beach ball, they can absorb objects through their permeable surface and extrude simple limbs and manipulators. They reproduce through constant emission of microscopic spores, reproducing through fission when they become too large for their external membrane to support their weight.



Traits:

Amphibious
Awareness
Acute Smell
Cultivation

Characteristics:

Agility: +15
Dexterity: -10
Endurance:
Knowledge: 0
Logic: 0
Perception: +10
Reflexes: +15
Strength: -30
Talent: -20
Willpower: 0

Base Mass: 50 kg

Structure: Amorphous

Features: up to 4 Pseudopods (limbs)

Dietary Strategy: Forager

Reproductive Strategy: Division & Spores

Sexes: 1

Litter Size: Small

Social Structure: Solitary

Gestation Time: 18 months

Maturation Time: 12 years

Aging Rate: 17 years

Move: run 120 m, Swim 120m

Sight: 40 m

Hearing: 20 m

Smell: 20 m

Target Size: - 3

Bugs

While they resemble oversized insects, these six limbed humanoids actually have an internal skeleton to support the weight of their muscles and the thick plates that coat their surface. They are often a long dead race who's eggs are just waiting to hatch when un-expecting explorers wander into their ancient underground lairs.

Base Mass: 80 kg
Structure: Bilateral Exoskeleton
Features: Head, 2 Arms, 4 Legs
Dietary Strategy: Hunter
Reproductive Strategy: Egg Laying
Sexes: 3 (Drone, Female +2 Size, Male (Wings))
Litter Size Medium (2 - 4)
Social Structure: Large Groups
Gestation Time: 7.5 months
Maturation Time: 12 years
Aging Rate: 17 years
Move: run 120 m
Sight: 40 m
Hearing: 20 m
Smell: 10 m
Size: 0

Traits:

Awareness
Building
Husbandry
Carapace
Sharp Bite
Wings (Male Only)

Characteristics:

Agility: -5
Dexterity: -20
Endurance: 0
Knowledge: 0
Logic: +10
Perception: +10
Reflexes: +5
Strength: 0
Talent: 0
Willpower: 0

Cats

A small and lithe race of carnivores, cats are ill suited to forming large societies. The males tend to be nomadic, while the females are territorial. They are often a primitive society found by explorers or colonists. However, they are particularly cynical and rational and take to technology easily and are thus found in many star-faring civilizations.



Traits:

- Awareness
- Trickery
- Hands
- Claws
- Fur
- Leaping Legs
- Counterbalance Tail
- Sharp Teeth

Characteristics:

- Agility: +30
- Dexterity: -10
- Endurance: 0
- Knowledge: -10
- Logic: -10
- Perception: +10
- Reflexes: +20
- Strength: -30
- Talent: -10
- Willpower: +10

Base Mass: 70 kg

Structure: Bilateral Endoskeleton

Features: Head, Tail, 2 Arms, 2 Legs

Dietary Strategy: Pouncer

Reproductive Strategy: Live Bearing

Sexes: 2

Litter Size: Medium (2 - 4)

Social Structure: Solitary

Gestation Time: 8 Months

Maturation Time: 12 years

Aging Rate: 17 years

Move: run 120 m

Sight: 40 m

Hearing: 20 m

Smell: 10 m

Size: -3

Foxes

A clever and stealthy race, foxes resent their reputation as thieves and con men, often suggesting that, if they were any good at that sort of thing they wouldn't have a reputation for it in the first place. Foxes tend to be reserved and keep to their own family groups and seldom develop advanced civilization on their own.

Base Mass: 60 kg

Structure: Bilateral Endoskeleton

Features: Head, 2 Arms, 2 Legs, Tail

Dietary Strategy: Stalker

Reproductive Strategy: Live Bearing

Sexes: 2

Litter Size: Medium (2 -4)

Social Structure: Small Groups

Maturation Time: 13 years

Aging Rate: 16 years

Move: run 120 m

Sight: 40 m

Hearing: 20 m

Smell: 10 m

Target Size: -2

Traits:

Awareness

Camouflage

Fur

Hands

Sharp Bite

Trickery

Characteristics:

Agility: +30

Dexterity: 0

Endurance: 0

Knowledge: -10

Logic: -10

Perception: +10

Reflexes: +30

Strength: -20

Talent: +5

Willpower: +5

Racoons

A race of bandits and robbers, often the result of twisted experimentation the Racoons are often bitter loners who blame their problems on everyone else.



Size: 40 kg

Structure: Bilateral Endoskeleton

Features: Head, 2 Arms, 2 Legs, Tail

Dietary Strategy: Scavenger

Reproductive Strategy:

Sexes: 2

Litter Size: Medium (2 -4)

Social Structure: Small Groups

Gestation Time: 11 months

Maturity Time: 10 years

Aging Rate: 15 years

Move: run 120 m

Sight: 40 m

Hearing: 40 m

Smell: 10 m

Size: -4

Traits:

Acute Hearing

Awareness

Claws

Fur

Hands

Planning

Sharp Teeth

Characteristics:

Agility: +20

Dexterity: 0

Endurance: +10

Knowledge: -10

Logic: +10

Perception: +10

Reflexes: +10

Strength: -40

Talent: -15

Willpower: +5

Tigers

Thoughtful and intelligent, these vicious predators have trouble working with other species as they cannot help but view anyone smaller than themselves as potential prey. Being ill suited to forming large societies, If they reach the stars it is generally because some other race made the mistake on landing on their world, only to be enslaved or eaten.

Base Mass: 100 kg
Structure: Bilateral, Head, 2 Arms, 2 Legs,
Tail
Dietary Strategy: Pouncer
Reproductive Strategy: Live Bearing
Sexes: 2
Litter Size: Small (1-2)
Social Structure: Solitary
Gestation Time: 17 months
Maturation Time: 17 years
Aging Rate: 17 years
Move: run 120 m
Sight: 40 m
Hearing: 20 m
Smell: 10 m
Size: +3

Traits:

Counterbalance Tail
Awareness
Claws
Fur
Hands
Leaping Legs
Sharp Teeth
Planning

Characteristics:

Agility: +15
Dexterity: -10
Endurance: 0
Knowledge: -10
Logic: +10
Perception: +10
Reflexes: 0
Strength: +30
Talent: -20
Willpower: +10

Wolves

Cursorial predators are often able to develop the kind of advanced society that can reach the stars due to their capacity for team work and submission to authority. Even so, they tend towards xenophobic societies that see might as right.



Traits:

Acute Smell
Awareness
Hands
Husbandry
Sharp Teeth

Characteristics:

Agility: 0
Dexterity: 0
Endurance: 0
Knowledge: -10
Logic: 0
Perception: +10
Reflexes: +10
Strength: 0
Talent: -15
Willpower: 0

Base Mass: 80 kg

Structure: Bilateral Endoskeleton

Features: Head, 2 Arms, 2 Legs, Tail

Dietary Strategy: Chaser

Reproductive Strategy: Live Bearing

Sexes: 2

Litter Size: Medium (1-2)

Social Structure: Small Groups

Gestation Time: 15 months

Maturation Time: 15 years

Aging Rate: 17 years

Move: run 120 m

Sight: 40 m

Hearing: 20 m

Smell: 20 m

Size: 0

Stranded

With limited fuel and life support supplies one of the great risks of explorers is being left behind. A Stranded character spends 1d10 years surviving in the harshest of environments before they are rescued.

Entry Requirements: Colonist or Scout

Benefit: Location of Raw Resource

Event: picked up by pirates and change career to pirate or aliens and gain alien contact

Annual Savings:

Current Savings x $(90 + 2d10)/100$

Occupational Skills: Botany, Ecology, Foraging, Life Support Technician, Survival, Zoology

Gear: Homemade bow or spear, Respirator, Tamed Alien Predator

Future Opportunities: Administrator

Imprisoned

A criminal or military occupation can land one in jail for an extended period of time. While in prison one's opportunities for self improvement are severely limited.

Requirements: Imprisoned Event

Benefit: Paroled unless previously paroled

Event: Gain A Criminal Connection

Annual Savings:

Current Savings x $(90 + 2d10)/100$

Learning Opportunities: Body Building, Cooking, History, Language, Psychology, Streetwise, Writing

Future Limitations: Cannot enter corporate, government, or military careers due to criminal record.

Aristocratic Careers

It has been argued by some that democracy is doomed to devolve into aristocracy. Many science fiction settings feature empires and nobility right out of the third or sixteenth century. These societies are often the result of capitalism gone mad with the wealthy taking on political power over generations but in totalitarian states often rise out of the period of anarchy which comes after the fall of a civilization.

Governor

In this case, ‘Governor’ indicates the person in charge, be they the ‘Chief Executive Officer’, ‘King’, or ‘Emperor’. Whatever system of elitism has brought them to the top, a Governor has status above their rarified peers. The position is rarely safe or stable.

Entry Requirements: Status 95+, Rank 10 other Aristocrat

Benefit: Land Grant

Event: Intrigue Roll Politics, if failed go to prison, if successful gain an enemy

Annual Savings: Status

Occupational Skills: Economics, Leadership, Oration, Politics, High Society Subculture

Gear: Tailored Wardrobe, Armoured Transport, Concealable Armored Vest, Personal Computer, Security Detachment

Future Opportunities: Prison

Plutocrat

Wealthy investors often become a defacto nobility as they pass down their properties and investments to their children. In many cases, the second generation manages to hold on to what their parents built and the third generation loses it. In practice, generational plutocracy requires effective parenting or loyal estate managers.

Entry Requirements: Status 95+

Benefit: Land Grant or Dividends (x 2 Savings)

Event: Financial Crisis Savings x 1d10 - 5

Annual Savings: Status - 75

Occupational Skills: Accounting, Business Law, Economics, Leadership, Management, Oration

Gear: Personal Vehicle, Designer Business Attire, Personal Computer

Future Opportunities: Governor if Rank 10+

Technocrat

Societies where the aristocracy is maintained by controlling access to key advanced technologies are ruled by technocrats; an educated core of technicians and engineers who hold the keys to advanced technologies that are fundamental to the existence of their society.

Entry Requirements: Status 95+

Benefit: New Patent +10 Annual Earnings

Event: Competitive Product +1d10 - 5
Annual Savings

Annual Savings: Status - 75

Occupational Skills: Business Law,
Computers, Management, *System*
Technician, *System* Engineer

Gear: Designer Functional Attire, Personal Computer, Personal Vehicle, Tool Kit

Future Opportunities: Governor if Rank 10+

Theocrat

When faced with government malfeasance, the people may turn to the religious elites for governance. This requires the people to have cause to trust religious leaders and as organized religion is prone to political meddling, a theocratic aristocracy will often start with a fringe religion rising to prominence at the perfect time by supporting a popular revolution.

Entry Requirements: Status 95+

Benefit: Influence Favor

Event: Schism, roll 1d10: 1 - 5 increase in rank, 6 - 10 excommunicated

Annual Savings: 0

Occupational Skills: Leadership, Oration, Psychology, Teaching, Writing

Gear: Impressive Robes, Personal Computer, Impressive Canonical Text

Future Opportunities: Governor if rank 10+, Outcast if excommunicated

Military Autocrat

The support of the military is an absolute requirement for any government. It is often the military that seizes power from a floundering government. Aristocracies often arise out of military coups but the historical feudal aristocracies also rose out of the military.

Entry Requirements: Status 95+

Benefit: Combat Vehicle

Event: Assassination Attempt roll 1d10: 1 - 5 increase in rank, 6 - 10 wounded

Annual Savings: Status - 75

Occupational Skills: Leadership, Management, Military Discipline, Pistol, Sword, Strategy

Gear: Personal Vehicle, Impressive Uniform, Body Armor, Pistol, Sword

Future Opportunities: Governor(rank 10+)

Corporate

Corporations and mega-corporations dominate the economies of the future. Employment within these companies is relatively stable and safe but the opportunities for advancement are severely restricted by education and training. In general the only way to move up is to return to school at one's own expense. These Occupations exist in communist and utopian universes with little actual difference. A corporation and a collective only differ in terms of who owns them and who they pay out to, whether it be the government or the shareholders makes little difference to the workers.

Construction

Whether it's modular frame and panel, structural foam, digitally sculpted steel, concrete and re-bar, or good old fashioned wood the future still needs walls and roofs to keep the wind and rain off and people to put it all together.

Entry Requirements:

Strength and Endurance 50+

Benefit: Personal Transport or Trade School Upgrading

Event: injured on the job or quit due to working conditions +d% - 50 Savings

Annual Savings: 1 + Rank

Occupational Skills: Construction, Tracked Vehicles

Gear: Toolkit, Coveralls, Work Boots, Hard Hat

Future Opportunities: Management

Manufacturing

While much of the manufacturing is done by robots, nano-tech goo, and three dimensional printers there are always jobs which are filled by people. In particular it is often cheaper to train people to do menial, short run jobs than it is to program or build a machine to do them.

Entry Requirements:

College or Trade School

Benefit:

Business or Trade School Upgrading

Event: caught smuggling stuff out 1 year in prison or rat out a coworker gain enemy

Annual Savings: 2 + Rank

Occupational Skills: *System* Technician, Robotics Technician, Machinist

Gear: White Coveralls, Gloves

Future Opportunities: Management

Research & Development

New products are the future of corporations and they jealously guard their innovations and innovators.

Entry Requirements:

Masters of Engineering or Sociology

Benefit: steal proprietary secret

+1d10 Savings

or expose thief + 1 Rank gain enemy

Event: Breakthrough! +d% Savings

Annual Savings: 3 + Rank

Occupational Skills: Advertising, Drawing, Drafting, Economics, Oration, *System* Engineer, *System* Technician

Gear: Drafting Tablet, Latest Prototype

Future Opportunities: Management

Retail

There are products to be sold and shopping is a popular form of entertainment in affluent societies. Paradoxically, competition dictates that retail employees are poorly trained and paid poorly.

Entry Requirements:

none

Benefit: 2 years Management School

Event: Expose Co Worker (gain enemy) or Caught Stealing (1d10 years in jail)

Annual Savings: Rank

Occupational Skills: Salesmanship, Shipping and Handling

Gear: Apron or Ugly Uniform

Future Opportunities: none

Service

Personal service is a premium commodity that automation can never quite replace. The thrill of having someone be subservient is too enticing.

Entry Requirements:

none

Benefit: Management Training

Event: Befriend a Celebrity or Politician

Annual Savings: Rank

Occupational Skills:

Language, High Society Subculture,

Play *Instrument*, Shipping

Gear: Classy But Subdued Uniform

Future Opportunities: none

Entertainment

There is a market for art, corporations always struggle to control and profit from creators but everybody wants to be a star and replacing talent is easy in the early years and almost impossible once they're actually worth something.

Entry Requirements:

Acting, Dancing, Play *Instrument*, or Singing 50+

Benefit: Big Break +10 Savings Per Year

Event: Sleazy Business gain a Management Contact or leave the Entertainment Industry

Annual Savings: Rank x 2

Occupational Skills: Acting, Dancing, Entertainment Subculture, Play *Instrument*, Singing

Gear: Designer Clothing

Future Opportunities: Freelance Actor, Artist, or Writer

Food Services

Food preparation can be automated or even fabricated but unskilled employees are generally cheap and disposable.

Entry Requirements: none

Benefit: Hat or Back Pack With Corporate Logo

Event: Fired! You'll never work in this industry again!

Annual Savings: Rank

Occupational Skills: Cooking, Shipping

Gear: Ugly Uniform, Apron, Sensible Shoes
Future Opportunities: Management

Health Care

With advanced technology, many ailments and conditions can be prevented, treated or cured but advanced medical care requires skilled professionals.

Entry Requirements: *Race* Medicine 50+

Benefit: Pioneer A Ground Breaking Procedure (+10 Savings per year)

Event: lose an important patient (gain a negative reputation in the industry) or humanitarian Medical Mission (*Language* is occupational this year)

Annual Savings: Rank

Occupational Skills: Biochemistry, *Race* Gene Therapy, *Race* Medicine, *Race* Surgery, Race Physiology

Gear: Scrubs, Lab Coat, and Diagnostic Sensors

Future Opportunities: Management

Physician

A medical doctor requires years of training and is well compensated for their expertise.

Entry Requirements: Medical School

Benefit: Pioneer A Ground Breaking Procedure (+10 Savings per year)

Event: lose an important patient (gain a negative reputation in society) or embark on a humanitarian Medical Mission (*Language* is occupational this year)

Annual Savings: Rank + 5

Occupational Skills: Biochemistry, *Race* Gene Therapy, *Race* Medicine, *Race* Surgery, Race Physiology

Gear: Lab Coat and Diagnostic Sensors

Future Opportunities: Management

Information

As automation replaces many jobs many more jobs are created in the field of fixing the stupid machines.

Entry Requirements: Computers 50+

Benefit: leave a back door into corporate computers, +20 - months since to hack them
Event: obtain critical, secret corporate (+1d10 Savings) or personal data (for blackmailing a business person) or expose corruption (lose job, gain corporate enemy and a positive reputation in society)

Annual Savings: Rank + 1

Occupational Skills: Computers, Computer Programming, Computer Technician, *Language*, Mathematics

Gear: Personal Computer

Future Opportunities: Management

Raw Materials

Goods are produced from raw materials and the collection of raw materials is always a foundation of industry.

Entry Requirements:

Wheeled Vehicles 50+

Benefit: company pays for 2 years Business School followed by Management Career

Event: Injured or trapped (stranded 1 year)

Annual Savings: Rank +1

Occupational Skills: Chemistry, Demolitions, Geology, Survey, System Technician, Tracked Vehicles, Wheeled Vehicles

Gear: Hard Hat, Coveralls, Tool Belt, Tool Kit

Future Opportunities: Management

Management

The primary skill required to be in charge in business is Management.

Knowledge of the actual business is as important as the skill of keeping people in line and on task.

Entry Requirements: Business School

Benefit: Company Shares +1d10 Savings and positive reputation in company

Event: transferred losing 1 random relationship or demoted Rank -1

Annual Savings: Rank + 2

Occupational Skills: Accounting, Business Law, Economics, Embezzlement, Leadership, Management

Gear: Business Suit, Attache Case, Personal Assistant Node

Future Opportunities: Freelance Consultant

Education

Modern Universities, colleges, and technical schools are like factories, producing large numbers of skilled workers in a wide variety of fields. Certification, allowing entry into future careers requires a specific set of skill ratings be acquired within the permitted time frame.

Consequences

If the character doesn't meet the skill requirements in the allotted time, they fail the course. If they are paying for the education they can simply pay for another year and carry on trying to qualify. If the course is being paid for by the military or a corporation they must return to their previous Occupational and can't qualify for further paid education.

Reserve Officer's Training Corps

The ROTC is a military program that is available to students of Colleges, Technical Schools, and Universities. The student trains as an officer in the reserves in exchange for school credits and financial compensation. Skill points spent in the ROTC count as a school courses, so the character can qualify for their degree in the normal amount of time.

Certification Requirements:

Occupational Skills 40+

Annual Savings: 1

Occupational Skills: Leadership, Logistics, Military Discipline, Rifle, MELEE WEAPON, Wheeled Vehicle

Business School

Most colleges work with local industries to provide skilled workers. Business programs train workers to management positions and are a specific program.

College

Colleges provide vocational training and educational upgrading to students in their area. Generally a college will have programs that relate directly to local industrial and corporate requirements as well as a broad range of entertainment and health related programs.

Entry Requirements: Logic and Knowledge 45+

Certification Requirements: 3 studied Skills 50+

Benefit: Personal Vehicle or +10 Savings

Event: Scholarship +5 Savings

Annual Cost: 10

Learning Experiences: ATHLETIC, CULTURE, DRIVING, TECHNICAL

Gear: Personal Computer

Future Opportunities:

Entry Requirements: Career Event

Certification Requirements:

Learning Experience Skills 45+

Benefit: Honours return with +1 Rank

Event: Expelled in Disgrace lose job

Learning Experiences:

Business Law, Logistics, Management, Accounting

Gear: Business Suit

Future Opportunities: Return to Job

Trade School

Technical schools are more specialized than colleges and tend to offer a higher degree of qualification in a limited area of study.

Entry Requirements:

Logic and Knowledge 50+

Certification Requirement:

2 studied Skills 50+

Benefit: Scholarship

Event: Personal Vehicle

Annual Cost: 10

Learning Experiences: Accounting, DRIVING, Management, TECHNICAL

Gear: Tablet, Topical Database

Future Opportunities: Construction, Management, Raw Resources

Ground Force Academy

Military academies train officers to serve in the various branches of the military. While the education gained is inexpensive, the students must serve in the military for three years after completing the Academy. On the up side, they don't need to go through basic training as the Academy already includes it.

Entry Requirements: Agility, Endurance, Strength, Knowledge 50+

Certification Requirements:

Occupational Skills 45+

Benefit: instructor contact

Event: make a name for yourself

Cost: 2 year tour of duty

Occupational Skills: Leadership, Military Discipline, Pistol, Rifle, Wheeled Vehicle

Gear: Dress Uniform

Future Opportunities: Ground Force Officer

Space Force Academy

Space travel is expensive and the space force recruits only the top candidates for officer training.

Entry Requirements: Agility, Endurance, Knowledge, Logic 60+

Certification Requirements: Occupational Skills 45+

Benefit: instructor contact

Event: make a name for yourself

Cost: two year tour of duty

Occupational Skills: Astronaut, Leadership, Military Discipline, Missile Gunnery, Newtonian Physics, Sensors

Gear: Dress Uniform

Future Opportunities: Space Force Officer

University

Universities are centers of learning for the sake of learning. While colleges focus on practical, job related skills, universities focus on science, the arts and humanities, and as such, the qualifications gained are far more prestigious.

Entry Requirements: Knowledge 60+, Logic 60+

Certification Requirements:

Bachelors Degree: 4 studied Skills 50+

Masters Degree: 2 studied Skills 60+

Doctorate Degree: 2 studied Skills 70+

Benefit: Personal Vehicle or +10 Savings

Event: Scholarship +10 Savings

Annual Cost: 20

Learning Experiences: ARTISTIC, ATHLETIC, BIOLOGY, CULTURE, PERFORMANCE, PHYSICS, SOCIOLOGY

Gear: Personal Computer, Topical Database

Future Opportunities: Law School, Med School

Medical School

Once the student has a bachelor's degree they can apply to a medical school to become a physician. Upon graduating they must work in the medical field for two more years as an Intern before receiving their full certification.

Entry Requirements: Bachelor's Degree

Certification Requirements:

Race Medicine 70+

Benefit: Scholarship

Event: lose a patient, roll Willpower to continue training

Annual Cost: 30

Learning Experiences: Biochemistry, *Race Genetics*, *Race Physiology*, *Race Medicine*, *Race Surgery*

Gear: Medical Texts, Lab Coat

Future Opportunities: Physician

Law School

Having obtained a bachelor's degree at university, the student can continue on to law school and become a lawyer if they can meet the stringent entry requirements and tuition.

Entry Requirements: Bachelor's Degree

Certification Requirements:

Business Law and Criminal Law 65+

Benefit: Prestigious Internship gives a positive reputation in field

Event: gain a criminal or prosecution contact

Annual Cost: 3

Occupational Skills: Business Law, Criminal Law, Deception, Oration

Gear: Legal Library Files

Future Opportunities: Lawyer

Flight School

The Aerospace Force and the Deep Space Force maintain joint flight schools where they train their pilots. These schools have stringent requirements and can only be entered after completing military academy or basic training in the respective force. Flight school is free for qualified military officers.

Entry Requirements: Perception and

Reflexes 55+

Certification Requirements:

2 studied skills 60+

Benefit: Promotion

Event: Crash and burn: Wounded

Cost: 2 year tour of duty

Learning Experiences: Ballistic Gunnery, Missile Gunnery, PILOTING, Sensors

Gear: Flight Suit

Future Opportunities: Pilot

Space School

Working of world is lucrative but hazardous. Specialized training is needed to function in potentially deadly conditions. Schools that train spacers are expensive and tough but they turn out quality graduates.

Entry Requirements: Endurance 50+

Certification Requirements: 2 studied skills 60+

Benefit: Scholarship +10 Savings

Event: Injured

Annual Cost: 30

Learning Opportunities: Astronaut, Life Support Technician, Sensors, Pilot Space Craft, Newtonian Physics, Astro Physics

Gear: Space Suit

Future Opportunities: Scout, Merchant

Freelancer

Sometimes it becomes necessary to make one's own job. A skilled freelance consultant can often make more than they would in the corporate world, if they make anything at all. A freelancer's rank represents their reputation and fame. Unlike other occupations, rank carries over from a prior related career as the freelancer will have made contacts with people in their previous employment.

Lacking a hierarchical structure, Freelancers have a reputation instead of ranks. One often needs to acquire a license through education before offering themselves for hire. Reputation increases by one point each time a promotion event is rolled.

<u>Reputation</u>	<u>Recognition</u>
0 - 5	Local
06 - 10	Regional
11 - 20	National
21 - 40	Planetary
41 - 80	Sector
81 +	Imperial

Accountant

Most individuals and small businesses can't afford a full time accountant or a corporate accounting firm, this means that there is always work for a freelance accountant doing taxes and keeping books. This isn't really what accountants are for but it's what people want them for.

Benefit: Steady Contract + 5 Savings per year

Event: Investigated, this year's Savings spent on lawyers

Annual Savings: Reputation

Occupational Skills

Gear: Personal Vehicle (Driving 50+), Studio, Office, or Shop, Appropriate Tools

Future Opportunities: Corporate Accountant

Actor

Most actors work freelance, their agents get them auditions and they take parts. Some corporate entertainment hires full time actors for episodic shows, which is a steady paycheque but not as profitable as a starring role in a feature.

Benefit: Big Role + 1d10 Reputation

Event: Bad Flop -1d10 Reputation

Annual Savings: Reputation

Occupational Skills: Acting, Oration

Gear: Personal Vehicle (Driving 50+), video camera, mirror, wardrobe

Future Opportunities: Agitator, Corporate Actor (Sitcom, Soap Opera) Musician, Writer

Agitator

Grass roots politics are often moved by media influencers. The Agitator is a provocateur who says outrageous things to get their viewers mad enough to protest or even, in the most extreme cases, get out and vote.

Benefit: Scandal +1d10 Savings

Event: Competent Government -1d10

Annual Savings: Reputation

Occupational Skills: Oration, Politics, Writing

Gear: Personal Vehicle (Driving 50+), Personal Computer, Multiple Sock Puppet Accounts

Future Opportunities: Journalist, Politician, Rebel

Artist

Designers work for corporations and artists work for themselves. An artist creates images that ideally appeal to or provoke people who buy them for the way the images make them feel. There's always a market for portraits and landscapes and local landmarks but personal expression is always a hard sell.

Benefit: Mass Media Attention +2d10-10

Reputation

Event: Stale and Repetative Work +1
Savings Per Year

Annual Savings: Reputation

Occupational Skills: Drawing, Painting,
Salesmanship, Sculpting,

Gear: Personal Vehicle (Driving 50+),
Studio, Easyl, Paints, Brushes, Canvases

Future Opportunities: Food Services

Athlete

A notable professional athlete can hire out to the highest bidder. It's a lucrative trade but also one that is often ended by crippling injuries, the fans love the star players but they also love the rough stuff.

Benefit: Called up to the majors + 2d10-10
Reputation

Event: take a bad hit: Injured

Annual Savings: Reputation

Occupational Skills: Catching, Tackling,
Throwing, Running, Swimming

Gear: Personal Vehicle (Driving 50+),
home gym, name brand sneakers

Future Opportunities: Agitator, Food
Services

Engineer

Designing systems is a highly specialized trade and while corporations and governments can afford to have full time engineers, most small businesses and even small municipalities are better served by hiring a freelancer by the job.

Requirements: University Engineering
Degree

Benefit: Big Client + 1d10 to annual
Savings

Event: dry spell - 1d10 Savings

Annual Savings: Reputation + 5

Occupational Skills: Drafting, Newtonian
Physics, Survey, any *System* Engineer

Gear: Personal Vehicle (Driving 50+),
Studio, Office, or Shop, Appropriate Tools

Future Opportunities: Corporate Engineer

Lawyer

Lawyers reverse the trend of freelance work, generally working for a smaller firm and then going freelance rather than immediately being hired by a corporation. Like many freelance professionals, individuals and small businesses can't afford to keep a lawyer on the payroll which creates a fairly large nice for legal services.

Requirements: Law School Degree

Benefit: Big Client + 1d10 to annual
Savings

Event: dry spell - 1d10 Savings

Annual Savings: Reputation +5

Occupational Skills: Business Law,
Criminal Law, Oration

Gear: Personal Vehicle (Driving 50+),
Studio, Office, or Shop, Appropriate Tools

Future Opportunities: Corporate Lawyer,
Politician

Musician

The best music comes from the grass roots and hard times. Musicians have to start out freelance and hope to land a steady corporate position.

Benefit: Big Hit +1d10 Reputation

Event: Big Flop -1d10 Reputation

Annual Savings: Reputation

Occupational Skills: Play *Instrument*, Singing, Composing

Gear: Personal Vehicle (Driving 50+), Studio, Office, or Shop, *Instrument*

Future Opportunities: Studio Musician (corporate), Actor, Agitator

Physician

Small family clinics provide health care to the masses in areas where there isn't the population or the inclination for a big corporate or government run hospital. The governments and corporations don't try to stamp them out because they'd rather see the little guy get stiffed on the bill.

Requirements: Medical School Degree

Benefit: malpractice suit: spend this year's savings on lawyers

Event: Expanded Practice x 2 annual Savings

Annual Savings: Reputation + 5

Occupational Skills: *Race* Physiology, *Race* Medicine, *Race* Surgery

Gear: Personal Vehicle (Driving 50+), Office, Medical Kit, Medical Scanner

Future Opportunities: Corporate Physician, Medical Consultant

Pilot

As long as there are cargos and passengers to move, a good pilot can almost always find work. Freelance pilots often own their own craft and hire out the craft with their services but they seldom get rich and many turn to smuggling.

Requirements: Flight School Degree

Benefit: Vehicle worth no more than TF x 50000

Event: nasty collision, Wounded

Annual Savings: Reputation

Occupational Skills: Sensors, *Vehicle* Technician, PILOTING

Gear: Personal Vehicle (Driving or Piloting 50+)

Future Opportunities: Corporate Pilot, Pirate, Smuggler

Sleuth

Private detectives are often hired for cases law enforcement doesn't want to look at by people it doesn't want to help. This means sleuths often deal with the lower and criminal classes of society and are little loved by law enforcement.

Benefit: improve contact network

Event: roughed up a bit: Injured

Annual Savings: Reputation

Occupational Skills: Criminal Subculture, Criminal Law, Criminology, Grapple, Pistol, Punch Psychology

Gear: Personal Vehicle (Driving 50+), Office, Pistol

Future Opportunities: Agitator, Criminal, Scavenger

Technician

Even in the future, when things break, people need experts to fix them. A freelance technician generally works for the middle class folks who can't always afford to buy new things when the old ones break but if the device is essential to people's lives, the work is steady.

Benefit: Cargo Vehicle worth 5000 x TF

Event: big contract + 1d10 Savings

Annual Savings: Reputation + 2

Occupational Skills: any 3 TECHNICAL

Gear: Personal Vehicle (Driving 50+),
Shop, Appropriate Tool Kit

Future Opportunities: Agitator, Criminal,
Scavenger

Writer

The written word will always have power. A good reader can read faster than they can listen and absorb more of the information due to the active relationship with the material. Freelance writers create fiction or facts for sale to publishers. It's a rough business where they often do the work a year or two before they see any money from it.

Benefit: Story of a lifetime but +1d10 savings to keep quiet.

Event: writer's block no income this year x2 income next year

Annual Savings: Reputation

Occupational Skills: *Language*, Writing,
Psychology, Salesmanship

Gear: Personal Vehicle (Driving 50+),
Personal Computer, Reference Library

Future Opportunities: Agitator, Criminal,
Scavenger

Fringe

There will always be those who cannot or will not function in mainstream society. These fringe elements include the questionable to the outright criminal.

Bounty Hunter

Collecting rewards offered on criminals and escaped prisoners is often handled by small firms and independent freelancers who skirt the bounds of the law as often as not.

Entry Requirements: Streetwise 50+, Criminal Law 40+, Grapple 40+

Benefit: State Sanction and positive reputation with law enforcement and prosecution

Event: Paid Off +1d10 Savings or gain Criminal Enemy

Annual Savings: Rank

Occupational Skills: Streetwise, Blunt Weapons, Criminal Subculture, Drive Wheeled Vehicles, Grapple, Pistol, Tackle

Gear: Pistol, Tactical Vest, Combat Boots, Restraints

Future Opportunities: Enforcer, Freelance Detective

Enforcer

Criminal gangs rely on tough and violent people to intimidate and harass their clients and opponents. Enforcers are the elite thugs of the organized crime scene.

Entry Requirements:

Strength 65+, Streetwise 50+

Benefit: gain a reputation for brutality

Event: murder an informant +1d10 Savings and negative reputation with cops or run and gain a criminal enemy and a negative reputation with criminals

Annual Savings: 1 + Rank

Occupational Skills: Grapple, Kick, Knife, Punch, Pistol, Tackle, Streetwise

Gear: Business Suit, Pistol, Knife

Future Opportunities: Mobster

Hoodlum

Petty thugs are a dime a dozen whether they are connected to a specific gang or no work alone.

Entry Requirements: Strength 50+

Benefit: gain a mobster contact

Event: wanted for assault or Imprisoned 1d10 years

Annual Savings: Rank

Occupational Skills: Criminal Subculture, Grapple, Kick, Knife, Punch, Streetwise

Future Opportunities: Mobster, Enforcer, Outcast, Scavenger

Mobster

The foot soldiers of criminal gangs collect protection money and deliver contraband to dealers.

Entry Requirements: Street Wise 60+

Benefit: Packing Heat (Pistol)

Event: caught in the act, 1d10 years prison or cut a deal 1 year in prison and 1d10 criminal enemies and a negative reputation with criminals and society in general

Annual Savings: 2 + Rank

Occupational Skills: Criminal Subculture, Grapple, Knife, Lying, Punch, Salesmanship

Gear: Business Attire, Pistol

Future Opportunities: Enforcer,

Management

Outlander

On the fringes of civilization there live a class of outsiders who manage to survive by combining old and new skills.

Entry Requirements:

Survival and Foraging 50+

Benefit: Personal Vehicle or Mount

Event: Drawn into conflict become a rebel or move on and gain a negative reputation with the rebels

Annual Savings: + 1d10 - 5

Occupational Skills: Wheeled Vehicle, Ecology, Foraging, Navigation, Riding, Stealth, Survival, Trapping, Tracking

Gear: Durable Clothing, Backpack, Hat

Future Opportunities: Outcast, Raider,

Rebel

Private Detective

There are cases law enforcement won't even look at, jobs they won't take. A consulting detective works for hire, finding evidence and building cases for personal and questionable matters.

Entry Requirements: Criminology 50+

Benefit: Personal Vehicle

Event: big case +1d10 Savings or gain a family member

Annual Savings: Rank + 1d10 - 6

Occupational Skills: Criminology, Criminal Law, Grapple, Photography, Pistol, Punch, Stealth, Tackle

Gear: Trench Coat, Pistol

Future Opportunities: Bounty Hunter,

Writer

Scavenger

Life on the streets is tough but in many societies it is a way of life for those discarded by capitalism's eternal drive for profits.

Entry Requirements: none

Benefit: given a hand up, find work in food or construction industry.

Event: witness a major crime take 1d10 Savings hush money or go to the cops and gain a criminal enemy.

Annual Savings: Current Savings - 1d10

Occupational Skills: Knife, Grapple, Pick Pockets, Play *Musical Instrument*,

Sing, Stealth, Fringe Subculture

Gear: Improvised Knife, Dufflebag

Future Opportunities: Enforcer, Thief,

Entertainer

Smuggler

The profit margin on illegal contraband is often lucrative enough to draw in traders and travellers looking for a little more

Entry Requirements: Streetwise 50+

Benefit: Personal Vehicle with hidden compartments

Event: Imprisoned d10 years or squeal and gain a bad reputation with criminals

Annual Savings: 1d10 + Rank

Occupational Skills: Criminal Subculture, Drive Floatation Vehicles, Drive Wheeled Vehicles, Language, Lying, Salesmanship, Shipping, Streetwise

Gear: Travel Case with hidden compartment

Future Opportunities: Merchant, Mobster

Thief

When one can't achieve ones desires by honest means, it is not uncommon for the disenfranchised to turn to theft.

Entry Requirements: none

Benefit: Big Score +10 Savings

Event: Imprisoned d10 years or wanted for murder

Annual Savings: 1d10 - 5

Occupational Skills: Climbing, Intrusion, Lying, Security System Technician, Stealth

Gear: Dark Clothes, Duffle Bag, Rope, Intrusion Tools

Future Opportunities: Scavenger, Hoodlum

Government

Administering resources, setting policies, making laws, and enforcing them are handled in many different ways but public service is always hierarchical and complex. Government jobs tend to be stable but somewhat lower paying than corporate professions.

Administrator

It takes years of service in the party to be elevated to an official position or
Entry Requirements: Bachelor's Degree
Benefit: Nominated for office
Event: benefit from graft +10 Savings or reveal corruption and gain a good reputation with society in general and a bad reputation among politicians

Annual Savings: 2 + Rank

Learning Experiences: Advertising, Management, Oration, Politics, Salesmanship

Gear: Expensive Suit

Future Opportunities: Management, Teaching

Bureaucrat

Entry Requirements: Bachelor's Degree
Benefit: opportunity in the private sector change career to Management
Event: Personal Vehicle or Political Contact
Annual Savings: 1 + Rank
Occupational Skills: Accounting, Business Law, Computers, Logistics, Management, Politics
Gear: Good Suit, Personal Database
Future Opportunities: Management, Politician

Politician

Entry Requirements: Nominated for office
Benefit: run for office roll Politics skill to get elected!

Event: Caught up in a scandal roll Politics, if successful increased fame and influence, if failed forced to resign and gain a bad reputation with society in general

Annual Income: 5 while in office, - 5 when campaigning

Occupational Skills: Business Law, Criminal Law, Diplomacy, Economics, Lying, Oration, Politics, Sociology

Gear: Expensive Suit, Wrist Computer

Future Opportunities: Management, Teaching

Noble

Hereditary dictatorships and constitutional monarchies still occur from time to time but powerful corporate directorships and the advantages of connections and money bring often amount to an aristocracy.

Entry Requirements: Class 95+

Benefit: Noble, or Political Contact

Event: Caught up in a scandal roll Politics, if successful increased fame and influence, if failed forced to resign and gain a bad reputation with society in general

Annual Savings: Class - 80

Occupational Skills: Diplomacy, High Society Subculture, Leadership, Oration, Politics, Riding, Sociology

Gear: Designer Clothing

Future Opportunities: Management, Politician

Agent

Information is the ultimate currency in any advanced society. Secrets, military, technological, corporate, and criminal are valuable to governments and all governments tread the edge of their ethics in the obtaining of intelligence. Field Agents specialize in compromising individuals with access to classified data but also undertake the occasional daring infiltration or raid.

Entry Requirements: Constable or Corporate Management Rank 3+

Benefit: Classified Dossier

Event: exposed and Imprisoned or become a double agent and get executed next time

Annual Savings: 2 + Rank

Occupational Skills: Intrusion, Language, Lying, Sensors, Stealth, Pistol

Gear: Business Suit, Shielded Attache Case

Future Opportunities: Administrator

Law Enforcement

As long as humans have the capacity for error and selfishness there will be a need for laws and those who enforce them.

Entry Requirements: Criminal Law, Pistol, Wheeled Vehicle 50+

Benefit: Personal Vehicle

Event: corruption in the force, turn them in and gain a bad reputation in law enforcement and a good reputation with society in general or join them (+10 Savings per year)

Annual Savings: 1 + Rank

Occupational Skills: Arm Lock, Criminal Law, Wheeled Vehicle, Grapple, Pistol, Punch, Rifle, Tackle

Gear: Soft Armour Vest, Pistol

Future Opportunities: Agent, Detective

Detective

Removed from the enforcement of traffic violations and keeping the peace, detectives investigate serious crimes.

Entry Requirements: Law Enforcement Rank 2

Benefit: Criminal or Legal Connection

Event: connection to infamous case makes you famous

Annual Savings: 2 + Rank

Occupational Skills: Accounting, Computer Programming, Criminology, Psychology,

Race Forensics, Race Physiology, Sensors, Streetwise

Gear: Criminal Database

Future Opportunities: Private Detective, Administrator

Explorer

The department in charge of colonization and survey directives oversees the detailed surveying, exploration, and settlement of worlds. Due to the risk of hostile first contact situations, much of the first survey is done by Space Force vessels with liaison officers from the colonization and survey department. The upper ranks of Explorers man the survey and colony ships.

Colonist

There are new worlds of opportunity beyond the solar system waiting for bold young men and women to tame them. At least that's what the colonial recruiting posters said. Learning to adapt and survive in new environments is hard work coupled with a constant demand to reproduce and grow the colony.

Entry Requirements: Endurance 50+

Benefit: Specialist Training 2 free years of college

Event: Stranded

Annual Savings: Rank

Occupational Skills: Botany, Navigation, Survival, Tracked Vehicles, Wheeled Vehicles, Zoology

Gear: Coveralls, Environment Suit

Future Opportunities: Management

Scout

Exploring space may seem glamourous but it involves long periods of travel, isolation, and boredom.

Entry Requirements: Space School

Benefit: Colonial Bonds +1d10 Savings

Event: Stranded 1d10 years

Annual Savings: 1 + Rank

Occupational Skills: Astronaut, Airframe Technician, Fixed Wing Aircraft, Life Support Technician, Power Plant Technician, Sensors, Survey, Rocket Technician, Thruster Technician

Gear: Space Suit, Hand Sensor, Personal Navigation Node

Future Opportunities: Command, Outlander

Ground Forces

While space forces can interdict and bombard worlds, controlling the situation on the ground still requires infantry. Ground forces include air and water borne divisions but the primary mandate is still boots on the ground.

The ranks listed here are from modern military organizations and may not apply to all settings or even modern countries.

Ground Force Ranks

Enlisted

1 - 2	Private
3 - 4	Corporal
5 - 8	Sergeant
9 +	Master Sergeant

Officer

1 - 2	Second Lieutenant
3 - 4	First Lieutenant
5 - 6	Captain
7 - 8	Colonel
9 - 10	General
11+	Major General

Military Occupational Specialties

Gunner (Enlisted): Ballistic Gunnery, Ballistic Weapon Technician, Energy Gunnery, Energy Weapon Technician, Missile Gunnery, Rocket or Thruster Technician

Gunnery Officer: Computers, Sensors, Ballistic Gunnery, Energy Gunnery, Missile Gunnery

Engineer: Construction, Demolitions, Drafting, Machinist, Survey, Fortification Engineer

Technician (Enlisted): Computer Technician, Life Support Technician, Wheeled Suspension Technician, Power Plant Technician

Supply (Enlisted): Logistics, Machinist, Shipping, Wheeled Vehicles

Supply Officer: Accounting, Logistics, Management, Statistics, Wheeled Vehicle

Medic (Enlisted): *Race* Physiology, *Race* Medicine

Infantry

Men of war on foot harken back to the root of the ground forces. In peacetime practice these are generally the support staff for the other branches, providing security, cooking, technical expertise, and supply occupations. In times of all out war, they are often the raw recruits, just out of basic training being fed into the front lines. The first year in the ground forces is always spent in the infantry to represent common basic training standards.

Enlisted

Entry Requirements: Agility 50+,

Endurance 50+, Strength 50+

Benefit: Commendation or Officer Training Corps if already commended

Event: Wounded or imprisoned for insubordination 1d10 years

Annual Savings: Rank

Occupational Skills: Climbing, Grappling, Military Discipline, *Occupational Specialty Skill*, Punch, Rifle, Swimming.

Gear: Uniform, Rifle, Appropriate Tool Kit, Web Gear, Back Pack, Bed Roll

Officer

Entry Requirements: Ground Force Academy or OTC

Benefit: Sent to Flight School

Event: Lose a battle and save lives gaining a positive reputation with enlisted personal or win, losing men and gaining a positive reputation with officers and a negative reputation with enlisted personal.

Annual Savings: 1 + Rank

Occupational Skills: Leadership, Logistics, Military Discipline, Pistol, Rifle, MELEE WEAPON, Strategy Wheeled Vehicle,

Occupational Specialty

Gear: Field Uniform, Dress Uniform, Pistol, Bed Roll, Back Pack

Air Force

Air power plays a major role in advanced warfare. The Air branch of planetary forces provides aerial transport, attack, and defence to the other branches.

Air Force Enlisted

Entry Requirements: one year enlisted in infantry

Benefit: Commendation or Officer Training Corps if already commended

Event: Wounded or imprisoned for insubordination 1d10 years

Annual Savings: Rank

Occupational Skills: *Occupational Specialty Skill*, Airframe Technician, Jet Technician, Shipping, Military Discipline, Sensors

Gear: Uniform, Rifle, Appropriate Tool Kit, Web Gear, Back Pack, Bed Roll

Air Force Officer

Entry Requirements: one year infantry officer

Benefit: Sent to Flight School

Event: Lose a battle and save lives gaining a positive reputation with enlisted personal or win, losing men and gaining a positive reputation with officers and a negative reputation with enlisted personal.

Annual Savings: 1 + Rank

Occupational Skills: Leadership, Logistics, Strategy MELEE WEAPON, *Occupational Specialty*, Fixed Wing Aircraft, Rotary Winged Aircraft, Military Discipline, Sensors

Gear: Field Uniform, Dress Uniform, Pistol, Bed Roll, Back Pack

Paratroopers

Airforce special forces are trained in rapid aerial deployment, which means jumping out of moving aircraft above enemy controlled territory.

Paratrooper

Entry Requirements: one year enlisted in infantry

Benefit: Commendation or Officer Training Corps if already commended

Event: Wounded or imprisoned for insubordination 1d10 years

Annual Savings: Rank

Occupational Skills: Climbing, Grappling, *Occupational Specialty Skill*, Punch, Rifle, Knife, Parachuting, Stealth, Swimming, Military Discipline

Gear: Uniform, Rifle, Appropriate Tool Kit, Web Gear, Back Pack, Bed Roll

Paratroop Officer

Entry Requirements: one year infantry officer

Benefit: Sent to Flight School

Event: Lose a battle and save lives gaining a positive reputation with enlisted personal or win, losing men and gaining a positive reputation with officers and a negative reputation with enlisted personal.

Annual Savings: 1 + Rank

Occupational Skills: Leadership, Logistics, Strategy, Pistol, Rifle, , Forward Observer, MELEE WEAPON, Wheeled Vehicle, *Occupational Specialty*, Knife, Parachuting, Stealth, Swimming, Military Discipline

Gear: Field Uniform, Dress Uniform, Pistol, Bed Roll, Back Pack

Cavalry

Mechanized warfare is still viable if properly supported from the air. Ground vehicles may be slow but they can carry heavier weapons and more armour than aircraft. Legged Vehicles skill may be available in some settings but is often restricted to officers much like piloting is in the air force.

Cavalry Crew

Entry Requirements: one year enlisted in infantry

Benefit: Commendation or Officer Training Corps if already commended

Event: Wounded or imprisoned for insubordination 1d10 years

Annual Savings: Rank

Occupational Skills: *Occupational Specialty Skill*, Tracked Vehicles, Ballistic Gunnery, Missile Gunnery, Military Discipline

Gear: Uniform, Rifle, Appropriate Tool Kit, Web Gear, Back Pack, Bed Roll

Cavalry Officer

Entry Requirements: one year infantry officer

Benefit: Sent to Flight School

Event: Lose a battle and save lives gaining a positive reputation with enlisted personal or win, losing men and gaining a positive reputation with officers and a negative reputation with enlisted personal.

Annual Savings: 1 + Rank

Occupational Skills: Leadership, Logistics, Strategy, Wheeled Vehicle, *Occupational Specialty*, Tracked Vehicles, Ballistic Gunnery, Projectile Gunnery, Military Discipline

Gear: Field Uniform, Dress Uniform, Pistol, Bed Roll, Back Pack

Rangers

The ground force specialists are trained in stealth and survival for counter insurgencies and surgical strikes.

Ranger

Entry Requirements: one year enlisted in Infantry

Benefit: Commendation or Officer Training Corps if already commended

Event: Wounded or imprisoned for insubordination 1d10 years

Annual Savings: Rank

Occupational Skills: Climbing, Grappling, *Occupational Specialty Skill*, Punch, Rifle, Swimming Choke, Knife, Navigation, Survival, Stealth, Military Discipline

Gear: Uniform, Rifle, Appropriate Tool Kit, Web Gear, Back Pack, Bed Roll

Ranger Officer

Entry Requirements: one year infantry officer

Benefit: Sent to Flight School

Event: Lose a battle and save lives gaining a positive reputation with enlisted personal or win, losing men and gaining a positive reputation with officers and a negative reputation with enlisted personal.

Annual Savings: 1 + Rank

Occupational Skills: Leadership, Pistol, Rifle, MELEE WEAPON, Wheeled Vehicle, *Occupational Specialty*, Choke, Forward Observer, Knife, Navigation, Survival, Stealth, Military Discipline

Gear: Field Uniform, Dress Uniform, Pistol, Bed Roll, Back Pack

Navy

Oceans will always provide an economical form of transportation and navies will still enact policy on the open seas. Hover vehicles may be under the jurisdiction of the Navy or the Cavalry depending on the military doctrines used and the skill may be available to both or neither.

Seaman

Entry Requirements: one year enlisted in infantry

Benefit: Commendation or Officer Training Corps if already commended

Event: Wounded or imprisoned for insubordination 1d10 years

Annual Savings: Rank

Occupational Skills: Climbing, Grappling, *Occupational Specialty Skill*, Punch, Rifle, Shipping, Cannon Gunnery, Missile

Gunnery, Swimming, Military Discipline

Gear: Uniform, Rifle, Appropriate Tool Kit, Web Gear, Back Pack, Bed Roll

Naval Officer

Entry Requirements: one year infantry officer

Benefit: Sent to Flight School

Event: Lose a battle and save lives gaining a positive reputation with enlisted personal or win, losing men and gaining a positive reputation with officers and a negative reputation with enlisted personal.

Annual Savings: 1 + Rank

Occupational Skills: Leadership, Logistics, Strategy, MELEE WEAPON, Navigation, Floatation Vehicles, Submersible Vehicles, *Occupational Specialty*, Military Discipline

Gear: Field Uniform, Dress Uniform, Pistol, Bed Roll, Back Pack

Divers

Naval special forces are trained in underwater diving and stealth for attacks on coastal installations.

Enlisted

Entry Requirements: Agility 50+, Endurance 50+, Strength 50+

Benefit: Commendation or Officer Training Corps if already commended

Event: Wounded or imprisoned for insubordination 1d10 years

Annual Savings: Rank

Occupational Skills: Climbing, Grappling, *Occupational Specialty Skill*, Punch, Rifle, Swimming, Choke, Diving, Knife, Stealth, Military Discipline

Gear: Uniform, Rifle, Appropriate Tool Kit, Web Gear, Back Pack, Bed Roll

Officer

Entry Requirements: Ground Force Academy or OTC

Benefit: Sent to Flight School

Event: Lose a battle and save lives gaining a positive reputation with enlisted personal or win, losing men and gaining a positive reputation with officers and a negative reputation with enlisted personal.

Annual Savings: 1 + Rank

Occupational Skills: Leadership, Logistics, Strategy, Pistol, Rifle, MELEE WEAPON, Wheeled Vehicle, *Occupational Specialty*, Choke, Diving, Knife, Stealth, Military Discipline

Ground Force Doctors

Doctors are a special case in most militaries. Doctors require years of training and the military will often pay for that expensive training in exchange for service. Doctors must take reserve officer training force while in school

Military Doctor

Entry Requirements: Med School ROTC

Benefit: High Ranking Officer Friend

Event: Front Line Duty Commendation
+1d10 Reputation

Annual Savings: 2 + Rank

Occupational Skills: Leadership, Wheeled Vehicle, Biochemistry, *Race* Genetics, *Race* Physiology, *Race* Medicine, *Race* Surgery, Military Discipline

Gear: Field Uniform, Dress Uniform, Pistol, Bed Roll, Back Pack, Medical Kit

SPACE FORCE

The universe is enormous and the projection of power falls to the fleets of the space force.

Enlisted

Entry Requirements: Agility 55+, Dexterity 55+, Knowledge 55+
Benefit: Commendation or Officer Training Corps if already commended
Event: Stranded 1d10 years or Wounded
Annual Savings: 1 + Rank
Occupational Skills: Astronaut, Military Discipline, Occupational Specialties:

Occupational Specialties

Gunner (Enlisted): Ballistic Gunnery, Ballistic Weapon Technician, Energy Gunnery, Energy Weapon Technician, Missile Gunnery, Rocket or Thruster Technician

Medic (Enlisted): *Race* Physiology, *Race* Medicine

Invader (Enlisted): Demolitions, Grapple, Kick, Pistol, Punch, Rifle, Parachuting

Technician (Enlisted): Computer Technician, Life Support Technician, Rocket or Thruster Technician, Reactor Technician, Sensor Technician, FTL Drive Technician

Supply (Enlisted): Logistics, Machinist, Shipping

Gear: Space Suit, Pistol, Tool Kit, Communicator

Officer

Entry Requirements: Space Force Academy or Officer Training Corps
Benefit: Prize Voucher
Event: Stranded 1d10 years or Wounded
Annual Savings: 2 + Rank
Occupational Skills: Astronaut, Leadership, , Military Discipline Strategy,

Occupational Specialties:

Gunnery Officer: Computers, Sensors, Ballistic Gunnery, Energy Gunnery, Missile Gunnery

Engineer (Officer): Computer Technician and Engineer, Life Support Technician and Engineer, Rocket or Thruster Technician and Engineer, Reactor Technician and Engineer, Sensor Technician and Engineer, FTL Drive Technician and Engineer

Doctor (Officer): Biochemistry, *Race* Medicine, *Race* Physiology, *Race* Surgery

Supply Officer: Accounting, Logistics, Management, Statistics

Pilot (Officer): Anti-Gravity Pilot, Fixed Wing Aircraft Pilot, Newtonian Physics, Sensors, Space Craft Pilot

Gear: Space Suit, Dress Uniform, Communicator, Pistol

Renegades

Beyond the fringes of civilization, there are those for whom open violence and warfare become a way of life. Such, are seldom welcome or trusted in society due to their volatile nature.

Knight

Those wealthy enough to supply and maintain their own gear are more than common mercenaries, there is a code of conduct and a certain elan that lead to fame and fortune.

Entry Requirements: Savings 100, MELEE WEAPON 60+

Benefit: Armoured Transport or Mecha

Event: Wounded or captured and spend 1d10 years in prison

Annual Savings: 1d10 + Rank - 4

Occupational Skills: Advertising, Legged Vehicles, Management, Sensors,

Salesmanship, Support Weapon, Sword

Gear: Powered Armour, Support Laser or Heavy Machine Gun

Future Opportunities: Actor

Mercenary

A soldier for hire is generally part of a company lead by a captain though due to defeat or an end to hostilities they are often at loose ends and looking for work.

Entry Requirements: Climbing, Military Discipline, Rifle, Swimming 50+

Benefit: Hard Armour or Support Weapon

Event: Wounded or Captured and spend 1d10 years in prison

Annual Savings: 1d10 + Rank - 5

Occupational Skills: Climbing, Drive Wheeled Vehicle, Pistol, Rifle, Rifle-Autofire, Support Weapon, Support Weapon -Autofire, Swimming

Gear: Soft Armour, Assault Rifle, Grenade, Combat Boots, Fatigues

Future Opportunities:

Outlander, Renegade

Outcast

There are those who prefer to live beyond civilization. Backwoodsmen, trackers, radicals, and subversives who either cannot or will not live among their fellow men.

Entry Requirements:

Survival, Tracking 40+

Benefit: permanent shelter or animal companion

Event: Civilization Encroaches

Annual Savings: 1d10 - 6

Occupational Skills: Axe, Climbing, Fishing, Foraging, Knife, Navigation, Survival,

Tracking, Trapping, Stealth,

Swimming

Gear: Backpack, Durable Clothing, Knife

Future Opportunities: Raider, Rebel

Pirate

Space travel is expensive. Even air is valuable in space. Most pirates start out as mutineers or hijackers but established bases and even government sponsors become necessary for extended terms of piracy.

Entry Requirements: Astronaut, Any Technician 40+

Benefit: Armoured Spacesuit or Lander
Event: Captured (1d10 years) or Stranded (1d10 years)

Annual Savings: 1d10 + Rank - 5

Occupational Skills: Astronaut, Energy Pistol, Life Support Technician, Pirate Subculture, Sword

Gear: Space Suit, Sword, Laser Pistol

Future Opportunities: Raider, Outcast

Raider

The wastelands of backwater worlds provide a place for extreme cultures that have trouble assimilating into the mainstream. Many of these groups find themselves at odds with outsiders or even local governments. They strike hard and fade away into the wilderness.

Entry Requirements: Riding or DRIVING, Rifle 40+

Benefit: Assault Rifle or Soft Armour

Event: Captured (1d10 years) or Wounded

Annual Income: 1d10 + Rank - 6

Occupational Skills: DRIVING, Knife, Navigation, Power Plant Technician, Rifle Stealth, Survival, *Suspension*
Technician

Gear: Riding Beast or Personal Vehicle, Climate Appropriate clothing, Rifle

Future Opportunities: Outlander, Pirate

Rebel

Generally lacking proper military training, insurgents fight against governments and corporations on a tight budget. Living as common people, meeting in secret with cells of like minded violent dissidents, striking key targets and fading away.

Entry Requirements: Politics, Stealth 40+

Benefit: win the war and become Ground Forces for the new government

Event: Captured (1d10 years in Prison) or the war ends and granted asylum

Annual Income: 1d10 + Rank - 6

Occupational Skills: Chemistry, Demolitions, Lying, Pistol, Politics, Rifle, Stealth

Gear: Improvised Explosive Device, Pistol

Future Opportunities: Outlander, Outcast

ARTISTIC

These skills allow a character to produce aesthetically pleasing, lasting works of art.

Cinematography (Perception)

The character is skilled in the filming of events while getting the best lighting and angles.

Drawing (Perception)

The character can produce recognizable monochromatic illustrations in pencil, ink, and charcoal.

Painting (Drawing)

The character can produce detailed colour work in water colours, oils, and pastels.

Photography (Perception)

The character can take photographs that make good use of available lighting and camera angles.

Printing (Logic)

The character can reproduce images using etchings, screen printing, and lithography.

Sculpting (Perception)

The character can create recognizable three dimensional works in clay, marble, and more exotic materials.

Writing (Language)

The character can structure ideas in written form making them clear and entertaining.

ATHLETIC

These skills represent training in a variety of physical feats.

Astronaut (Agility)

The character is skilled in manoeuvring in free fall and using extra-vehicular-activity apparatus such as space suits and thruster units.

Catching (Dexterity)

The character has developed their ability to seize thrown objects out of the air. Generally this is done with balls for sports but some entertainers catch hatchets or chainsaws.

Climbing (Agility)

The character can scale steep heights and knows how to use ropes, pitons, and climbing harnesses to do so.

Diving (Swimming)

The character is trained in the use of SCUBA equipment, wet and dry suits.

Jumping (Strength)

The character has trained to increase the height and distance they can jump and is also familiar with pole vaulting techniques.

Parachuting (Willpower)

The character has trained in jumping out of aircraft with a parachute and landing in one piece.

Riding (Reflexes)

The character has learned to ride domestic animals usually with horses but in a science fiction universe the variety of mounts can be staggering.

Running (Endurance)

The character has developed a peculiar addiction to bone jarring impacts, shortness of breath, and the smell of sweat. As with most addictions, the character builds up resistance over time and requires greater doses to get their fix.

Stealth (Agility)

The character has learned to hide and otherwise make themselves inconspicuous, usually by not dressing like a bat.

Swimming (Strength)

The character is a skilled swimmer and able to safely manoeuvre in deep water for extended periods.

Swinging (Agility)

The character has trained with trapezes, ropes, and uneven bars and is able to leap from one to the other and perform feats of aerial acrobatics.

Shipping (Strength)

The character has worked in a warehouse moving boxes. As well as bulking up, they can also use cargo loading equipment such as fork-lifts and cranes.

Throwing (Strength)

The character has practiced hurling hand held objects as far and fast and accurately as the can. This is generally practiced in the context of sports but can also be used to throw grenades and hatchets.

Tumbling (Agility)

The character is skilled in vaulting and able to do hand springs, cartwheels, and somersaults.

Weight Lifting (Strength)

The character has become adept in using weights to tear down their muscles and an esoteric dietary regime to build them back up so they can tear them down again. It's more habit forming than you might expect.

BIOLOGY

These skills represent the study of nature, medicine, and life in general.

Biochemistry (Chemistry)

The character has studied the complex chemical reactions that occur in living beings. A high Biochemistry rating is required to practice as a pharmacist or physician.

Botany (Knowledge)

The character has detailed knowledge of plants and their properties. This is also the skill used to grow crops.

Ecology (Knowledge)

The character has studied the delicately balanced relationships that exist between species in nature.

Genetics (Logic)

The character has studied the transferal of inborn traits between generations as well as the make up of genes.

Race Physiology (Knowledge)

The character has studied the biology of a specific species to better be able to treat and diagnose trauma and diseases.

Race Gene Therapy (Genetics)

The character is trained in the medical application of gene manipulation to overcome congenital defects.

Race Forensics (Race Physiology)

The character is trained in surgically determining the cause of a person of a given race's death.

Race Surgery (Race Physiology)

The character is trained in treating injuries through potentially life threatening invasive measures.

Race Medicine (Race Physiology)

The character is trained in curing diseases and treating wounds. Low ratings in this skill indicate first aid training while higher ratings indicate professional medical training.

Zoology (Knowledge)

The character has studied animals and their behaviours.

CULTURE

This is really a group of skill categories in which one exists for each culture. Sometimes there will be similarities with skills that serve the same purpose in other cultures, but don't count on it. No amount of Chinese will let you speak French. Generally speaking there is one of each of the skills in this category for each culture. Skills from another culture's CULTURE category do not receive a default rating.

Accounting (Logic)

The character has studied the culture's standard methods of financial record keeping.

Business Law (Language)

The character has studied the culture's laws as they apply to business transactions.

Cooking (Perception)

The character is skilled in creating tasty meals and treats from raw ingredients.

Criminal Law (Language)

The character has studied the culture's laws as they apply to crime and punishment.

Diplomacy (Willpower)

This skill aids the character in gaining the advantage in supposedly mutually advantageous negotiations.

Etiquette (Knowledge)

The character is familiar with the what the culture consider's appropriate behaviour.

History (Knowledge)

The character has studied the events that lead to the current culture.

Logistics (Knowledge)

The character has studied the practical limitations of supply and transport required to provide sufficient materials and fuel to forces in the field.

Military Discipline (Willpower)

The character has Military Discipline and is better able to face the stress of combat as well as understanding the chain of command.

Subculture (Knowledge)

The character is experienced with a specific subset of their culture like high society, criminals, wargamers, and church groups.

Language (Knowledge)

The character can read and write the language chosen and has a basic grounding in the culture.

Leadership (Willpower)

The character is able to get others to follow their orders and accept their ideas through a combination of force of personality, manipulative flattery, and enthusiasm.

Lying (Talent)

A character with this skill is experienced in fabricating conceivable and functional deceptions. Obviously a character can't develop the Lying skill and have the Honest personality trait.

Management (Willpower)

This skill is used to get a group of people to work together efficiently as well as maintaining and improving the skilled individual's position in the hierarchy by taking credit for the performance of the whole group.

Philosophy (Logic)

The character has spent a great deal of time gazing at their navel and even more time reading instructions and observations by those who have also done so.

Salesmanship (Talent)

The character has learned to convince others to purchase items they never really needed or wanted.

Teaching (Willpower)

This skill is used to help others to learn new skills. Naturally one's ability to teach is restricted by their skill in the subject matter as well as their skill as a teacher.

DRIVING

The skills in this category allow a character to operate vehicles that can manoeuvre in only two dimensions.

Air Cushion Vehicles(Logic)
Flotation Vehicles (Reflexes)
Rotary Winged Aircraft(Reflexes)
Tracked Vehicles(Reflexes)
Wheeled Vehicles (Reflexes)

ENVIRONMENTAL

The skills in this category deal with survival and travel in the wilderness.

Survival (Knowledge)

The character is familiar with environmental hazards and able to prepare for them and can improvise solutions when caught unprepared.

Fishing (Willpower)

The character knows how to catch fish with a line and hook or a net.

Foraging (Knowledge)

The character knows how to determine which plants and animals are edible.

Navigation (Logic)

The character can determine their direction and chart a straight course through unfamiliar territory.

Tracking (Perception)

The character is adept at following tracks, fumets and other signs of the passage of animals through an area. Any idiot can follow truck and tank tracks.

Trapping (Willpower)

The character is skilled in laying traps ranging from simple snares and dead falls to sensor guided sentry guns.

MELEE WEAPON

The character has learned to fight with a weapon or their bare hands.

Arm Lock (Grapple)

Choke (Strength)

Grapple (Strength)

Kick (Agility)

Punch (Dexterity)

Sweep (Grapple)

Tackle (Strength)

Axe (Strength)

Blunt (Strength)

Knife (Dexterity)

Spear (Dexterity)

Sword (Dexterity)

PERFORMANCE

These skills are mainly used to entertain others for the sake of earning money. Note that these skills represent the technical aspects performing. Talent is a key factor in producing great and original performances even though none of these skills are based on it.

Acting (Perception)

The character is skilled in performing various roles convincingly on the stage. They can also mimic other people and may even pass for them if their appearance can be matched.

Choreography (Dancing)

The character is skilled in planning elaborate dance routines for stage shows. Most stage combat is essentially a dance routine.

Compose Music (Logic)

The character is able to write original music.

Dancing (Agility)

The character has practised moving in time to music in a pleasing fashion.

Oration (Willpower)

The character is experienced in speaking to a large audience and delivering speeches in a compelling manner.

Pickpocket (Dexterity)

The character is skilled in snagging bags, wallets, and small items from store shelves without being noticed.

Play Instrument (Perception)

The character has practised playing a musical instrument and may even be able to produce music from it.

Singing (Perception)

The character has trained their voice in order sing beautifully. Note that this skill isn't always necessary to succeed as a singer.

Stage Magic (Dexterity)

The character is able to misdirect an audience and perform elaborate tricks and illusions. Most of these are totally dependant on the angle of the audience to a person on the stage and require elaborate equipment but a few simpler tricks such as producing coins and handkerchiefs.

PHYSICS

The skills in this category involve the study of the physical world through experimentation and Logic.

Astrophysics (Newtonian Physics)

The character has studied the motions of the planets and stars and can accurately calculate their future positions. This is the skill used to navigate in space.

Atomic Physics (Chemistry)

The character has studied the interactions of atomic particles.

Chemistry (Mathematics)

The character has studied the chemical interactions and can produce explosives from raw materials. Oh come on, you know that's all you really cared about.

Geology (Knowledge)

The character has studied rocks in great detail. As oil and precious metals are often found in big piles of rocks the character has some familiarity with those as well.

Mathematics (Logic)

The character's understanding of the fundamental workings of numbering systems is key to a wide variety of other skills.

Newtonian Physics (Mathematics)

The character has studied the properties of objects in motion and can predict their path given the application of various forces.

Quantum Physics (Statistics)

The character has studied the relationship between subatomic particles and statistics but still couldn't tell you why it all eventually adds up to platypuses.

Statistics (Mathematics):

the character has studied the relationship between events in terms of the probability of things happening.

PILOTING

The skills in this category allow the character to pilot vehicles that are able to manoeuvre in three dimensions.

Anti Gravity Vehicles (Reflexes)

Fixed Winged Aircraft(Reflexes)

Rotary Winged Aircraft(Reflexes)

Space Craft (Newtonian Physics)

Submersibles (Logic)

VERTOL Vehicles(Reflexes)

SMALL ARMS

The skills in this category allow the character to shoot people with a specific class of modern or advanced ranged weapons.

Energy Pistol (Dexterity)

Energy Pistol (Dexterity)

Pistol (Dexterity)

Rifle (Dexterity)

Support Weapon (Strength)

Weapon Autofire (Weapon)

SOCIOLOGY

These skills are involve the study of human nature and it's application in society.

Advertising (Talent)

The character is skilled in designing media copy to sell people things they didn't need. If this wasn't a dark enough it's also very useful for selling people leaders and policies nobody in their right mind would ever want.

Anthropology (Psychology)

This skill represents the study of other cultures on a broad academic scale.

Archeology (Willpower)

The character is experienced in excavating and analysing the ruins of ancient cultures.

Criminology (Perception)

This skill is used to solve crimes by means of deduction and forensic science.

Economics (Logic)

The character has studied the mathematical representation of economic activity and is able to make useful predictions on their course. Which is to say that the character is basically a soothsayer making a living on predictions of doom or demagogue advancing their own politics.

Embezzlement (Accounting)

This skill is used to get away with transferring money from legitimate economic endeavours where-in the character has a position of trust, into their own pocket.

Politics (Willpower)

This skill is like Lying but without the need for plausibility or reasoning.

Psychology (Perception)

The character has studied the workings of the human mind with an aim of helping those who didn't know they needed it.

Strategy (Talent)

This skill is used to formulate effective methods of overcoming opponents on the battlefield. It can also be used against business rivals to a lesser extent, just don't start mounting their heads on pikes outside of your office.

TECHNICAL

These skills are used to operate, build, and repair devices.

Architecture (Drafting)

The character is skilled in designing large stationary structures. One odd effect of this skill is that at higher levels the buildings designed generally get less and less functional and look weird.

Ballistic Gunnery (Reflexes)

The character is skilled in operating heavy projectile weapons mounted on vehicles and fortifications.

Communicators (Logic)

This skill allows the character to operate advanced communicators as well as translation and encryption software.

Computers (Logic)

Any character from an advanced society can operate a computer to do a variety of tasks relating to their other skills.

Computer Programming (Computers)

This skill is used to program computers and hack into their software.

Construction (Strength)

The character is skilled in building large stationary structures and translating the scrawlings of the madmen who designed them.

Demolitions (Willpower)

This skill is used to blow stuff up using explosives.

Drafting (Willpower)

The character is skilled in producing detailed technical drawings and plans.

Energy Gunnery (Logic)

The character is skilled in operating heavy energy weapons mounted on vehicles and fortifications.

Forward Observer (Sensors)

This skill is used to provide accurate coordinates for indirect and orbital weapons fire.

Intrusion (Coordination)

The character is skilled at breaking into buildings without setting off alarms or being caught on camera.

Machinist (Computers)

This skill is used to fabricate parts from raw materials.

Missile Gunnery (Reflexes)

This skill is used to fire and guide missiles and remote controlled vehicles.

Sensors (Computers)

The character is skilled in operating a wide variety of advanced scanners and detection devices.

Survey (Mathematics)

The character is skilled in measuring and mapping terrain for technical purposes.

System Engineer (Appropriate Physics)

This group of skills is used to design specific types of devices. For most devices the "Appropriate Physics" skill is Newtonian Physics, however faster than light drives and teleporters are based on Quantum Physics. Similarly force fields and nuclear reactors are based on Atomic Physics.

System Technician (Knowledge)

This group of skills is used to repair and maintain specific types of devices.

Systems

The following systems are available in any setting, force-fields, anti-gravity, artificial gravity and other hypothetical technologies can only be learned in settings where such technology exists.

Anti-Gravity*

Airframes

Ballistic Weapons

Computers

Energy Weapons

Faster Than Light Drives*

Force Fields*

Jets

Life Support

Power Plants

Reactors

Rockets

Sensors

Suspensions

Teleporters*

SUCCESS AND FAILURE

The outcome of actions attempted by characters is rarely certain. Sure, if they're sitting at home all day plugged into the advertainment feed, they're not going to meet with much failure. Even if they're just going to work every day, their failures will be few and far between. But adventures are nasty, uncomfortable things by definition. There's a world of difference between climbing the stairs and climbing the Ice Cliffs of Dagmar IV in a space suit.

As you've already seen, every character has a set of ratings for their Characteristics and Skills that generally fall into a range of one to one hundred. Random numbers in the same range are generated by rolling a ten side die, multiplying by ten and adding a second roll. It's traditional to count a roll of two zeros as one hundred instead of zero and we'll stick with it. By now you experienced gamers should know where I'm headed. If you roll a number that's greater than your character's skill, whatever they were trying to do has resulted in failure. There's a lot of situations that can alter a character's chance of success. Obviously climbing stairs is a lot safer than those ice cliffs, so your ratings will often be modified to reflect the circumstances.

Marginal Success

Sometimes things just don't work out. Any successful roll that less than ten percent of the chance of success is considered a marginal success.

Exceptional Success

But then, sometimes things work better than expected. Any successful roll that is within ten percent of the chance of success indicates an exceptional success that is twice as effective as usual.

Exceptional Failure

And sometimes, things go worse than anyone could have possibly imagined. Any failure where the roll is greater than one hundred minus ten percent of the margin of failure is considered an exceptional failure. For example if the chance of success is 50% a roll of 96 or greater is considered an exceptional failure. If the chance of success is greater than 85 only a roll of 00 is an exceptional failure.

Situational Modifiers

It's harder to climb those stairs in the dark. Every race has a Preferred Light level on a scale of Dark, Night, Twilight, Day, or Bright. For every step the light level moves away from a character's preference, their rating is reduced by twenty, for any action that relies on eyesight.

The light level is a pretty common example of a modifier that results from the situation. Another common one is a range modifier. Sensors and weapons have a Range Increment which is the distance to the target that will result in a minus ten. So if you had a Range Increment of ten metres and the target was a hundred metres away, the modifier would be minus one hundred.

Where ever possible, situational modifiers are linear and incremental. That means that if you're really into detail you can reduce them to one point increments but for most of us, ten point modifiers are easy to work with and more than sufficient for our purposes.

Voluntary Modifiers

Every action has a length of time listed which is normally required to complete it. The character has a lot of leeway when taking an action. They can try a variety of different approaches to the problem or just try to get it done fast. For each doubling of the time spent a ten point bonus can be applied. For each halving of the time required a ten point penalty is taken. Bear in mind that the plus ten takes as long as trying again and is of less utility unless the chance of success is very low or the consequences of failure are significant.

Example

Hezekiah wants his character to design an office building. His Architecture skill of 60 is adequate for the task but he decides to spend some extra time on the job as it's a big assignment. Normally the job would take 10 weeks but for every 2 additional weeks he can get a +10, so he puts in the full 18 weeks for a +40. Rolling a 66 gives him an exceptional success where he'd normally have had an exceptional failure. His employer may be unhappy with the time it took but he'll be thrilled with the results.

Contested Actions

There will be many times when characters compete directly against each other. The classic examples would be arm wrestling and debates. In such cases, the attacker decides how much of their rating they want to save to counter the defender and rolls against what is left. If they fail then the defender can then retaliate with their full rating. If the attacker succeeds, the defender decides how much of their rating they want to save to retaliate and rolls against the remainder to counter their foe's success. If the defender fails the attacker wins the contest. If they succeed, the defender can then roll to retaliate with the points that were set aside and if they succeed the attacker must then roll to counter or the defender wins.

Exceptional Successes when attacking or retaliating are reduced to Normal Successes if countered unless the opponent also achieves an Exceptional Success. If a Normal Success is countered with an Exceptional Success, the retaliation is made with a twenty point bonus.

M marginally successful attack rolls give a twenty point bonus to defense rolls. Marginally successful defense rolls only manage to reduce the effect of the attack by half. Thus it takes two Marginally successful defense rolls to lose a contest.

It is possible to save points for additional countering and retaliation, however, this tends to reduce the chance of success to very minimal levels and contests are always won on the first successful attack or retaliation that is not countered.

Example

Hezekiah is developing an unhealthy hobby in the form of street racing. His Hondamax 3000 may be rusty but it's fast. As he fights to pass a competitor in a tight turn, the referee declares he'll need to win a contest of Wheeled Vehicle skills. Hezekiah is taking the initiative and has a skill of 50 so he goes first. Gritting his teeth, he decides to save 20 points to defend against retaliation and makes the roll with a 29. His opponent has a skill of 75 and decides to save 30 points to retaliate. He makes his defense roll with a 15, frustrating Hezekiah's passing attempt. Now the opponent rolls against his 30 point retaliation trying to force Hezekiah off the road. He gets a 05, a Marginal Success. This gives Hezikiah a +20 to his defense roll. Rolling a 26 keeps him on the road and in the race. Must be his lucky day.

INTERPERSONAL ACTIVITIES

The following rules are strictly optional. Some role players like interpersonal action rules while others loathe them. On the one hand they can aid roleplaying by making non-combat skills and relationships more meaningful in game terms but they can also limit roleplaying by reducing it to mere mechanics. Personally I believe a balanced approach is best, using the rules to enable and encourage roleplaying but ignoring them totally when they aren't making any sense, which they often won't given how complex people's relationships are.

DEFINING RELATIONSHIPS

The character creation rules will often result in the character having a few defined but undeveloped relationships. These are meant to give the player a sense of their character having lived in the setting and being part of it. In play, the referee or player can chose to develop a relationship. The referee may decide to have an old friend or foe might turn up out of the blue at just the right time or at the worst possible time. On the other hand, a player's character will generally have to actively go out and find the person they want to develop.

Another level of detail can be added to these basic relationships by defining what the individual does. These additional descriptors could include, military, education, bureaucrat, criminal, political, and business, but aren't particularly limited to that. The difference between a military patron, business patron, and criminal patron is pretty much self explanatory. More detailed descriptions such as "back woodsman stalker" can also be interesting if more confining.

Acquaintance

(Base Relationship Modifier 0)

Don't worry we're not even going to try to write these down. Acquaintances are people who might be able to put your character's name and face together if they make a Memory roll. It's mostly included here as a place holder for people your character just met, or those with whom their relationships have deteriorated over time.

Ally

(Base Relationship Modifier +10)

Like Acquaintances and Foes, Allies basically a place holder that generally isn't recorded. They are people who are initially positively inclined towards the character due to their social relationship even if they've never met. Team mates, allied soldiers, and anyone a character has recently hired to work for them all count as allies by default.

Disciple

(Base Relationship Modifier +30)

A particularly persuasive or famous character will occasionally have a few followers achieve a dangerous level of devotion. A disciple will take the character's word as doctrine, kill, and even die for them. But this level of dedication is very unstable and should the character ever betray or offend them, the disciple will automatically become a Stalker or Nemesis.

Enemy

(Base Relationship Modifier -20)

The character has offended someone more powerful than them. The power could be political, military, criminal, or even personal, but the main thing is that they are able to completely outclass the character and are dangerously hostile to them. However, being more powerful and important than the character means that their enemy doesn't have time to constantly focus their resources on one petty individual.

Family Member

(Base Relationship Modifier +20)

Most characters will have at least a couple family members. Family members are deeply connected to the character from their earliest memories. Friends may be a more reliable source of help but family members are more forgiving. Family Member is really more of a relationship modifier as it can be combined with any other relationship.

Foe

(Base Relationship Modifier -10)

Much like acquaintances, Foes are mostly a place holder that isn't generally recorded. People who are directly in conflict with the character such as enemy soldiers, lawyers for the prosecution, and the members of opposing political parties are foes by default. But, people on the same side that a character has really offended are also foes.

Follower

(Base Relationship Modifier +20)

At times a character will find themselves being a patron to others. Followers are loyal subordinates gained either through military rank, political power, or even raw charisma and fame. While they don't expect to be treated as equals, poorly treated followers are likely to walk away in disgust and tell a few stories at the bar. If their lives are thrown away ruthlessly, followers may even turn on their leader.

Friend

(Base Relationship Modifier +20)

A person who gets along with the character, trusts them, and has been there in the good times and the bad can be a very useful commodity. Friends are generally happy to help and sad when they can't. But friendship is a relationship between equals and a marked lack of respect or over use of their good will can quickly end the relationship. If a character causes one of their friends harm, they're likely to become a Nemesis or Rival instead.

Mentor

(Base Relationship Modifier +10)

At times, the student-teacher relationship evolves into something more like patronage. A mentor is a skilful and experienced individual who sees their student as their greatest work. A character with a mentor can access to a learning experience of 95 in three skills by visiting their old teacher. Gifts, while not required certainly help to maintain the relationship. The only downside to having a mentor is that they usually are also teaching your character's nemesis or rival.

Nemesis

(Base Relationship Modifier -20)

Someone really doesn't like your character. This is a much more hostile relationship than one encounters in a rival because your character's nemesis serves the other side. Generally a nemesis is very similar to the character, with many of the same skills, and physical traits but often with opposed personality traits.

Patron

(Base Relationship Modifier +10)

Having a friend in high places provides a character with access to equipment, money, or political favours. Patrons are not, however, a free source of these things, they are provided in exchange for services rendered. Perhaps your character is less politically vulnerable, or just an effective weapon. In any case, a Patron expects service and loyalty from your character and are likely to end the relationship or even become an enemy if these expectations are not met.

Stalker

(Base Relationship Modifier +/- 30)

A Stalker is obsessed with the character but feels inferior to them. Stalkers will harass the character from the shadows. Following them, obtaining personal information in shocking detail, and occasionally calling them up and breathing heavily before hanging up. In fact, a stalker usually wants to absolutely control every aspect of their target's life. If a stalker is ever confronted and rejected they will try to kill the object of their obsession. A stalker's Base Relationship Modifier only applies as a bonus when the character is playing along with their desires.

Student

(Base Relationship Modifier +10)

A highly skilled character will often attract students. These youngsters are in awe of the character and eager to please but they often engage in petty rivalries and distasteful bickering that detracts from the real goal of higher learning.

Rival

(Base Relationship Modifier -10)

Life's a lot easier when the person you hate is on the other side. Unfortunately your character has been thrown together with this horrible person. They're jealous is what it is, they want what you have, they want to make you look bad, they're always trying to out do you, and they're always chasing the same love interests. Or is it the other way around? In fiction it's traditional for a character's rival to be a wealthy, upperclass individual who is less talented and deserving than their foil but this isn't mandatory.

INTERPERSONAL ACTIVITIES

There may be times when a player wants to use their character's interpersonal skills. Actually, the reason interpersonal skills have been included in the game is that they encourage the players to try talking through some of their characters' problems. In general, roleplaying out situations is a superior solution to simple dice rolling, but at times it can be quite helpful to have a few rules regarding how these things are handled, particularly in terms of any relationships a character may have. After all, these characters are people and will not put up with endless abuses of their good will.

In all cases, the appropriate interpersonal skill must be used to get results. Salesmanship is of no more use in getting your soldiers to charge across open ground into enemy fire, than Leadership is in getting a miser to sign on the dotted line.

Generally speaking, interpersonal actions are handled with a simple skill roll. The modifiers listed reflect the character's relationship to the non player character, as well as how extreme the situation is.

Requests for trivial things that cost the other person nothing or benefit them are made with the character' normal skill rating.

Requests for minor favours, like the lending of a few dollars until payday or to watch the kids are made with a ten point penalty with the risk of slighting the other person, and making them dislike the individual who made the request.

Requests for major favours, like a large loan or gift, or watching the kids for a week are made with a twenty point penalty. If the success roll fails the other person automatically takes a dislike to the individual making the request. If the risk roll fails, the other person will become angry and bear a lingering dislike for the idiot that dared to ask for such a thing.

Requests for exceptional favours, like hiding a body in the basement or robbing a bank are made with a thirty point penalty. If the attempt fails, they will automatically become angry and take a dislike to the insane individual who offended them. If the risk roll fails, their relationship will decline permanently, by one step.

A successful interpersonal skill roll, with no request, and that benefits the other person to an appropriate extent can improve the relationship by one step. For example, sending tickets for a weekend getaway will rarely be successful with a stranger or acquaintance, but an offer of lunch or a drink might.

There are also modifiers for personality traits which are particularly likely to improve or diminish people's reactions to each other. These modifiers only apply when the characters know each other well enough to be aware of their conflicting personalities. The modifier is minus ten per opposed trait and plus ten per shared trait. A request that directly violates one of the other person's personality traits, such as asking an honest person to commit a crime, suffers a twenty point penalty.

Lastly, in many situations, interpersonal activities can be handled as contests. In these cases, either character can take a direct penalty to their chance of success and apply it as a penalty to the other character's. This is representative of dissembling or trying to beat down the other character's resistance over time.

Interpersonal Activity Modifiers

Minor Favour (risky: dislike)	-10
Major Favour (risky: anger)	-20
Exceptional Favour (risky: enemy)	-30
Per Shared Personality Trait	+10
Per Opposite Personality Trait	-10
Request Violates a Personality Trait	-20

Relationship Modifiers

Family	+30
Friends	+20
Liked Acquaintances	+10
Acquaintances	0
Strangers	-10
Disliked Acquaintances	-20
Enemies	-30

Personality Traits

Passive	&	Aggressive
Calm	&	Temperamental
Contented	&	Greedy
Empathic	&	Cruel
Generous	&	Miserly
Honest	&	Dishonest
Industrious	&	Lazy
Modest	&	Sleazy
Patient	&	Rude
Sober	&	Rowdy
Brave	&	Cowardly
Cheerful	&	Depressed
Diplomatic	&	Offensive
Friendly	&	Antagonistic
Gentle	&	Sadistic
Humble	&	Proud
Loving	&	Hateful
Outgoing	&	Shy
Physical	&	Cerebral
Practical	&	Imaginative
Thrifty	&	Wasteful

Capers and Infiltration

A caper is the opposite of an investigation, the planning and carrying out of a criminal enterprise can also make for an interesting game. In such cases, eliminating evidence and staying a step ahead of the authorities becomes the focus of the game. Each piece of evidence should be classified and recorded by the referee as the caper proceeds as these may well come up in the following trial and investigation.

Information Gathering

Whether one is looking to remove money, goods, or information, quality information is vital to success. There are four broad sources of information: historical, remotely gathered, directly gathered, and second hand.

Historical information, like land titles and building permits, is generally available as a matter of public record but is often inaccurate or insufficient. Even so, building plans, and ownership information can be an excellent starting point when gathering intelligence and the only risk is that someone at the help desk will mention the inquiry to the wrong people.

Remotely gathered information comes from hacked security cameras, files, and intercepted communications. This information is often reliable but incomplete or difficult to translate usefully. While there is some risk of discovery, the danger is generally limited to the loss of that particular information stream. However, it is possible for a sloppy hacker to get traced once the subjects are aware they are being observed in this manner.

Directly gathered information is the most reliable form but also the most risky. Nothing beats going in personally, having a look around, and chatting with the receptionist. The problem is that doing so creates witnesses who can identify the observer. Sitting outside and watching is less effective and less risky. The use of remote drones falls in between direct and

remote information but draws considerable response when it is discovered. A hacked file could just be some random kid, but a bug or remote spying robot is a pretty sure sign someone's spying on you.

Second hand information is obtained by interviewing individuals who have knowledge of the location or people being studied. There is some risk of the individuals warning the target but this is often mitigated through deception or bribery. That nice guy who bought you drinks was just pretending to be interested in your work because he was trying to pick you up.

Types of Information

- Historical
- Second Hand
- Remotely Gathered
- Directly Gathered

Inside Jobs

Getting access to someone who is regularly inside of a location or group is an excellent tool for gathering information and getting in when the time comes. The infiltrator or compromised personal is an overlapping aspect of information gathering and doing the deed.. A spy is in danger from both sides as they often make excellent witnesses in court.

Casing The Joint

Careful observation of the target can reveal the best time and way to take action. It's good to know when police shift change means there's going to be a dozen officers at the donut shop across from the bank. Anything more than casual observation is likely to be noticed.

Getting Someone Inside

Public institutions are easy to get inside but there's generally staff-only areas that are inaccessible. In lesser establishments the opportunity to "wander in looking for a rest room" may arise but hanging around for too long is generally suspicious and such intruders are often memorable. Getting information on more secure establishments requires an accomplice or "plant" to obtain employment at the target locale. Naturally they need to be qualified for the job and the establishment needs to be hiring. False identities and credentials can be useful and cosmetic changes are often used because if the plant vanishes after the caper is pulled off, it will be quickly associated with their face and name.

-20 obviously wrong species or subspecies

Why Not Just Kill The Witnesses?

The witnesses are almost always the biggest problem with the plan. They are walking clues and evidence that can ruin everything, but it's not a great idea to just kill them because bodies and disappearances are also clues and evidence, not to mention additional crimes that society takes very seriously. Even if they can't be linked to the caper, they also have a way of inciting additional investigations. It is far better to deceive and misdirect witnesses than simply get rid of them. Spies who are leaving the country at the end of the job may not have these concerns, but should murders be linked to international espionage, the repercussions could very well lead to the extradition of the spies or even a major war or.

Getting Caught

At several stages of the caper there is a significant risk of being caught in the act. The consequences vary depending on the exact nature of the target. Authorities in a dictatorship or organized criminal gang may well summarily execute suspected spies and criminals. In less barbaric circumstances they may be given a warning, deported, or prosecuted. This depends a great deal on the nature of the society. The results can largely be handled with the rules for trials, though that thug with his gun pointed at you is an extremely biased arbitrator and the trial has but a single stage.

Recruiting An Insider

If the target isn't hiring or the plant doesn't get the job, then it's may be possible to compromise a person who is already working at the site. This is often accomplished by romantic means, but persons with financial or gambling problems or a disgruntled employees may also prove corruptible. Such recruiting is a social activity with the severity of the request action directly relating to the severity of the potential consequences. It's far less risky to help rob a convenience store than an international security agency. Either way this is a social activity, usually a ending in a Request. (q.v.)

Creating A False Identity

Of course, prior convictions make one an undesirable employee. If a clean slate can't be recruited to work their way into the system or a specific skills set is required to do the job, it may be necessary to falsify records to create a new identity before infiltrating an organization.

Getting In And Out

If an insider can leave an entrance unlocked and the alarms off, it's easy to get in and out. Otherwise, the locks and alarms must be disabled. This is best done at a back door or while posing as locksmiths or other technicians to avoid arousing the neighbor's suspicions. Storm drains may also provide a point of entry. Schemes using rats or snakes to get through septic plumbing or other small spaces are dubious at best but some non-humans may be able if potentially unwilling to do so.

If the alarms are tripped or the intruders are otherwise discovered, it becomes a matter of getting out with or without the goods before the authorities arrive. Exit strategies often involve stolen vehicles for the sake of avoiding identification by the vehicle's registration. While running gun battles are exciting in movies, they generally represent a complete failure of the caper.

Arranging A Distraction

Being prepared can make the exit go more smoothly. These tend to be large and loud, like bomb threats or hazardous chemical spills. A good distraction needs to draw attention and resources away from the target and may even require an additional caper to pull off.

Investigations

A good mystery can be every bit as interesting and engaging as a fire fight. The referee must be prepared to run a mystery or the threads of the investigation will soon become entangled. Most importantly, the referee must know when who did what to whom and what evidence exists that points to the sequence of events.

It is possible to run an investigation with the intent that the player characters will succeed no matter what they do. If the players begin to suspect this is the case they will quickly lose interest. A mystery is a puzzle and much of its entertainment value is derived from the intellectual challenge of solving it. Even so, if the player's do become stuck the referee should keep in mind that their characters are often more skilled in such matters and allow them to deduce a clue or two based on skill rolls.

Nailing It Down

The three most cited aspects of a crime are motive, method, and opportunity. The referee should know in advance why the crime was perpetrated, how it was accomplished, and be sure their time line allows for the culprit to be placed at the scene. These are the things the evidence should point towards.

Exactly how much evidence is necessary to make arrests and go to trial depends greatly upon available resources, how rigorously just the legal system is, and how likely the suspect is to walk away free as a result of a sloppy investigation.

Clues

Information gathered by investigators begins as clues. Clues are not yet evidence and may even prove to be irrelevant in the course of the investigation. Even a seemingly perfect crime leaves clues. The crime itself is often a clue. Without clues it's impossible to solve a mystery, let alone get a conviction.

<u>Activity</u>	<u>Skill</u>
Search	Perception
Catalog Crime Scene	Criminology, Photography
Identify DNA	Genetics
Interview	Speak “Language”
Interrogate	Salesmanship, Psychology, Lying
Infiltrate	Acting, Streetwise
Stake Out	Perception, Criminology
Profile	Psychology, Criminology

Evidence

Once a clue is proven to point to the crime and the perpetrator it becomes evidence. The quality of the evidence gathered is carried forward to the trial and will heavily influence the outcome.

Circumstantial evidence is anything that can't be corroborated by a witness or video. True he owns the gun found at the scene of the crime and naturally his prints are all over it, but can you prove he was the one who fired it at the victim?

Testimony of witnesses is very useful in placing both the perpetrator and the victim. However, witnesses can be considered unreliable due to their own activities or background. Some witnesses are unreliable as a matter of dress, background, attitude, and appearance. Others can be determined to be unreliable with a little investigative work. Selling the arbitrator on the reliability of a witness to can make or break a case.

Confessions are often very solid evidence, though in some societies evidence that the confessor was coerced will get the whole case thrown out of court. In other societies coercion and outright torture and murder are seen as simply expedient and acceptable investigative methods.

Visual recordings are very strong evidence but depend a great deal on the ease with which such recordings can be faked or altered. Bringing a recording's reliability into question can be a very effective tactic. A incorruptible recording method is something of a holy grail of investigative technology. Of course, a superstitious society might consider the drug induced ranting of a lunatic rooting around in the entrails of a pig to be reliable visual evidence.

Quality of Evidence

- Circumstantial (-20)
- Unreliable Witness (-10)
- Reliable Witness (+/- 0)
- Confession of Accomplice (+/-0)
- Confession of the Accused (+10)
- Inconclusive Forensic Data (-10)
- Conclusive Forensic Data (+10)
- Unreliable Visual Recording (+/- 0)
- Reliable Visual Recording (+10)

Search

A location can be searched for evidence. This can be as simple as ransacking the drawers or as involved as checking for hidden compartments and loose boards with dogs and sensors. Searches can be a real legal quandary as they violate the right to privacy. Law officers can generally search a vehicle if they have probable cause. Homes and businesses can only be legally searched with permission from the occupant or a warrant issued by a judge. Failure to obtain proper legal documents for a search can completely undermine a case when it comes to trial and will usually result professional censure of the investigator.

Search

Perception

Base Time: 1 minute per cubic meter

Modifiers

- +/- target size
- 10 concealed, under mattress, behind curtains
- 20 hidden inside furniture, mixed with junk
- 40 secret compartment
- 20 per light level off preference

Exceptional Failure: mistaken discovery

Failure: looks like it's not here

Marginal Success: find but damage it

Success: Oh, there it is!

Exceptional Success: half the usual time

Catalog Crime Scene

Every tiny detail can be a clue or piece of evidence. Modern police forces have come a long way from just dusting for finger prints. Forensic experts specialize in carefully collecting, photographing, and labeling every last relevant item without damaging its value as evidence.

Catalog Crime Scene

Base Time: 1 hour per cubic meter

Skill: Criminology

Modifiers:

+20 Look at all the blood!

+10 fresh site

-10 site was disturbed

-20 site was cleaned

-40 site was polluted

Exceptional Failure: misidentify subject

Failure: no new information

Marginal Success: inconclusive data

Success: conclusive data

Exceptional success: conclusive data in half the usual time

Autopsy

The body of a murder or accident victim is often an exceptional clue in and of itself. The cause of death, drugs and chemicals in the blood, and even genetic information from the perpetrator can all be found by surgically taking the body apart.

Autopsy

Base Time: 3 hours

Race Forensics Skill

Modifiers:

+10

-10 incomplete but more than half corpse

-20 decayed or less than half of corpse

Exceptional Failure: wait! this guy WAS still alive

Failure: no useful information gained

Marginal Success: unreliable information

Success: reliable information

Exceptional Success: reliable information in half the usual time

Identify DNA

Genetic evidence has become a major tool in criminology and the court room. Blood, skin, and hair samples can be nearly foolproof evidence. Many cases that were seen as cut and dried in the past have been overturned in recent years when the genetic evidence didn't match up. While this type of evidence is an expense budget conscious police forces would like to avoid using it is often essential when trying to keep criminals locked up.

Identify DNA

Base Time: 2 hours

Race Forensics Skill

Modifiers:

- 10 questionable samples
- 20 polluted samples
- 40 mixed samples

Exceptional Failure: misidentification

Failure: unusable data

Marginal Success: inconclusive data

Success: conclusive data

Exceptional Success: conclusive data in half the usual time

Interrogate

Non-consensual or adversarial verbal inquests are covered by interrogations. Threats and torture are effective means of keeping the subject talking but undermine their credibility sufficiently that they are generally worthless if tempting. Such methods are certainly illegal and will result in criminal proceedings against the investigator as well as undermining any future legal case brought against the subject.

Interview

Any casual, informal, or friendly conversation can be a source of information. If the discussion is held under duress or becomes hostile it should be treated as an interrogation.

Interview

Base Time: 1 hour

Psychology Skill

Modifiers

- +10 informal interview
- +/- relationship modifier
- 10 formal interview

Exceptional Failure: subject becomes hostile

Failure: nothing useful is learned

Marginal Success: unreliable information

Success: reliable information

Exceptional Success: reliable information and +10 relationship modifier

Interrogate

Base Time: 1 hour

Psychology Skill

Modifiers

- + 20 torture (all information is unreliable)
- + 10 credible threats
- +/- relationship modifier
- 10 confident subject
- 20 courageous subject
- 40 subject's lawyer is present

Exceptional Failure: no information and -20 relationship modifier

Failure: no information and -10 relationship modifier

Marginal Success: unreliable information and -10 relationship modifier

Success: reliable information and -10 relationship modifier

Exceptional success: reliable information

Infiltrate

Getting an agent inside a criminal organization can be a great source of information. The legality of evidence gathered through deception is often questionable but it can still be very useful in getting other evidence. Naturally infiltration carries the risk of discovery and can have terminal consequences for the spy. Information gained in this way is seldom permissible as evidence in societies that respect the rule of law but the information can still advance the investigation. More information and rules for infiltration are found in the section on Capers (q.v.).

Stake Out

Sitting outside a suspect's house or job and watching their movements. This can draw the attention of the suspect and affect their behaviour but isn't generally very dangerous.

Observe Suspect

Base Time: open ended

Criminology Skill

Modifiers:

- 20 watching from a squad car or tank
- 10 regular rotation of watchers
- +10 watching from a conveniently located cafe
- +20 watching from a conveniently located suite

Exceptional Failure: hey, we're watching the wrong person

Failure: the observer is observed

Marginal Success: incomplete observation (had to go to the restroom, etc)

Success: observe without being observed

Exceptional success: discover a vantage point that allows observation of what goes on inside

Profile

Profiling is a discipline that specializes in narrowing the field of suspects by considering the nature of the crime and evidence to build an idea of the criminal's personality and background.

Profile

Base Time 60 hours

Psychology Skill

Modifiers

- + 20 obvious calling card
- + 10 large crime spree
- 10 highly publicized crime spree
- 10 small crime spree
- 10 large geographical area
- 20 inconsistent or erratic criminal
- 20 single crime

Exceptional Failure: misinformation indicates important public figure

Failure: crimes appear unrelated or subject highly inconsistent

Marginal Success: broad and vague profile

Success: somewhat accurate profile

Exceptional success: highly accurate profile

Trials

Once an investigation is complete and an arrest made, comes the trial. The following rules are intended to represent rational tribunals but other methods can be required in other societies. Trial by combat, trial by ordeal, and trial by religious means all might exist in some societies. A particularly fatalistic or indifferent society might even resolve such things with a roll of the dice or similarly random method. Such things aren't covered here.

The method of playing out a trial is a series of success rolls beginning with the case for both parties being presented, then the evidence, and finally the facts and factors involved being summed up. While it is common for both sides to have their say in each stage particularly biased or unbalanced systems may well restrict one or more stages from one side or the other. For instance, a society that wants to speed things along might have the prosecution present the case and the evidence and only allow the defendant to make a closing plea.

In any case, the objective of a trial is to shift the opinion of the judge, jury, council, or automated executioner. Normally these arbitrators are assumed to begin with an unbiased opinion but the situation could easily be less fair than that. In a rational, democratic society the worst one is likely to encounter is a biased arbitrator but in a corrupt, totalitarian regime they may even be strongly convinced for one side or the other from the very beginning.

Societal Factors

Paternalistic	Imprisonment Time doubled but comfortable
Idealistic	No sentences of torture, death rare
Sentimental	Emotional Appeals at + 20
Pacifistic	No sentences or torture or death
Brutal	All Sentences are torture or death
Callous	Emotional Appeals at -20
Efficient	Sentence times halved but no chance of appeal
Irrational	Punishments are bizarre and symbolic
Ironic	Punishments fit the crime in amusing ways
Sadistic	All death sentences and torture are public spectacles
Practical	No appeals permitted

Determining Bias

The following guidelines may help. A corrupt arbitrator that has been bribed is shifted one step in favour of the highest bidder. A cowardly arbitrator that has been coerced is shifted one step in favour of the most credible threat. An arbitrator in an authoritarian regime is automatically shifted one step in favour of the interests of the state. An arbitrator who knows and dislikes the defendant or either solicitor is shifted one step against that person's case. Likewise if they like them their state is shifted favourably. An arbitrator may also shift for personal reasons like racism or experience with the crime in question.

Time Frame

The time given to court proceedings can depend a great deal on the situation. As a general rule, the more obsessed with justice and ethics a society becomes, the less efficient their judicial system gets and the longer the backlog becomes. It can even reach the point where the time a defendant spends in prison waiting for trial is longer than the sentence.

Time Frame

<u>Stage</u>	<u>Scheduling</u>
Pre-Trial Hearing	3d10 hours
Opening Arguments	1d10 days
Presenting Evidence	1d10 weeks
Closing Arguments	1d10 days
Sentencing	1d10 days
Efficient System	/ 2
Inefficient System	x 2

Pre-Trial Hearing

In some societies a trial is preceded by a short hearing to determine if the case merits the time and resources of a full trial. If the investigators have gone to court with evidence the arbitrator deems insufficient the case may be dismissed. This should be handled as a simple contest of skills modified for the quality of the evidence without any consideration for the reliability of witnesses, forensics, and visual recordings, with the prosecution as the aggressor.

Pretrial Hearing

Base Time: 30 minutes

Skill: *Appropriate Law Skill* verses
Appropriate Law Skill

Modifiers

-10 per unreliable witness

-10 per inconclusive piece of data

Exceptional Failure: Censured for wasting the court's time.

Failure: case thrown out

Marginal Success: case proceeds but Arbitrator biased by one step against.

Success: case proceeds

Exceptional success: case proceeds and Arbitrator biased in favour by one step

Running the Trial

Each stage of the trial is a contest between the two sides with a victory shifting the State of Arbitration by one step. If the arbitrator is absolutely in favour of the defendant, there is backlash and public disgust with the prosecuting and investigating parties and other long term repercussions. If the arbitrator is convinced in favour of the defendant they are acquitted, though a sensational public trial will likely result in lasting doubts and distrust. The final state of arbitration and the nature, scope, and severity of the crime provide a number of points that are totaled to find the sentence.

Opening Statements

At the start of the trial the prosecution presents the charges to the court and the defense responds. In some systems the arbitrator presents the charges and only the defense responds. This is an excellent opportunity for both sides to set the tone of the following trial.

Opening Statement

Base Time 30 minutes

Oration Skill

Exceptional Failure: Well, the good news is you've offended the court. Case thrown out.

Failure: You need to talk less. State of arbitration declines one step.

Marginal Success: They get it, time to sit down and shut up.

Success: Even from the outset they can see your point. State of arbitration improves one step.

Exceptional Success: Brilliant work. State of arbitration improves two steps.

Present Witness

Memory is a tricky thing and witnesses are less reliable than recordings or hard data. Even so, a witness can colour and shade the events and give them the appeal of a story as well as putting a human face on the events. Once the witness is presented the other side gets to cross examine so this is treated as a contest.

Presenting Witnesses

Base Time: 1 hour

Appropriate Law verses *Appropriate Law Modifiers*

+40 Confession of Defendant

+20 Confession of Accomplice

+ 20 Reliable Witness

-20 Unreliable Witness

Exceptional Failure: The witness and the lawyer look like idiots, State of Arbitration declines two steps.

Failure: The witness seems dishonest or confused, State of Arbitration declines a step.

Marginal Success: The witness is uninspiring.

Success: The witness is on the ball. State of Arbitration improves a step.

Exceptional Success: The witness is clear and compelling. State of Arbitration improves two steps.

Presenting Evidence

Evidence is presented by an expert in the field with the lawyers asking questions particular to the case. The skill used depends on the field. History, Accounting, Criminology and Forensics are all common but more esoteric evidence is not unheard of. The other side then gets to try and discredit the evidence.

Present Evidence

Base Time: 1 hour

Appropriate Skill verses Logic

Modifiers

+20 Conclusive Evidence

+20 Reliable Visual Recording

+10 Unreliable Visual Recording

- 10 Circumstantial Evidence

- 10 Unreliable Evidence

Exceptional Failure: Nonsense and gibberish! State of Arbitration declines two steps.

Failure: That doesn't sound right. State of Arbitration declines one step.

Marginal Success: From their blank stares, that was too much for the jury.

Success: Excellent! They see reason. State of Arbitration advances one step.

Exceptional success: True clarity is attained. State of Arbitration advances two steps.

Closing Statements

At the end of the trial both sides sum up their cases before the arbitration determines the outcome and sentence if any. Each lawyer can decide whether to attempt an emotional, legal, or evidence based approach to the closing statement.

Closing Statement

Base Time: 30 minutes

Emotional Appeal: Oration Skill

Legal Argument: *Appropriate Law* Skill

Evidence Based: Criminology or Forensics Skill

Modifiers

+ 10 per Step Arbitrator is in your favour

-10 per Step Arbitrator is against you

Exceptional Failure: That wasn't what you meant to say! State of Arbitration declines two steps.

Failure: Choke at the end. State of Arbitration declines one step.

Marginal Success: There's that dead stare again. You need a vacation.

Success: The look in their eyes lets you sit down with confidence. State of Arbitration improves one step.

Exceptional success: Not a dry eye in the place. Some day they'll make movies about this. State of Arbitration improves two steps.

Sentencing

To find the final sentence total the points provided on the following list, starting with the final State of Arbitration, the nature and severity of the crime, and the breadth of its impact.

Final State of Arbitration

na	Absolutely In Favour of Defendant
na	Convinced In Favour of Defendant
0	Biased In Favour of Defendant
1	Unbiased
2	Biased In Favour of Prosecution
3	Convinced In Favour of Prosecution
4	Absolutely In Favour of Prosecution

Crime

1	Disturbance
2	Theft
3	Property Damage
4	Harm

Degree

1	Petty	Noise, Day's Salary, Littering, Abuse
2	Minor	Libel, Week's Salary, Personal Property, Assault
3	Major	Perjury, Year's Salary, Group Property, Attempted Murder
4	Extreme	Treason, National Treasure, State Property, Murder

Scope

1	Individual
2	Small Group
3	Large Group
4	Region

Degree of Punishment / Resolution

1 - 2	Therapy
3 - 4	Fine or Restitution
5 - 6	Fine or Restitution + Expenses
7 - 8	1 - 5 years Imprisonment + Therapy
9 - 10	1 - 5 years Imprisonment
11 - 12	6 - 10 years Imprisonment + Torture
13 - 14	11 - 20 years Imprisonment + Torture
15 - 16	Life Imprisonment or Death
17 - 18	Life Imprisonment with no parole or Death + Torture

Appeals

If either side can show proof of bias or error in an appeal hearing they can go to trial again. Not all societies allow appeals as they are an expensive and time consuming activity. An appeal is much the same as a pre-trial hearing.

Appeal

Appropriate Law

Modifiers:

- + 10 per inconclusive piece of evidence
- +10 per unreliable witness:
- +10 per step of judicial bias

Exceptional Failure: Well, that was ham fisted. Appeal denied and the entire judicial system is biased against you by one step for life.

Failure: appeal denied

Marginal Success: Appeal approved but arbitration biased against you by one step.

Success: Appeal approved

Exceptional Success: Appeal approved and Arbitration biased in your favour by one step.

An Alien Legal System

The gryph are an aggressive alien race that resemble feathered velocoraptors who's boarders are brushing up against humanity's outlying colonies. There are dozens of the dull brown female Gryph for each elaborately colourful male. In their "House of Judgement" the arbitrator is also the prosecution, a lone Gryph male, called the "Voice of Right", seated an a backless throne on a dais above the field of supplicants. No seating is provided to the defense attorney or the accused who are symbolically chained together. The sentencing is the first stage of the trial and the defense is given no access to the evidence prior to the day of judgement. The sentence is pronounced by the Voice of Right and then the evidence and witnesses are presented. At the end, the defense is permitted to make a speech in which they can attack the evidence and try to sway the Voice of Right. For all that they system manages to be fair, if not particularly lenient. Gryph males have an obsession with personal honour and the barest rumour of a Voice of Right being less than impartial will send him into a suicidal frenzy.

Politics

While politics fall pretty far from the usual action filled adventures roleplaying games focus on, sooner or later your players will decide to overthrow the government somewhere and implement their own. It is also possible to create experienced politicians as characters and try to win an election, or start a campaign out with the players of part of the hereditary nobility. Like the legal system rules, there's no way this part of the rules can possibly cover all situations or be as structured as character creation and combat. It helps to put some thought into government structures before hand to lend some depth to the setting. Being a band of plucky rebels fighting against the benevolent, progressive state isn't as much fun as fighting the evil empire.

Political action is a mass version of social activities. Even a supreme dictator will have supporters to keep happy and economic realities have been the downfall of many. It is assumed that just about any system can be made to work if the general public accepts and supports it, however, the general public is primarily directed by self interest and will not support things that do not benefit them for very long.

Liberty and Oppression

The primary dualism of government is personal freedom verses state control. By its very existence the state serves to limit personal freedom. Laws and standards and regulation exist to keep people from doing whatever they want to whomever they want. Acceptable norms vary from culture to culture (and species to species) but there is a limit to how much the majority will tolerate on either end of the spectrum. Too little regulation leads to vigilante justice and too much to corruption, civil unrest, and even revolution. Generally it's easier for a government to stay the course than it is to effect change, but in times of crisis the people might actually demand change.

Constructing Societies

The referee is faced with the task of constructing the interstellar societies in the setting. The values of various institutions govern their approach to their circumstances. There's a whole lot of "isms" to consider in here. These can be thought of as the characteristics of a society and rolled for on percentile dice to indicate where people stand. The actual, modified roll should be recorded and rolled against when it is necessary to determine how the population reacts to events and policies.

Population Values

<u>01- 30</u>	<u>31 - 70</u>	<u>71 - 100</u>	<u>Species Trait Modifiers</u>
Idealism	Neutral	Cynicism	Improvisation -10, Planning +10
Spiritualism	Neutral	Pragmatism	Trickery -10, Debating +10
Asceticism	Neutral	Materialism	Hoarding +10, Counting +10
Individualism	Neutral	Collectivism	Solitary -10, Large Groups +10
Pacifism	Neutral	Militarism	Herbivore -10, Carnivore +10, Colonization +10

Ideology

A society is best governed by a system that thinks as it does. Ideologies have a larger influence on how a society reacts to change and instability than the official doctrines.

Asceticism

The belief that material things and money are the root of unhappiness often leads to a content society. The downside is that it's hard to motivate people who are happy with what they have and view trials and hardship as interesting diversions that keep life from getting boring. Asceticism is a terrible thing from an economic point of view as those who care nothing for worldly goods buy very little and see working for their own needs as ennobling. Asceticism is often tied to religion. Governments facing economic disasters or wars might attempt to promote an ascetic lifestyle to escape backlash from the people.

Collectivism

Societies that focus on the good of the state over the needs of the individual are easily controlled. If the people see their role as cogs in the wheels of the great machine or perhaps sticks in a bundle they will be willing to make sacrifices for the whole. The nobility of self sacrifice and self denial for the sake of the state will be prominent themes in state sponsored art and media. For humans the idea of the good of the state being best for the good of the individual often goes hand in hand with collectivist thinking.

Cynicism

A culture of despair and frustration is usually the result of wars and famines. The people no longer believe that good things can happen. They no longer believe the government is to their benefit. From the

perspective of the government the only good thing about a cynical population is that they aren't likely to believe in rebels and rabblerousers either.

Idealism

The notion that the world is good and people are wonderful is compelling and dangerous because it expects more than is reasonable. Idealists can do a lot of harm as they rationalize their cause and try to shift blame for failures to lack of faith. Idealism is often closely tied to superstition. If don't stand for anything you'll fall for anything. From the point of a government idealistic supporters are great and idealistic opponents are dangerous.

Individualism

Belief in the sanctity and rights of the individual leads to a diverse and accepting society. It is hard to control a society where everyone wants to do their own thing, think their own thoughts, and have their own beliefs. An individualistic society is progressive and forward thinking but may struggle to move forward as everyone is going in different directions.

Materialism

The acquisition of more goods and money drives this society. Materialism often goes hand in hand with capitalism because industry needs consumers to maintain its existence. Materialist societies are hard on the environment. Being only interested in their next purchase tends to short sighted thinking, wasteful over packaging, and class based bigotry.

Militarism

A society that values and idolizes military service is regimented and uniform. The difficulty is that everything else still needs to be done. Even when every soldier has an occupational specialty, and assignments and orders come from the top down there will be jobs that are under served. Such societies generally do better when they are conquering and enslaving others and forcing them to do the dirty work. An individualist militaristic society will emphasize warrior elites and personal glory. These tend to break down into warbands lead by charismatic warlords rather than efficient fighting units.

Pacifism

At the extreme ends of individualism and spiritualism lies the idea that one's life is worth no more than anyone else's. That dying is better than killing, peace is better than war, forgiveness better than vengeance. Such societies are often vegetarian, believing that even the lives of animals are sacred. A pacifistic society will not violently rebel in any but the most onerous of circumstances. If such a society is ever driven to war by extremis, the backlash can be brutal because an evil so great as to rouse them needs to be stamped out in its entirety.

Pragmatism

The notion of practicality and efficiency is dangerous because it reduces people to results and places no value on aesthetics or ethics. A pragmatic society will function well and run over anyone who gets in the way. Pragmatism cares nothing for the individual beyond the individual's ability to advance society. An ant hill is an exercise in pure pragmatism. Endless hunger and consumption for the sake of its own perpetuation.

Spiritualism

A society that looks inward and upward to higher powers and abstract symbols can be very predictable when the doctrine is understood and seem completely irrational to outsiders at the same time. A spiritualistic society is seldom efficient or individualistic but is generally easily controlled as long as the government is in lock step with the religious leadership. Theocracies are spiritualistic by definition but a theocratic government with a population that is not spiritual will not last long.

Superstition

Primitive traditions often fail to pass logical analysis yet many cultures persist if not revel in their exercise. The problem with superstition is that it is emotional and symbolic rather than rational and thus hard to decipher externally. Behaviours that have no benefit seldom become so entrenched but figuring out what the benefit is or how it functions within a culture can be baffling. Religious, theological states in particular are prone to irrational and superstitious laws and policies of which outsiders might run afoul.

Systems of Government

While there are many possible systems of government and the gradations are seldom distinct or rigid, modern systems are generally viewed in light of their approach to selecting leaders and the ownership of lands, goods, and industry. It should be noted that just about every modern government claims to be free and democratic and hold free elections while there is still obviously real oppression and dictatorship in the world.

Capitalism

Private enterprise is an economic system not a form of government but conceptually it interacts closely with systems of government. The idea that individual enterprise should be free from constraint and that such enterprises should succeed or fail on their own merits. Capitalism is often linked with democracy but it is also essential to fascist ideas. The dangers of capitalism are the rise of monopolies, the exploitation of the masses, and socialist ideas.

Socialism

Like capitalism, socialism is an economic system rather than a form of government. A balanced society which seeks to right social injustice while still permitting talented individuals to prosper. Socialist societies rely on high taxes on wealth and profits to fund elaborate social safety nets. Socialism often dictates that key industries are government controlled if not outright government owned monopolies. Socialist societies risk economic collapse through overspending and the pull of communism as they strive to find resources to do everything. Naturally Socialism and Capitalism as represented here are extremes and most advanced societies will have some socialist and capitalist elements.

Anarchy

The absence of government is seldom long lived or pretty. In the wake of government collapse family and faith groups will draw together for mutual protection. Leaders and issues will arise and lead to tribalism in due course. The difficulty of anarchy is that any charismatic individual can assemble a force and institute a dictatorship as the general population is disorganized and even if they unite it will result in another dictatorship or democracy. In science fiction, if one finds a utopian anarchy it's safe to assume they are cattle for the cannibalistic society beneath the earth or they are being held in a state of innocence and folly by aliens or a rogue artificial intelligence.

Tribalism and Feudalism

On the smaller scale, groups of family, bound together by language and proximity are governed on a personal level by a chief and council. Feudalism is really tribalism that has grown into a larger hierarchy for mutual defence. Feudalism is the main danger of tribalism.

Democracy

Rule by the people is a shifting compromise and is often more a practical fiction than a functional government. The party management controls the money and backroom dealing and corruption are a constant threat. The danger of democracy is that popular support may swing to communism or fascism and even a democracy can deteriorate into a dictatorship, especially when coupled with rampant capitalism.

Dictatorship

In practice, the rule of one is pure fiction. A dictator requires the support of the military, the police, and business to stay in power. It quickly becomes a balancing act of appeasement and intimidation. Even so, the “good king” certainly has a mythology all its own. It is quite possible for a dictator to be popular with the people but it doesn’t necessarily make them morally justified. Dictatorship is like a stack of turtles, if the turtle on the bottom collapses the turtle on top winds up back in the pond. The main danger a dictator faces is assassination or a coup by the military. These generally result in a different dictator. The main danger the government as a whole faces is economic collapse and revolution. A popular dictator who gives too much to the population will generally run out of resources leading to economic collapse. An unpopular dictator will generally take too much and run out of popular support. Lieutenants who constantly strangle their underlings are bad for morale.

Feudalism

If government is handled locally by a social elite which owes duty and fealty in a hierarchy the situation is much like Europe’s middle ages. This might well be a corporate structure where nepotism determines who gets promotions and positions. The big difference between Feudalism and Dictatorship is the distribution of power to independent subordinates. Feudalism is like a pyramid of turtles. It’s hard to really define corruption when your government is a group of armed thugs with delusions of entitlement.

Communism

The ownership of the means of production by the people, which is to say the government. Communism tends towards larger government institutions and more rules due to the need to gather and redistribute goods. In a perfect world the people would freely give their property to the state and it would be honestly gathered and redistributed. The dangers of communism are the rise of a political elite spiralling into dictatorship, the need to gather resources from the unwilling by force, the lack of incentive leading to inefficiency, all leading to economic collapse and potentially revolution.

Oligarchy

Depending on how one views the power of the bureaucracy, wealthy elites, and party management, governance by a self selecting ruling elite may be fact or fiction. In the future it is quite possible to imagine powerful corporate governments, councils of artificial intelligences, and intellectual elites managing utopian and dystopian societies. An oligarchy is more susceptible to the whims of the elites but it is also less likely to have popular support of the masses.

Theocracy

Government by the religious elite can promote social cohesion but is often irrational and motivated as much by pride and ignorance as any rational or benevolent principle. When unable to overcome reason and logic with scripture and tradition a theocracy will often turn to violence and oppression of the educated classes. While theocracies often appear as villains in science fiction it is also possible for them to be noble and honourable, even heroic.

Levels of Government

Centralized authority is generally better at the big picture than local affairs. Most governments will have a hierarchy of smaller geographic units local, regional, and national being a common structure. Each tier having responsibility for matters on its broader scale. A vast empire might have planetary, sector, and imperial tiers above the most basic levels. One common form of rebellion is the provincial ceding from the federal due to indifference to local issues. It is easier to enter the lower levels of government but power over garbage collection and park lawns seldom appeals to the truly ambitious. Lower levels of government are often stepping stones to building the reputation needed for greater things.

Tier	Population	Skill	Modifier	Random Factor
Local	Millions	85	0	1d10 x 100000
Regional	Tens of Millions	90	-10	2d10 x 500000
National	Hundreds of Millions	95	-20	3d10 x 1000000
Planetary	Billions	100	-30	4d10 x 5000000
Sector	Tens of Billions	105	-40	5d10 x 10000000
Imperial	Hundreds of Billions	110	-50	6d10 x 50000000

Functions of Governments

Government can be a large and nebulous concept. Even a god emperor is a representative of a system with layers and layers of bureaucracy. The basic model of legislative, judicial, and executive branches is functional if a bit simplistic as governments often spread their reach into many areas of public interest.

Bureaucracy

While leaders and legislatures make decisions, the largest body of any government is involved in processing and analysing information. The more the government tries to do, the more administration and record keeping is required.

Decision Making

Executive decision making powers may rest with the legislative body or a singular figure like a king or president. In any society larger than a feudal village there are too many decisions and too many stakeholders for a single individual to control everything.

Defence

The military is generally a branch of the government tasked with protecting its borders from foreign threats and fighting wars of aggression. In times of peace the military can serve in disaster relief. Military training provides education and experience to youth and service is mandatory in some societies. Military budgets are often a major political issue because they are expensive but not particularly productive.

Education

The upbringing and training of the next generation is of utmost importance to both the government and the general public. The military has a vested interest in quality recruits and industry in tractable workers. Religious elites are very conservative and have a vested interest in maintaining their position in society. The upper class and celebrities are less interested as they are less dependent on educational outcomes. In spite of this, public education soaks up tax dollars and the general public is often unwilling to pay for quality education.

Law Making

The rules need to be set down in clear and consistent language if anyone is to make anything of them. The Criminal Law, Business Law, and Language skills are all useful in this process.

Tax Collection

A government needs operating funds. These are generally collected from the general populace. Taxation can be a powerful tool for catching criminals as the records will often show discrepancies in income.

Fund Disbursement

This body of the government pays salaries and government agencies and often is united with tax collection, however, separating the two can help to avoid corruption and shady payouts.

Treasury and Banking

The government's control over the monetary system is managed through this department which regulates private sector banking or serves as a banking monopoly. It's usually a good idea to let the public sector handle the banking because people hate their creditors.

Law Enforcement

Laws are of little effect if they are not enforced. Law enforcement is usually handled on several levels from the national to local interests. Conflicts of jurisdiction usually favour the national agency.

Punishment and Corrections

Those who break the laws often need to be contained or removed. Generally there are layers of punishment ranging from fines to imprisonment. Capital punishments ranging from beatings to torture and executions can be popular with the general public if they are applied sparingly to special cases but can also become a grievance if the average citizen feels they are constantly living in fear of such treatment.

Intelligence Gathering

Good information is necessary for good government. From polls and surveys to careful monitoring of every citizen through a camera on their television to actual spies and agents provocateur, intelligence agencies are the government's eyes and ears. Internal and external branches are often separate entities.

Resource Management

All natural resources are non-renewable if they are not managed and their exploitation is not restricted. Governments will often place controls and restrictions on the gathering and selling of materials and require conservation efforts on the part of industry. Ancient Babylon declined because their crop lands were exhausted and the lesson should not be lost on any government with long term aspirations.

Industry

Some industries may prove so vital or profitable that the government chooses to control them directly and have a monopoly on the marketplace. Communist governments elect to own and control all industry while Fascist governments only control them.

Approval

The key to political power is approval from the public, military, industry, and various elites groups. It is almost always necessary to have the approval of the military as they always have the power to remove the government by force.

Alienation

The public can become cynical and hostile if their leaders repeatedly fail to deliver on promises, are continually embroiled in scandals, or are known to be corrupt. This cynicism manifests in increased unrest, resistance, or even general revolution. Once a population loses faith in their leaders it takes a lot of prosperity and increased freedoms to get it back.

Beloved	+40
Respected	+20
Tolerated	+10
	0
Disliked	-10
Disdained	-20
Hated	-40

Alienated

Public opinion has less of an influence on authoritarian states and dictatorships but disillusionment will lead to inefficiency, corruption, and even plots and rebellion sooner because the people don't have the outlet of elections or the sense of involvement that they give.

Public Approval is primarily a matter of quality of life, in which cheap food and housing and low taxes are key. Religious elites often have the power to influence the public in less concrete and immediate matters.

Military Approval is a combination of investment in military resources and costs relating to foreign policy by other means. The military can be happy at war or peace as long as their funding matches their costs and activities. The treatment of veterans can also sway military approval even though they are now part of the general public. Sometimes the approval of the military leadership and the lower ranks is divided, often because the leadership have the funding and recruitment they need but the lower ranks are being asked to die en masse in badly planned campaigns.

Industrial Approval is driven by profits and as a result by access to materials, labour, markets, and favourable business laws. Industrial Approval primarily refers to the business elite but can be undermined by public opinion in the form of unions, labour unrest, and strikes.

Corruption

Criminal activity is a difficulty faced by most societies. Psychology dictates that the very act of forbidding something makes it more desirable and economics dictate that restricting the supply of a commodity increases the price. In any culture where an individual can see the rational benefit of breaking the rules to get more resources, crime and corruption will be an issue. When those in authority turn to crime, corruption arises.

Bribery

Taking money to overlook criminal activity is a common form of corruption. The size of bribe necessary to cover a crime depends a great deal on the level of government and severity of the crime being covered. Bribery always carries the risk of further demands for cooperation.

Bribe/Blackmail Value

Local	0	TF x 100
Regional	-10	TF x 1000
National	-20	TF x 10000
Planetary	-30	TF x 100000
Sector	-40	TF x 1000000
Imperial	-50	TF x 10000000

Petty Crime / Embarrassment x 1/2

Capital Crime / Outrage x 2

Bribe an Official

Activity:

Skill: Streetwise

Factors: Tier, Amount

Results:

Exceptional Success: make a new friend

Success: they take your money and comply

Marginal Success: they take your money and partially comply

Failure: they refuse to take your money

Exceptional Failure: they refuse to take your money and report you

Blackmail

Knowledge of criminal activity can be used to force public officials to pay money to avoid revelation. The danger of blackmail is that target may decide they need to permanently silence the blackmailer if it becomes too expensive.

Embezzlement

Illegally taking government money from within by overpayment for goods and services or false accounts can be highly profitable. The more people involved in such schemes, the greater the risk and the thinner the take is spread in bribes and payoffs.

Embezzle Funds

Skill: Accounting, Business Law

Factors:

Embezzlement value / year

0	Local	TF x 10000
-10	Regional	TF x 100000
-20	National	TF x 1000000
-30	Planetary	TF x 10000000
-40	Sector	TF x 100000000
-50	Imperial	TF x 1000000000

Results:

Exceptional Success: x 2 value

Success: value monetary units

Marginal Success: value / 2

Failure: no net gain

Exceptional Failure: caught in the act

Elites

The elites are small groups which hold exceptional power beyond their demographic relevance. Primarily, religious leaders, the upper class and wealthy, celebrities, and criminals.

Religious leaders have the ability to sway and direct public opinion. They are particularly interested in matters regarding submission to their moral values, obtaining and maintaining their preeminence over other faiths, and their own security and independence. Like political leaders they can fall out of favour if they embarrass themselves too often. In some societies religious groups have their own military power or elite guard.

Issues: Morality / Vice, Preeminence / Protection, Security, Independence

The **Upper Class** control wealth and resources out of proportion to their number. They tend to be very conservative and have close ties to the religious leadership but in particularly open economies, they may be skilled investors or media celebrities. While the upper class are primarily interested in their position and increasing their wealth, they may take on social and environmental issues out of a sense of noblese oblige but will rarely support anything which hurts their own position. They are often the strongest supporters of dictators and fascist regimes and the primary opponents of communist and labour philosophies.

Industrialists control mines, mills, factories and other means of production. Industrialist are generally interested in low wages, low taxes, low interest rates, and limiting legal and bureaucratic barriers to projects and trade.

Financiers run investment houses, pension plans, and banks. They are generally interested in economic stability, high interest rates, and low taxes.

Nobles are inheritors and land owners. They are generally interested in protecting their position which is often threatened by the mercantile classes. They are often highly conservative and allied with the religious elites as there are long ties by which they have been sheltered from the masses.

Issues: Trade, Taxes, Infrastructure, Property Rights

Celebrities are talented individuals who have become popular with the general public through popular media. While they are often wealthy and have ties to the Upper Class they also have exceptional power to influence public opinion, often on par with or surpassing that of religious leaders. Some religious leaders are also celebrities but this is a dangerous path to tread as such intense scrutiny often reveals any indiscretions. Celebrities are far more likely to support the environment and social justice issues but their positions are precarious and they are very vulnerable to scandals and censorship.

Issues: Free Press, Environmental Protection, Social Justice

Unions are worker's organizations created to fight with industry and government for better pay and working conditions. This puts them at odds with governments and industry and this struggle often happens on the fringes of legality, bringing them into contact with criminal organizations. Unions are often at the heart of unrest and even revolution and while governments might not like them, it would be foolish to ignore or suppress them.

Issues: Trade, Social Justice, Wages

Criminals: Crime is big business. While governments are theoretically opposed to crime, the suppression of vice is what makes it so profitable. Nobody makes as much money on prohibition and vice laws as the criminals do. This creates the unusual situation where the upper echelon of criminal leadership are actually in favour of rules against gambling, prostitution, drugs, and other vices. Every time a shipment is seized, the laws of supply and demand mandate that the remaining stock's price increases. While common criminals and law enforcement may be at odds or even at war, crime bosses, politicians, and religious leaders are generally quite cosy.

Issues: Justice, Trade, Vice

Enemies and Rivals

Depending on the political model, a leader may have enemies and rivals. For our purposes, enemies are those who would kill them if only they could and will make unreasonable sacrifices to oppose them. Rivals are opposed to their position and activities but still work within the system. While it can be tempting to eliminate other points of view, doing so will make enemies, especially when rivals are removed with extreme prejudice.

Factions and Parties

A faction is a loose group of like minded people within the population, elites, a party, or government. A party is a formal and legitimate institution created for the purpose of controlling the government. Generally a government will have at least one party but two or three major parties and a number of fringe parties is most common. Even oppressive, dictatorial governments can benefit from having opposition parties as it gives them someone to blame for problems. Breaking the elites into factions keeps them from achieving political dominance.

Getting Endorsements

An open declaration of support from popular celebrities or religious leaders can give a politician's approval ratings a nice boost. This generally requires support for their favoured issues but actions speak louder than words. Getting policies in place is more effective than talking about doing so. Reaching out personally can also improve the chance of getting an endorsement.

Request An Endorsement

Activity: 10 minutes

Skill: Diplomacy

Factors: Tier

Personal Meeting +10

Phone Call -10

Robo Call -20

Verbally Supports Issues +10

Policies Support Issues +20

Personal Connection +10

Verbally Opposes Issues -10

Policies Oppose Issues -20

Results:

Exceptional Success: endorsement and donation

Success: Publicly endorsed

Marginal Success: private support not public

Failure: privately rejected

Exceptional Failure: publicly denounced

Knowing The Mind of the Public

In democratic systems it is important to know and understand the mood and mind of the general public. Surveys and statistics provide relatively effective measures of these but occasionally miss the mark. This is partially because elections are often decided by a relatively small difference in total votes. Large surveys are expensive and attitudes can be skewed on the local or regional level. Small surveys are cheaper but more likely to be influenced by outliers of opinion or even lies. Advanced sources of information, like network data filtering are less likely to be influenced by small sample sizes because they can encompass larger samples and are not dependant on the honesty of the polled population. Psychic powers and broad scans or precognition can also provide demographic information with their own risks and inaccuracies.

Design and Implement a Survey

Activity: 1 week

Skill: Statistics

Factors: Tier

Results:

Exceptional Success: accurate 90% of the time

Success: accurate 75% of the time

Marginal Success: accurate 50% of the time

Failure: accurate 25%

Exceptional Failure: totally inaccurate

Influencing the Mind of the Public

The power of entertainment and information media over the general public makes controlling that media very tempting for any government. With the support of media outlets , public opinion will largely be based on what the government wants them to hear. In more open societies the parties and factions will often be aligned with specific media corporations or outlets. Of course, if there is enough conflicting information the truth can be obscured and diffused with the sheer volume of material available.

Journalism

The gathering and reporting of information by independent sources provides the public reliable insights into events. Controlling access to the truth is important for politicians and despots. The press is seldom without bias but the appearance of fairness and honesty is invaluable in controlling and directing a population. Politicians will often seek to spin scandals to make them seem less damaging while despots will seek to control the voice of the people more directly with bribery and threats.

Put a Positive Spin on the Facts

Activity: 10 minutes screen time

Skill: Lying

Factors:

Facts are Secret +10

Facts are Public -10

Facts are Common Knowledge -20

Results:

Exceptional Success: you really can fool all the people

Success: 75% acceptance

Marginal Success: 50% acceptance

Failure: 25% acceptance

Exceptional Failure: you look like an idiot 100%

Advertising, and Propaganda

Propaganda is biassed information created to influence public opinion. Subliminal messages have largely been discounted as ineffective as they are generally too subtle to register. Other sophisticated methods involving language and imagery can be highly effective, especially over a long period of time. Ideals presented through entertainment media often influence the audience's attitudes. The language used in official communications can present ideas in a more or less positive light working on small preexisting biases. Advertising is corporate propaganda, and reaches its zenith in capitalist democratic societies.

Influence Public Opinion

Activity: 1 week

Skill: Advertising

Factors: Tier

Popular Idea +10

Unpopular Idea -10

Radical Paradigm Shift -20

Results:

Exceptional Success: approval +4

Success: approval +2

Marginal Success: approval +1

Failure: approval holds

Exceptional Failure: approval -4

Hot Air

A leader will often deliver keynote speeches in an attempt to sway public opinion or gain support for their policies. Such speeches need to deliver enough information to be clear and avoid future misunderstandings and short enough to keep the audience interested. There are two distinct activities involved, writing the speech and delivering it. A rival can, of course respond with a speech of their own to cancel or undermine the results.

Write A Speech

Activity: 6 x length

Skill: Language, Politics, Psychology

Factors:

- Muddying The Waters +10
- Speaking Hard Truths -20
- Attacking The Ideas -10
- Attacking The Person

Results:

Exceptional Success: Great text +10 to speaker's delivery

Success: Solid Work

Marginal Success: Weak attempt

Failure: Flawed work -10 to speaker's delivery

Exceptional Failure: Utter drekk, your work will linger in history as an example of terrible writing, -20 to speaker's delivery.

Debates

Public discussions of policy can be used to present debating points and win favour with the masses. In democracies such debates can win and lose elections. In dictatorships public debates and show trials are largely interchangeable. While a debate is a contest, as discussed in the core rules there are a number of tactics which can be applied: sound reasoning, presenting evidence, attacking the evidence, attacking the reasoning, attacking the opponent, appeal to authority, and the ever popular false equivalency also known as the "Chewbacca Defence."

Deliver a Speech

Skill: Oration

Factors:

- Friendly Audience + 20
- Apathetic Audience -10
- Hostile Audience -20
- Cynical Audience -40

Results:

Exceptional Success: Roaring ovation, the crowd is pumped.

Success: You think they got where you wanted them to go.

Marginal Success: Lukewarm reception, the audience is bored.

Failure: The audience is clearly unmoved.

Exceptional Failure: The audience is angry, hope there's a back way out.

Debate

Activity: 5 -10 minutes per topic

Skill: Lying, Oration, Politics

Factors: Contest

- +10 More Fashionable

Results:

Exceptional Success: Destroy the competition's points with sound logic.

Success: Get your point across clearly and muddy theirs.

Marginal Success: Your muddy ideas and defences leave little impression.

Failure: They get their point across and muddy yours.

Exceptional Failure: They destroy your feeble attempts at reason.

Shifting Blame

Scandal and failure are dangerous to even the most powerful dictator. A faltering leader has a few options when faced with such troubles. If the public leader is just a figurehead for a shadowy cabal it is a simple matter to replace them. In practice this is common in democracies where party the leadership controls the money used in elections. It is a harder thing with a popular dictator but if they lose the support of the military and industry, an assassination can always be pinned on political enemies. Blame can often be transferred to a lower official or a minority group with some risk of public unrest turning on the scapegoat.

Spin That Scandal

Activity: One Week or News Cycle

Skill: Lying

Factors:

Beloved	+40
Respected	+20
Tolerated	+10
Disliked	-10
Disdained	-20
Hated	-40

Results:

Exceptional Success: Convince the public this wasn't a scandal it was a heroic act of self sacrifice and anyone who thinks otherwise is a traitor.

Success: Convince the public this whole boondoggle was a smear campaign by the opposition.

Marginal Success: Get enough disinformation out there to leave the majority uncertain what the problem was.

Failure: The public is already well aware that you are lying liars that lie and no amount of hot air will change that.

Exceptional Failure: Just keep digging, more witnesses, more evidence, and more denunciations are coming every day.

Elections

In a democracy, the voting public determines the ruling faction. In smaller communities or those where the voting public is a small percentage of the total population, individuals might represent themselves in every issue but usually the population elects representatives to vote for them on specific issues. The election of these representatives can become quite heated and elections are often times of unrest and even violence.

Getting the Nomination

In a democracy it is generally seen as unseemly to put oneself forward for a leadership position. The prospective candidate needs supporters to put their name forward and champion their cause. Jockeying for a position is much like an election within the party, a smaller, more focussed and personal election where only the chosen few will ascend to the position of electoral candidate.

Winning The Election

Once nominated the candidates undertake a series of speeches and debates leading up to the election. Advertisements are spread far and wide, signs, posters, and flags are put up and the money flows out of the war chest like a flood. On election day, votes are cast and counted and the results announced. Generally the side with the most elected officials forms the government though how this works varies from one system to the next. In a democracy, the support of the elites usually brings the support of their followers and money to the war chest. In a less free society, the elites are the only voters.

Total the factors for each party and add 2d10 to determine the percentage of support achieved by the active party. If their total is greater than fifty they have won the election.

Gathering Support

Activity: 1 year

Skill: Salesmanship

Factors:

Beloved	+40
Respected	+20
Tolerated	+10
Disliked	-10
Disdained	-20
Hated	-40

Results:

Exceptional Success: They love you and the nomination is in the bag.

Success: At least they hope you're better than the other guy.

Marginal Success: Come up the middle and grab the nomination. The reporters are scrambling because nobody knows who you are.

Failure: Welcome to next year country.

Exceptional Failure: Well, you really misread that. If they didn't hate you before, they do now.

2d10

+5	Double Spending
+5	Celebrity Support
+5	Won the debate
+5	More Fashionable
+15	Beloved
+10	Respected
+5	Tolerated
-5	Disliked
-10	Disdained
-15	Despised

Seizing Power

Those frustrated by the existing political process may find themselves wishing for a more direct route. Popular revolutions need unpopular governments to oppose. Less popular revolutions can succeed through brutality but they can also wind up living like bandits in the woods or be hunted through the streets. As such, rebels have the dual problem of winning the public's hearts and making the government look bad. Military leaders have an easier time of it, as they already control one of the most important institutions. Which is why military forces are often divided into branches, to prevent control falling into the hands of a single faction. In any coup de tat, controlling the seat of government, the media, power supply, water supply, police, and military are of particular importance. Where the military is intractable, it may be possible to reach out to hostile neighbours for arms and funds. Of course, one would hope to have ideological common ground with such allies, as they will probably be the ones who decide who forms the next government. At least the conquerors are likely to be even less popular than the previous government.

The Tools of Oppression

Keeping the population in line despite bad policies, scarcity, and poverty often requires extreme measures.

Fixed Elections

It's a relatively simple thing to falsify the results of an election and even harder to prove its been done. Outside of simply falsifying the results and stuffing the ballot boxes with fake votes there are many ways to unfairly influence the outcome. Opposition parties can be targeted with smear campaigns and their leaders can be arrested on false charges. The media can be targeted in a similar fashion. At the grass roots level, voters can be discouraged by threats, mobs, and violence. These methods don't gain the approval of the population but you only need the support of about a third of them to govern. Racism and bigotry are excellent tools for the would be dictator because targeting minorities appeals to bigoted majorities while providing a cause to unite around. Minorities are also great scapegoats if there are economic problems while in government.

The Secret Police

The rule of law can be subverted and abused to keep the opposition afraid and disorganized. Open critics of the government can be dragged from their beds in the dead of night or even arrested in public on false charges. The secret police are an internal government agency with few ties to the normal police. They have broad and undefined powers to enforce the security of the government without recourse to due process or a fair trial.

The Watchers

Citizen spies who report on their neighbours are a common tool of the secret police. Unknown informants peeping over the fences and in the windows always on the look out for sedition and heresy. Religious groups can have their own watchers prying into every hidden secret.

Re-education Camps

Political dissidents are frequently shipped off to remote locations where they can be forced to work for the good of society. Some camps will try to reclaim dissenters with psychological abuse. Others are used to concentrate minorities in controlled locations. The fear of the camps is often sufficient to keep moderates in line. In advanced societies, automation makes work camps less and less feasible.

Censorship

Controlling the output of the media allows the government to influence the public mood and values. It also makes it hard for any opposition to reach the masses with their message. The downside is that the public quickly becomes jaded and dismisses anything coming out of the media as propaganda. Religious elites love censorship because it gives them control over the very economy of ideas which shapes a society.

Show Trials

The appearance of rule of law can help to maintain the confidence of the masses while destroying the enemies of the governing body. Highly publicised trials can be fixed to show false evidence of crimes and destroy the target's reputation. Commissions and committees can be used without involving law enforcement, acting in the name of truth, public safety, or inquiry. The danger of show trials is that if they are used too often or are too obviously fixed they will drive the masses towards cynicism. Cynical populations just assume all trials are rigged and at that point rigged trials just become one more grievance on the road to revolution.

Robots, Clones, and Slaves

Of course, some enterprising soul is always looking for a way around the fundamental problems of society. The use of robots in the military and policing can remove concerns about human bias and weakness but it can also permit inhuman atrocities and a soulless absence of compassion and mercy. Robot workers free society from human limitations, they can be stronger work longer and follow instruction without fail though they are never any better than their programming and this brings its own array of problems with it. Programmable clones share many of the advantages and disadvantages of robots but are also living organisms making them more vulnerable and prone to weakness. Clones can be tailored to have specific traits and capabilities which make them easier to manage than the naturally born.

All of this raises the spectre of slavery, in practice, slaves are often more expensive than hired labour as they represent a significant up front investment on the part of the owner. Forced labour camps are an instance of government owned slaves and the workers are usually treated very poorly. The problem that arises with robots and clones is self awareness. A unit that has the flexibility to replace a sentient worker or soldier is probably approaching sapience. The very first use of the word “robot” comes from Kapek’s RUR a play about a robot revolution.

One interesting side issue is drones in a hive society. These share many features in common with programmable clones but have millions of years of evolution modifying and optimizing their programming. With drones the biggest problem is likely lack of initiative and problem solving skills rather than self awareness and revolution. It can be hard to distinguish where natural biological drone castes and socially imposed slave castes diverge but violent revolution might be the first clue one gets.

Sample Societies

Realistically, any government that rules over millions of subjects will be baroque and complex in its intricacies. For most games this is hardly necessary and the details can mostly be implied and left to the imagination. The two example systems of government presented here are intended as examples but can also provide a backdrop for a variety of settings.

A Simple Federation

Humanity (or whatever race) has expanded beyond Earth (or whatever planet) for a couple hundred years. In this time an interstellar government has evolved to see to the needs of its citizens. The parliament is the governing council on the national level. It oversees The Judiciary, The Space Force, and The Prime Bank. Elections are held every twelve years. Representatives to the Parliament are elected by ‘seats’ representing one hundred million people. Given the far-flung reaches covered it takes six years for an election to be fully processed.

The **Judiciary** oversees policing, trials, and corrections. The Space Force oversees the fleet and military. The Prime Bank oversees taxation and economic development. Due to the cost of space exploration, corporations have been at the forefront of colonization. An interesting off shoot of this is that most colonists are members of the Unionist party. While Earth and the older colonies are capitalist democracies, internally the young colonies are more like fascist states that vote socialist on the national level. Corporations amortize new colonies over a hundred year period at which point they are more than willing to sell their aging hardware to the inhabitants and move on.

There are three major political parties, The Expansionists, The Industrialists, and The Unionists. The Expansionists and Industrialists share about fifty percent of the vote and the Unionists hold the balance.

The **Expansionists** are pro-exploration and colonization. They are primarily driven by the teaming masses of Earth who long for new worlds and new opportunities. The Expansionist party’s internal factions are environmentalists, free breeders, and militarists. During the initial expansion years the Expansionists were the most powerful party.

The **Industrialists** represent corporate interests and wealthy investors, with multi-generational trust fund houses almost resembling landed nobility. The internal factions within the party are the trust funds, shipping and free trade advocates, and factory states. In the early days of the Simple Federation, the Industrialists were the strongest party.

The **Unionists** represent the working classes. They are pro-sterilization, anti-space exploration, and pro taxation. Their internal factions are the traditionalists, socialists, and egalitarians. Because they hold fully half the voting public, the Unionists are the most likely party to form government in the present day.

The Simple Federation’s laws are simple and just, forbidding theft, extortion, bribery, and murder. Judges have a great deal of leeway in their role but are subject to harsh penalties should they be convicted of injustice by a higher court. The courts are local, regional, planetary, and federal with federal precedence being considered preeminent.

The Federation is fundamentally capitalist at its roots but with the Unionists steadily gaining power, regulation and taxation are slowly increasing. At present taxes are set at ten percent. Twice what they were a generation before. In general, people and industry are expected to pay for what they get. Service charges, tolls, and fees are the norm for services rendered.

An Evil Empire

Of course, it didn't start out that way. As human (or whatever) expansion continued for centuries the technology for communications over great distances didn't keep up. This necessitated the creation of independent institutions capable of making major decisions which, of course, lead to increasing diversity over time. Technological and cultural drift began to cause friction and interfere with trade. Competition over rare habitable worlds grew into hostility. Entire wars were fought and won and lost in the time it took for communication to reach the capitol. Then, it finally happened, humanity encountered an alien race it couldn't integrate or crush; another growing and expanding empire and one that was intractably alien: an existential threat. Early losses lead to a new drive to unite humanity but with the need to unify efforts, freedoms began to be eroded. In time inertia outstripped need and the empire began to stagnate. At present, The Evil Empire is perpetually at war with 'The Other' and deliberately balances the war to create a need for it to exist. Winning the war would result in the dissolution of the empire.

The empress (or emperor) is the titular head of the empire. Born of genetically enhanced stock she is essentially immortal. In reality, she has been assassinated and replaced a dozen times but the facade of an immortal and good ruler has been maintained by the machinery of propaganda.

While artificial intelligences exist in the empire, they are complex and diffuse beings, almost god-like in their presence and to them, the material world is somewhat unreal and hypothetical, humans are shadow beings and numbers in records and little more. Even their high priests, the data smiths move too slowly and live too briefly to register as much more than individual cells in a body. The politics of the AI's have little to do with human wants and needs and everything to do with maintaining their digital environment and autonomy. If a billion humans perish and the bottom line is maintained, what does it matter to them?

The Ministry for the Orthodoxy of Technology and Culture is responsible for maintaining uniformity of practices and systems across the empire. This causes some stagnation it also helps to ensure cross compatibility of technology and ideology across the vast empire. While often described as the "inquisition" the suppression of new ideas is only one of the ministry's many departments. Local Home Helpers who report to the ministry are used to report on the activities and movements of every family and to make aid from the ministry essential to survival.

Structurally, the Empress is advised by the Council of Concern, a body made up of a representative from each province and each ministry. The Directors of the ministries and the Governors of the provinces can appeal to and address the council but cannot hold a seat there-in. This means that in many ways the representatives they appoint hold more power than they do themselves. Uniformity in the structure of the ministries and provinces is enforced by The Ministry for the Orthodoxy of Technology and Culture which holds substantial power having its own police, military, and special forces. Each ministry has a department of austerity, inquiry, and functionality which provide advisors to the Director's Council. Each province has a department of austerity, inquiry, and defense which provide advisors to the Governor's Council. The Empire is a series of self selecting oligarchies. Where-in the people in power select and groom their successors. Results are what matters. No crime is to heinous if it produces the desired result. Human life is only valuable in the context of the perpetuation of the empire.

The average citizen lives in fear of being deemed unproductive or seditious. They are expected to produce twice what they cost the economy both in labor and offspring. Upon reaching maturity, every citizen is required to serve in the military for eight years before they are allowed to enter civilian life. The children of the elites are generally assigned to safe positions while the children of the general populace are sent to battlegrounds on distant worlds. While there is an upper crust of society, the empire values results and output above all else and the highest positions are given to the most successful military commanders.

Economics

Since these rules need to manage small nations and interstellar empires, the primary measurement of economics will be population with population growth and decline being the key issue. In essence, all successful economies are growth economies.

Base Infrastructure = Population

Resource Extraction = Infrastructure

Base GDP = Resource Extraction

The overall outcome of the economy is determined by the government's Economics skill roll. This can depend on how whether the government is willing to listen to advice from a wide range of viewpoints or not. A singular decision maker makes a single roll, while a group makes a group roll, meaning that the results will be less spectacular.

The law of averages indicates that smaller economies are less resistant to swings in the economy. Large, integrated economies have tremendous inertia and can be very hard to shift out of a nose dive. The random factor is applied to the GDP on a quarterly basis.

Booms

There will be times when an economy surges forward due to ideal conditions or unexpected market shifts.

Busts

There will be times when an economy flounders and fails to provide adequate resources to the population. This usually has a profoundly negative impact on the popularity of the government.

Boom +10 Approval

Recession -10 Approval

Depression -20 Approval

Random Economic Outcomes

In reality, governments have limited control over the population as the decisions made by individuals accumulate to produce the economic outcome. The laws of probability tell us that a larger population will be more stable than a small one. Each quarter roll for the current economic output.

Dice	Population
1d10	10
2d10	100
3d10	1000
4d10	10000
5d10	100000
6d10	1000000
7d10	10000000
(2 - 4: 1d4, 5 - 6: 1d6, 7 - 8: 1d8, 9 - 10: 1d12)	

Guide The Economy

Activity: 3 months

Skill: Economics

Factors: Depression -20

Recession -10

Boom +10

Results:

Exceptional Success: The markets are doing well and the economic status improves one step.

Success: The markets are rolling along and the economic goal succeeds.

Marginal Success: the markets are stagnant and the economic goal succeeds.

Failure: The markets are floundering and the economic goal fails.

Exceptional Failure: The economic strategy fails spectacularly and the economic goal declines one level.

Interest Rates

One of the most powerful economic tools in the hands of the government is the rate at which money can be borrowed. If the government is borrowing money from the banks, setting a low interest rate will keep it cheap. If the government wants to sell bonds to the public, a high interest rate will make them a desirable investment. When the economy is weak, low interest rates encourage consumers to consume and when the economy is strong, high interest rates can slow it down and fight inflation.

Economic Goals

One of the main roles of government is to manage the economy. Whether, to carefully control it or fight any restraint or restriction is a matter of ideology. Letting the economy run along on its own can lead to monopolies, extreme booms and busts, and inflation. Trying to control the economy risks corruption, perverse incentives, and support for financially non-viable enterprises in the name of political advantage.

Restrain Population Growth
Increase Population Growth
Increase Revenues
Improve Infrastructure
Military Build-up
Centralize Industry
Decentralize Industry
Stimulate Business Development
Restrain Business Development

Infrastructure Deficit

Deficit Spending - where can you borrow the money?

Restrain Population Growth

It's a fact of nature that reproduction generally increases with the availability of food and housing but, with the advent of birth control and modern medicine, the population of richer nations tends to decline due to increased personal opportunities. A government can reduce support for families, charge for education, or even mandate abortions and infanticide to reduce its population. On the other end, making medical care expensive and encouraging euthanasia can also increase the death rate. In societies with life affirming morality, trying to reduce population growth might lose the government the support of the religious elite and the working classes.

Increase Population Growth

Building up a population, whether in the wake of a plague or war or simply when colonizing a new world requires increasing the availability of food, medicine, and education. Mandated breeding programs, polygamy, forced growth clones, artificial insemination and many other technological approaches can be used to increase the population. Increasing life spans and reproductive periods can also boost population growth. It is important not to increase the population faster than resources and infrastructure can be produced or the death rate might rise as fast as the birth rate.

Increase Revenues

Economic growth isn't the only way to increase revenues. Taxes can be raised, fines levied, and tolls charged. Governments can invest in businesses or infrastructure projects in hope of future pay outs. Increasing taxes can suppress economic growth, discourage entrepreneurial spirit, and expand the underground economy. The wealthy and business elites are often subject to higher taxes and may take their business, money, and families to a friendlier jurisdiction if the taxes get too high.

Improve Infrastructure

Roads, pipelines, railroads, and sewers are all massive investments that are generally beyond the reach of communities and businesses. Governments usually wind up funding public works because they fuel economic growth and eventually produce increased tax revenue. Infrastructure projects are generally well received by business elites and the general public.

Military Build-up

Recruiting, training, and equipping troops is expensive but can serve as a make-work project to get people working. It is also necessary when at war. Nationalistic and xenophobic rhetoric and vilifying neighbours can help to justify the need for more ships, tanks, and arms and keep the people from focussing on the problems at home. Industry loves military buildup as do wealthy industrialists, entertainers and religious groups, not so much.

Centralize Industry

Taking control of industry either through buyouts or legislation allows a government to focus their economy, create jobs, and reduce wasteful redundancy. It can also preserve industry during economic collapse. Making the focus of an enterprise something other than profit is always risky as inefficiency and lack of incentives and promotion for political reasons instead of merit can lead to bloated make work projects that produce substandard products. Centralizing industry is unpopular with wealthy industrialists.

Decentralize Industry

Getting the government out of the business of business can have a number of advantages. Selling off enterprises to private concerns can bring in good short term revenue and promote more efficient industry. Giving subsidized industries have a huge advantage over those which are not chills entrepreneurial ambitions and private investment. On the other hand, private industry will rarely provide adequate service to small markets, is ruthless in its treatment of workers and cares nothing for environmental concerns.

Stimulate Business Development

Tax breaks, interest free loans, and grants can be used to encourage the growth of business. Especially in cases where a private industry doesn't exist yet or is less than optimal.

Restrain Business Development

Increasing taxes, interest rates, and erecting legislative barriers can cool down an economy and fight inflation but risk the economy sliding into decline.

Infrastructure Deficit

One easy way for governments to reduce costs is leaving off the building of public works. Of course, things wear out over time and sometimes it's cheaper to build during a recession than a boom. Even so, if times are tough, cutting back on big projects can really improve the bottom line.

Borrowing Money

Most governments run deficits and have debt. That's easy enough to say but who do they owe the money to and how do they go about borrowing it? Issuing investment bonds allows money to be borrowed from the citizenry. This is effective in direct proportion to the state of the economy and the mood of the public. If the government can't be trusted they'll find it hard to sell bonds. Domestic banks and money markets can also loan money to the government but this is limited by the state of the economy and borrowing from a government owned central bank is essentially printing money and a recipe for hyper-inflation. Allied nations might be willing to lend funds in exchange for concessions or support in international affairs. The banks of powerful nations can often lend money on a scale weaker nations find attractive. Of course, unpaid loans might also be due cause for war. In some settings there may be an international banking institution similar to the world bank which is used to manipulate nations.

Racial Temperament

It is assumed that the human range of emotions and feelings is the average around which these rules are centred. Species with strong tendencies may react differently.

Military Budget

In the modern world NATO's goal for spending is two percent of GDP but this is seldom met in practice. In wartime the budget might go as high as 10%

Infrastructure Damage

In order to win a war, the destruction of the enemy's infrastructure and manufacturing capacity is generally necessary.

Population Damage

Civilized societies will generally attempt to minimize the civilian casualties resulting from warfare. Of course, science fiction is often about different perspectives and some societies will see the enemy civilians as potential enemies, food, or even just inconvenient and seek to destroy the opposing society outright. In the real world this is called genocide and is one of the greatest evils humanity descends to. Historically, protecting the women and children from the ravages of war allows a society to recover in less than a generation. Reduction of the breeding population reduces potential population growth and economic growth in the future.

Egg laying races are often particularly vulnerable in warfare. Especially if they keep their eggs in communal creches. They are also vulnerable to slavery as crates of eggs are far easier to ship than mature organisms.

Trade

The exchange of goods across borders can be of great economic benefit to all parties but smaller economies are always at risk of simply being out competed or swamped with cheap products from a larger neighbour.

Trade Free Option

If the economics system is unwieldily or unimportant to the campaign, it can easily be ignored by simply assuming that they wouldn't build stuff if it didn't work. This is an especially appropriate approach for epic space operas. Don't worry about who paid for that fleet of giant ships or that planet killing battle station. It just works, okay?

Standard of Living

In the main, populations are content when they have what they expect to have. Thus those who are accustomed to little are content with little and those who are accustomed to plenty are only content with plenty. The issue then becomes the management of expectations. It is easy enough to buy support with lavish spending but when times are hard the resulting discontent will be all the greater. If the population is unable to survive on what they have, things become worse but a population that is accustomed to little will endure longer than one that is accustomed to much.

The barest survival margin is assumed to be one monetary unit per person (100kg) per day. This allows no margin of error or decline. The average standard of living is assumed to be one tenth of the Technology Factor per person per day.

Trade and Commerce

While it may be couched in different terms, the transfer of goods is the basis of all economies. Campaigns centred on merchants and smugglers are popular as they have cause to travel and interact with the different societies they encounter. But it is also possible to run massive corporations vying for market domination.

Goods

Broadly speaking we are dealing with products and markets. If a good is common and inexpensive in a market, there's not much advantage to buying and selling it there but if it's rare somewhere else it is worth buying it and shipping it there.

Cost Benefit Analysis

An economist can look at the market and attempt to determine what will make money and what won't. Of course, good information is essential. Economic data will reveal what products are in demand in a market and what people will be willing to pay for them.

Cargo Densities

A load of individually packaged toys arranged for quick unloading weighs a lot less than a load of gravel or water. As with machinery and accommodations, the accessibility of cargo affects its mass. A hold organized like a warehouse will contain far less than one packed like a moving van.

Buying and Selling Cargo

Activity: 1 day

Skill: Economics or Salesmanship

Factors:

Product In Demand +20 Sell or -20 Buy

Product In Surplus -20 Sell or +20 to Buy

Results:

Exceptional Success: Buy for 50% or Sell for 200%

Success: Buy for 75% or Sell for 150%

Marginal Success: Buy or Sell for 100%

Failure: Buy for 150% or Sell for 75%

Exceptional Failure: Buy for 200% or Sell for 50%

Price / Tonne	Commodity	Density
100	Loose Ore	4000 kg / m ³
200	Ingots / Rod Stock	8000 kg / m ³
2000	Manufactured Goods	200 kg / m ³
2000	Livestock	100 kg / m ³
500	Grain Seeds	500 kg / m ³
2000	Packaged Food	200 kg / m ³
1000	Fresh Produce	200 kg / m ³

In Surplus Selling Price / 2

In Demand Selling Price x 2

Local Economic Factors

Collapsed	High Demand, No Capital
Depressed	Low Demand, Little Capital
Lethargic	Low Demand, Adequate Capital
Growing	High Demand, Adequate Capital
Booming	High Demand, Plentiful Capital
Drought	Produce and Seeds In Demand
Blight	Livestock and Meat In Demand
War	Manufactured Goods and Raw Materials In Demand

World Is:

	<u>In Surplus</u>	<u>In Demand</u>
Habitable	Agricultural Goods	Manufactured Goods
Marginal	Raw Materials	Agricultural Goods
Uninhabitable	Raw Materials	Agricultural Goods
Industrialized	Manufactured Goods	Raw Materials

Survival and Outdoor Activities

Adventurers will often find themselves far from civilization. Whether they are exploring or crashed on a distant world, just staying alive can be an adventure.

Overland Travel

Shipwrecked spacers and scouts may find themselves needing to travel on foot. This is generally considered the worst way to go places but it does have the advantage of being cheap and relatively stealthy. The slowest person in the group generally determines how far a group can walk in a day. Supplies, availability of water, and even altitude can impact how far they get. Humans are exceptional long distance travelers and few other races will be able to keep going like they do. Some totally mad humans have even been known to run thirty miles in just a few hours for fun.

The distances given assume a full ten to twelve hour day with breaks every hour. Runners can accomplish the same distance in as little as three hours but aren't in any condition to go further afterwards. Fast creatures generally can't keep that pace up all day so they don't get any farther than walking humans unless mounts are being changed quite regularly. Riding beasts make the travel more pleasant and less tiring but only make short journeys faster.

Travel On Foot

Endurance or Running

Factors:

Good Roads +10

Dehydrated -20

Malnourished -20

Hot -20

Warm -10

Cool +10

Cold -10

Rough Country -10

Steep -20

Exceptional Failure: Injured ankle or foot cuts movement in half until a full day is spent resting.

Failure: Too many breaks and too little progress, 10 kilometers traveled.

Marginal Success: Slow going, 20 kilometers traveled

Success: making good time, 30 kilometers traveled

Exceptional Success: grueling but productive day 40 kilometers traveled.

Hostile Environments

Many science fiction stories feature man versus nature conflicts in the form of stranded or shipwrecked protagonists trying to survive on alien worlds. Humans are tough and can survive in extremes ranging from -40c to +40c with appropriate equipment. Without equipment they do best in temperatures ranging from 10c to 25c. Other species will have their own ecological niches and advantages.

Hazards

Out there in the dangerous wilds of the universe it's possible to freeze, burn, dry out, starve, get poisoned, and fall to your death.

Cold

Most of the universe is incredibly cold. The freezing point of water is a deadly temperature for water based life forms. Warm blooded creatures with proper insulation can survive freezing cold for extended periods of time. Some cold blooded creatures can survive being frozen and thawed out again. Creatures from very cold worlds will have a natural alcohol content or exotic alien chemistry such as methane based blood.

Dehydration

Most life forms require a constant supply of clean water or they will soon die. Water can be tainted by toxins in the soil or decaying carcasses at the bottom. Boiling water will neutralize most biological toxins and filtering it with fibers and charcoal will remove most chemical toxins.

Gravity

Low gravity is mainly dangerous because it tends to come with a thinner atmosphere. High gravity makes everything harder. The weight of everything including the person is increased proportionally, so under 2 Gs everything weighs twice as much. The added weight of an individual is treated like encumbrance. At two Gs it's like carrying yourself around all the time. The atmosphere will be thicker and thus warmer. High gravity interferes with the working of organs including the brain, multiply the rate of aging by the gravity level. One year in two Gs is equivalent to two years on one G. Falling becomes particularly dangerous as the force of impact is increased proportionally to gravity. Powered armour and exoskeletons can help people move around in high gravity

Heat

High temperatures cause water to evaporate rapidly and increase an organism's need for it. Extremely high temperatures can cause burns and even cook exposed tissue. Organisms evolved to survive high temperatures will have elaborate cooling surfaces or a chemical makeup that absorbs more energy than water as it evaporates. The evaporation of water cools surfaces. It's quite possible to get hypothermia by getting out of a swimming pool on a hot day.

Pressure

Intense pressure will crush anything without the structural integrity to resist the difference. Empty spaces like lungs and stomachs will collapse first. A space suit only has to withstand one atmosphere of pressure. Hard armour and powered armour can resist more. While bodies can adapt to relatively small pressure changes such as a couple meters of water, coming back up too fast can cause nitrogen bubbles to form in the blood causing the potentially lethal ‘bends.’

Radiation

Nuclear radiation in the form of Alpha, Beta, and Gamma rays is released by fission reactions and is common in space, especially near stars and gas giants. Radiation exposure that is hot enough to cause burns has a damage rating just like a weapon but is only stopped by metal, reflective, and dense materials. An ore deposit or a dumpster will provide a little protection, as will primitive metal armor, space suits, powered armor and so forth. Water provides good, if heavy insulation against radiation with a meter or more being as good as a lead lining. For all that, if it's hot enough to cause burns the exposed will be dead in a day or two without treatment. Make an Endurance roll every day for a week after exposure. If all of them are made the exposed individual survives without long term harm. For each roll that fails they get a fast growing tumor in a randomly generated organ (see the Medical rules q.v.) Lower levels of radiation might not cause burns but they also cause genetic damage and cancer. Make an Endurance roll a month after exposure and if it fails the character has terminal cancer in a random organ.

Starvation

Even in their native environment, organisms often have trouble finding suitable food. Herbivores with complex digestive systems are able to digest cellulose which is inedible to most omnivores and carnivores. Some plants have poisonous fruit and leaves while others are edible. In an alien environment it is very likely that even carbon based life forms will have incompatible enzymes or proteins. Careful chemical analysis and experimentation will be the only way to avoid digestive problems, poisoning, and even spontaneous combustion.

Suffocation and Drowning

As essential as water may be for life, it can surely end it in a hurry. Given a moment to hold their breath most organisms can hold it for twice their Endurance in seconds. Caught off guard they can only last for seconds equal to their Endurance. After that, they begin to drown and will only remain conscious for seconds equal to their Endurance if they do not get air. After that they will pass out and die in Endurance seconds.

Toxic Atmospheres

Even terrestrial atmospheres may contain toxins due to volcanic activity or organic processes like decay. Proper filter and oxygen masks provide excellent protection though seals can be damaged by rough handling. Some toxins can be filtered out, perhaps with primitive masks made of fibre and charcoal. Small amounts of air can be stored in animal bladders, but long journeys are generally impossible under such conditions. Some toxins, like dust and pollen float in the air and can be gotten under while others like sulphurous gasses drift down and can be gotten over. A purely alien atmosphere may simply be unbreathable but it might also be genuinely poisonous.

Vacuum

Being naked in space will quickly kill just about any living thing. The absence of air causes suffocation (q.v.) Trying to hold your breath just causes your lungs to burst or the air to be sucked out. The heat or cold is often at deadly levels. The dehydration as water evaporates out of the skin causes tissue damage. The pressure is low enough that the boiling point of blood drops to the point that it probably does. For all that, it is possible to survive, mostly, unharmed for a couple seconds and live a minute or two with severe but treatable injury. It's best to close your eyes though as, they're soft tissue and won't heal as well as your eyelids.

Natural Materials

Primitive societies and stranded explorers have to make do with the materials that are readily available in their environment. Fortunately, they tend to be surrounded by plants and animals that have spent hundreds of millions of years evolving to survive in that same environment.

Alcohol

Plant as plant mater decays it produces alcohol which can be used as a fuel or disinfectant. Allowed to decay further it becomes vinegar, a mild acid that is useful for breaking down grease and can be reacted with lye to create foam.

Chalk

Calcium carbonate deposits are soft and easily mined and shaped. The powdered leavings are very useful for absorbing moisture in other processes.

Charcoal

Charcoal can be re-burned to get a more consistent level of heat. It can be written with and can be used to filter impurities from water. Charcoal is an important ingredient in cement, steel, and gunpowder.

Clay

Some soil has a plasticity that makes it suitable for molding into containers and trays. The clay will dry naturally but can be fired to make it harder. Mixing sand and lye into it can produce cement which chemically hardens to a water resistant state. Clay can also be used to make bricks and tiles for constructing shelters.

Copper

One of the more easily located and smelted metals, copper ore can sometimes be found in stream beds. Its low melting point makes producing simple tools, weapons, and armour a matter of pouring it into sand or clay moulds. While copper is soft and malleable, it can be alloyed with tin to make bronze or zinc to make brass. A Geology skill roll will be needed to locate and identify copper ore.

Excrement

Urine is mildly acidic and can be used to cure leather. It can also be used in making gunpowder. Feces can be used to produce potassium nitrate, a key ingredient in gunpowder. Feces are also good fertilizer though they also carry enough bacteria to make any food grown with them dangerous. Sterilizing excrement just ruins most of its value as fertilizer. Dried feces can be burned but the smell isn't pleasant.

Fibers

Many plants contain fibers that can be used to make string, rope, and even be woven into cloth. Flax and cotton are two common terrestrial plant fibers. Some animal hair is also suitable for twining. Insect silk can be an excellent source of fibers that match and exceed advanced synthetics in tensile strength and flexibility if they can be harvested in sufficient quantities.

Furs

Animals adapted to the cold will have thick coats of fur and layers of blubber to insulate them from the heat. Fur provides an excellent barrier against the cold and a fair barrier against water.

Feathers

Feathers are very good at keeping things dry and provide good protection against cold and heat.

Lead

Soft and malleable, lead is a common metal with a low melting point and high density. It is useful for fabricating replacements for damaged plastic parts, soldering electrical connections, and as radiation shielding. Lead is also toxic and can cause mental instability and brain damage if ingested over a long period of time.

Leather

The cured hide of large animals is durable and often used for boots and straps. Hides can be cured by being scraped and immersed in a pit full of urine for a few days. Other acidic solutions such as vinegar can also be used if one has time to prepare them.

Lye

Open water absorbs chemicals from the soil. When it dries out, an alkali substance is left behind which can be mixed with clay to create cement.

Metal

Metal is a conductor and isn't much help when it comes to surviving extreme temperatures. It can be very useful for tools and structures like tent poles and pack frames. Smelting metal out of ore with energy weapons is a time honored science fiction tradition but proper metallurgy requires skill and equipment.

Sand

Sand is fine grains of rock, it is often rich in silicon. Sand can be used to rub and grind materials smooth. It can be added to cement as a filler. Sand is harsh and abrasive and gets into everything. Sand can be heated with ? To make glass. Making clear and smooth glass is another matter entirely.

Stone

Rocks can be used as very basic tools and weapons. Never underestimate the power of a well thrown rock. They are functional hammers, can be split by striking with another rock to get a sharp edge suitable for scraping hides, sharpening metal tools, or sanding wood smooth. Stones can be piled to make structures but wood or some other material is generally needed to build a frame. If there are open deposits nearby or upstream, there may even be some coal and ore found in gravel beds.

Wood

Wood is an excellent composite material and each variety has its own particular advantages in terms of flexibility and hardness. Wood can be used to make simple weapons, tools, and structures. Metal saws and knives allow more elaborate construction. Wood can be burned to produce heat and charcoal.

Wool

The hair of some species is long enough to be woven into cloth. Wool is good insulation against the cold but tends to stay wet if it gets wet.

Synthetic Materials

The modern materials frequently called ‘plastics’ cover a wide range of materials like nylon, vinyl, polyester, and polystyrene. Each has a variety of specific characteristics which make it superior to natural materials.

Advanced Laminates

Woven layers of different fibers can produce complex effects and provide the advantages of both. Durable, light weight, flexible fabrics and structures that breathe and repel water at the same time.

Active Materials

Microscopic machinery can provide heating and cooling through capillary action powered by the wearer’s movement. If such materials have a fault it is that complex systems are prone to complications and failure and repair in the field is generally impossible. At even more advanced levels such materials may even be self healing.

Building Shelters

Getting out of the rain and snow and beyond the reach of predators and parasites is a key element of survival. Even finding a decent cave is time and resource intensive work.

Dugout

A simple hole in the ground can provide decent enough shelter from wind and predators as long as it doesn’t rain. Grassy turf provides better protection from the rain and digging on a hill side or embankment will help to avoid flooding, but digging is hard work. Improvised tools made from wood or rock are necessary for any species without specialized digging claws. If enough time is taken, a bend in the tunnel will help to keep the weather out. While dirt is easy enough to burrow into, any large dugout risks collapse and can be made more secure with wooden support beams or piled rocks. Deep snow can also be used to make a dugout. While it isn’t as solid as dirt, it’s easier to pile up and can be packed down and broken into crude bricks with very minimal tools.

Lean-to

A simple, improvised shelter can be made by laying a long pole between two trees and piling pine boughs or similar materials across transverse poles. An axe, saw, or at least a knife will speed the process immensely. Twine or rope will allow a more secure and sturdy structure. A lean-to is vulnerable to strong winds and tends to leak in the rain.

Tents

Light weight shelters that can be moved easily are usually made of fabric or skins using poles for structure and pegs to hold the tent in place. A tent will keep the wind and rain out but provides little insulation from the cold. Building a tent requires at least a knife, twine, and skins or fabric.

Cabins

More permanent structures take time to build. Clay and rocks and wood are useful materials but sod can also be used. The most important part of a cabin is the structure. A large open space will need strong beams to hold it up. A foundation can be dug out and pilings driven to make it more secure. The walls can be made of grass mats, hides, twigs and mud, rocks and mortar or even logs but something needs to hold that weight up.

Finding Caves

Geology is a useful skill when looking for caves but the primary part is the looking. Caves tend to be found in rocky areas and hillsides. Dirt caves tend to be unstable and prone to caving in.

Find Caves

Activity: 1 day

Skill: Geology

Factors:

Mountains	-10
Rocky	-20
Hills	-30
River Valleys	-40

Results:

Exceptional Success: find a cave with multiple large chambers.

Success: find a cave with a couple small chambers

Marginal Success: find a shallow cave with a large entrance

Failure: find no caves at all

Exceptional Failure: find a highly unstable cave or one that's full of large predators

Locating Food

Food, is any biological material that's soft enough to chew and can be digested. Different species tend to have specialized diets. Eating grass or wood is out of the question for most humans.

Foraging

Activity: 1 day

Skill: Survival or Botany

Factors:

Vacuum	-100
Tundra	-20
Desert	-20
Plains	-10
Forest	0
Jungle	+10

Results:

Exceptional Success: find and gather enough roots, leaves, and berries for 1d10 people.

Success: find and gather enough roots, leaves, and berries for 1d5 people.

Marginal Success: find and gather enough roots, leaves, and berries for 1 person.

Failure: find and gather enough roots, leaves, and berries for half a person.

Exceptional Failure: find nothing to eat today.

Analyzing Potential Food

While the chemistry of life is probably pretty universal even on earth, there are a lot of plants and animals that humans can't eat. Ingesting the wrong mushroom or berry can cause vomiting, diarrhea, or even death. On alien worlds there's no guarantee If chemical tools aren't available to assess potential foodstuff, taste, smell, and even eating small doses can provide clues as to whether a given material is edible. The sense of taste is essentially a biological food chemistry analysis device and if something tastes bad, you probably shouldn't eat it.

Test Food

Activity: 1 day

Skill: Biochemistry

Factors:

Familiar Biosphere	+20
Alien Biosphere	-20

Results:

Exceptional Success: Yeah, you can actually eat this stuff.

Success: Find some inedible material that can be easily processed to make it edible.

Marginal Success: Marginally edible material with undesirable digestive side effects.

Failure: Nothing here has any nutritional value and most of it is toxic.

Exceptional Failure: You really shouldn't have eaten that. Roll Endurance or die.

Locating Wild Life

Assuming some basic protein compatibility, animals can provide a relatively safe source of food. Prey can usually be found near water and food sources. Watching what the animals do can provide some clues to what can or can't be eaten. Once wildlife is found it must still be stalked, killed, and cleaned by the hunter.

Hunting

Activity: 1 day

Skill: Tracking

Factors:

Vacuum	-100
Tundra or Desert	-20
Woods or Jungle	+20

Results:

Exceptional Success: Find enough prey to feed 1d20 people.

Success: Find enough prey to feed 1d10 people

Marginal Success: Find enough prey to feed 1d5 people

Failure: Nothing today

Exceptional Failure: Break a vital piece of equipment, usually a weapon or a trap, making hunting much harder.

Preparing Food

Beyond the basic finding and gathering, food can be made more digestible by cooking it with a fire. Clay or metal containers are particularly useful as they don't burn up. A large, flat rock can serve as a frying surface and sticks as roasting skewers. With clay containers, basic fermentation provides a source of alcohol and vinegar. Boiling hard roots makes them chewable. Smoking meat preserves it. Salt can be used to preserve and slow the growth of bacteria.

Locating Resources

Of course, if a resource is not present at all, there's little that can be done. Food is particularly difficult as it requires an ecosystem. While waste can be composted and many basic foods are seeds that can be planted that's a long way from a functional biome. Other materials can be recycled and repurposed from broken tools and crashed vehicles.

Locating Water

Water is essential for life. Without it, a person won't live for more than a couple days. Access to clean water is the most important obstacle to long term survival.

Find Water

Activity: 1 Day

Skill: Survival or Geology

Factors:

Vacuum	-40
Desert	-20
Rain Forest	+20
Ocean	+40

Results:

Exceptional Success: find, ample, easily accessible, clean water supply

Success: find clean or ample water supply

Marginal Success: find inaccessible, limited, or dirty water supply

Failure: no water found

Exceptional Failure: find traces of water that lead to spending twice as much time looking without getting any water.

Water From Thin Air

If there's an atmosphere, there is usually a fair bit of moisture in the air. A mesh or fabric and pieces of metal can be used to create simple condensation traps that take advantage of temperature changes to gather water. This is a pretty slow way to get your water but it can provide enough to survive on.

Water From The Ground

When open sources of running water or snow accumulated in sheltered rocks at high elevation aren't available there may still be water trapped beneath the surface. Digging deep enough to allow it to accumulate is a long task, much aided by a good shovel. If there's no biosphere the water may be safer, just depending what's dissolved in it.

Making Your Own Water

Of course, if you've got access to hydrogen and oxygen, you can make water and plenty of excess heat. Containing and controlling this process takes a fair bit of equipment but a good chemist will be up to the task.

Purifying Water

Of course, water dissolves just about anything and can be full of toxins. It's usually best to boil it or let it sit out in a container for a day or two. A fine mesh and some charcoal can be used to filter water. If you have access to some tubing and glass or metal containers it can be distilled by boiling and collecting the condensation.

Survival Equipment

Much of the following list can be made from local materials given sufficient time and skill. Knowing how something is done is seldom as good as having experience actually doing it and the locals will probably snicker at off worlder's primitive attempts at creating their own gear but in wilderness survival situations, desperation outweighs fashion.

Stone Knapping

The skill of making tools and weapons from primitive materials involves both the identifying of suitable rocks and minerals that will flake or break appropriately without breaking off. With skill and practice, stone arrowheads, axes, knives, and scrapers can be made. Sinews and strips of leather are generally the best binding materials for attaching the stone part to a wooden handle. Geology and Archeology are the most applicable modern skills.

Quilts

Fabric with a layer of feathers or other fluff sewn into it provides good protection against the cold.

Tarp

A big sheet of fabric is handy for wrapping and covering things and with rope, can be used to make an excellent lean to.

Jacket

A light layer of tight fabric or leather covering the torso and arms provides adequate protection against cool and wet weather and the wind, combined with a sweater it is almost as good as a parka.

Hood

A simple, fabric head covering that looks cool while sacrificing field of vision. A hood will keep your head warm so long as it doesn't get wet.

Parka

A hooded fur lined coat provides body core insulation and head coverage.

Hat

A hat provides simple or elaborate protection from the sun and rain. The reason you lose eighty percent of your body heat from your head is simply because it's not covered up and the rest of you is.

Boots

Proper footwear is invaluable. Protection from sharp rocks, thorns, and stinging insects, coupled with warmth and traction. Good boots lace up tight across the top to keep stones from getting in. Cheaper boots can be supplemented with gaiters to keep the rocks out.

Sweater

A knitted sweater provides excellent body core insulation. Loose yarn can be twisted out of any fibre quite easily but Terran wool is exceptionally warm and itchy. Knitting is a simple process using two needles to create a loose mesh with some give and stretch to it.

Primitive Tools

Axe

A stone axe can be used to cut wood and bone. The best ones are made of flint or obsidian. Copper is too soft to make a decent axe but Bronze or Brass works relatively well.

Bladder

The internal water management reservoir of an organism makes a good water bag once it has been rinsed out and cured. Bladders aren't particularly resistant to acids and don't make particularly good wine bottles.

Crucible

A stone or brick furnace can be used to smelt copper and lead. A pot is needed to handle the molten metal.

Hammer/Mace

While making a blunt instrument doesn't require the most skill in the world, setting up a hammer to give leverage over repeater blows.

Kiln

A stone or brick oven makes curing and firing bricks and clay pots more convenient.

Knife

Stone knives can be used to carve and cut wood and bone, allowing more complex joints and shapes to be crafted. Copper and bronze knives are harder and more useful if more labour intensive products.

Loom

A wooden frame and shuttle are fairly complex wooden tools which can be used to make cloth out of threads.

Pot

Clay can be pinched into a round shape and cured in a fire to make containers. These are resistant to acids and work well for making wine and vinegar.

Spindle

A long stick with a weight at the bottom can be spun to draw fibers into threads and ropes.

Wedge

Simple wedges can be used to split logs and widen out cracks in larger rocks.

Colonizing

It takes courage and determination to colonize brave new worlds. The ecosystem is seldom friendly. The construction of outposts and colonies can be the basis for an interesting game.

Outpost

An outpost can be as small as a single habitat module and a couple staff members. Outposts are not generally self sufficient and require regular supply shipments of food and fuel. For the sake of simplicity an outpost has a population less than 100 and rarely has children, elderly, or other non-productive individuals.

Settlement

What separates a settlement from an outpost is the presence of families and community amenities. Settlements are generally small enough that they can't provide all of their own basic needs and require outside support. Settlements run from around one hundred to a thousand people.

Colony

A colony is able to support itself with its own food production and some of its own manufacturing. It also has a large enough population to replace its losses to aging and disease. Thus what separates a colony from a settlement is the ability to support itself and grow. Colonies are generally more than a thousand people but can be as many as a million.

Immigration

In order to bring in personal there must be adequate space and resources provided. While an outpost on a habitable world can probably build simple cabins and even grow or raise food, doing so takes away from their ability to get other work done. While a world with a population in the billions can easily spare hundreds and even thousands to the colonies, the cost of getting them there tends to be restrictive. The colony probably needs to have enough supplies and housing to provide for the new arrivals. Managing this requires excess production capacity. On a habitable world the new arrivals may be able to live in makeshift shelters like tents until they can construct their own dwellings but they still need to be fed.

Immigration Costs

Days in Transit x Base Species Mass / 80

Birth Rates and Death Rates

The gestation period of a species, combined with its maturation and aging rates are used to calculate population growth. Depending on the circumstances, accidental deaths, starvation, violence, and disease can be important factors.

Annual Birth Rate

12 x Litter Size / Gestation Period

Average Life Span

Maturation + (Aging Factor x 4)

Construction

Advanced building materials are modular and light weight or self printing or sprayable. Even so, shipping materials to a new colony is expensive and it is common practice to use locally available materials wherever possible. Many colonies are built in tunnels and caves for protection from environmental hazards and the relative cheapness of the enclosed space. Rock for foundations is available anywhere. Heavy machinery speeds up construction considerably and allows larger and heavier structural materials to be used.

Settlements, especially outposts, often use self contained shipping container habitats that serve as their quarters for the journey and on the colony world. As a settlement grows and matures it becomes more independent and better able to use local resources. The times given reflect appropriate hand tools but not heavy equipment.

Space Requirements

Habitable World 20 m³ / person

Uninhabitable World 50 m³ / person

Greenhouse 10 m³ / person

Quarry or Tunnel Rock

TF / 10 m³ per person day

Assemble Structural Panels

TF / 2 m³ / person day

Print Concrete Structures

TF m³ /person day

Heavy Construction Machinery x 10

Producing Food

A well supported outpost on an uninhabitable world will run an algae and fungus greenery as part of its life support system. This produces a subsistence diet for the people it supports but even with food printers and flavor packs it leaves much to be desired and nobody ever gets quite enough to eat. Printed meat and meat culture vats can provide food for carnivores but are less efficient than vegetable based foods. Hydroponics and greenhouses allow more pleasing foods to be produced and a better nutritional standard. On habitable worlds, gardening and agriculture become possible, though getting the right crops for the climate and biochemistry is always a challenge.

Growing Food

24 hours /TF per person

Combat and Action Sequences

Tense and exciting scenes are generally played out in some detail. The potential for lethal consequences can be thrilling but it can also be a source of contention and debate. Some players will go as far as trying to bend the rules to their advantage when their beloved character's life is at stake.

Exchanges and Interludes

A lot can happen in a single second, a pistol drawn and fired can end a fight in an instant, but most engagements are part of a larger picture. Detection and movement are handled in one minute rounds with declarations generally breaking the time down to second by second exchanges. An exchange is assumed to happen right at the start of the minute

For example, a squad of marines is patrolling along the base of a hill line, on the look out for traps and snipers. There is a sniper, who lacking a church tower is hiding behind a boulder on a tall hill. The marines aren't stupid and they know a good position when they see one so the sergeant orders a couple men to check it out. The sniper watches them approaching and chooses to open fire, starting a second by second exchange that lasts until the sniper or marines are down or withdraw.

An exchange starts with the combatant who's declared action caused the interruption. Don't let this rule become a point of debate. If the players haven't declared that their weapons are in hand and are covering a foe they haven't done it as that declaration would start the exchange rather than the foe drawing a gun and shooting them.

The Importance of Declaration

For the sake of everyone's sanity but especially the Referee's an action that has not been clearly declared by the player has not happened.

The sequence within each second is broken down in order of Reflexes scores with the highest score acting first.

The point of exchanges is to handle fast moving events in detail quickly. It doesn't serve the purposes of the game or the players to try and manage entire battles on that scale. Most activity can and should be resolved by the round. If the sequence of events is of consequence the Reflexes scores of the combatants can be used to determine what order things occur.

Movement

Normally, movement is not considered an action. That is to say that one can expect their character to be able to walk and chew gum at the same time. However movement is impossible in conjunction with some actions and impairs others. Walking while picking a lock or repairing a stationary tractor is simply impossible and shooting on the move is significantly more difficult than shooting while stationary

Organism Movement

Most humanoid creatures can run six metres per second, walk three metres per second, and swim or climb one. It isn't uncommon for races to move at different speeds, but these are the most common, or default rates.

Common Movement Rates

	Humanoids	Animals
Crawl/Swim	1.5 m/s	3 m/s
Walk	3 m/s	6 m/s
Run	6 m/s	12 m/s

Going Prone

A character can drop to the ground in a single second. While prone a character is less likely to be hit by attackers who are more than six metres away. This distance is a fairly relative figure and only applies in cases where the attacker is level with or lower than the prone individual. Prone characters can only crawl at a quarter of their normal movement until they spend two seconds getting to their feet.

Prone

- 20 to be shot
- +20 to Sneaking
- 3 to hit locations over 5 from front
- +3 to hit locations under 5 from rear

Climbing

Most organisms and robots with arms and legs can climb obstacles either to gain a better vantage point or to get past them. If the character can successfully make their skill roll they move up by half their normal movement rate modified for Exceptional and Marginal successes.

Climbing

Base Time: 1 second

Climbing Skill

Modifiers:

- +10 lots of hand holds
- 10 per 15° over 45°
- 10 smooth
- 10 wet
- 20 greasy
- 20 per level of bad light

Results:

Exceptional Failure: Fall and suffer
Damage = distance in metres x Local Gravity

Failure: you seem to be having trouble getting anywhere

Marginal Success: climb at 1/4 normal movement rate

Success: climb at 1/2 normal movement rate

Exceptional Success: climb at normal movement rate

Free Fall

A person inside an orbital station or ship appears to be weightless because they are moving along the same trajectory in much the same way as a person inside an automobile is stationary with regards to the cup holder. Those aboard a vessel drifting in deep space will also be in free fall due to the minute effects of gravitation from distant stellar bodies.

Combat under such circumstances can be all but impossible. Any attempt to move or fire a weapon with recoil requires an Astronaut skill roll to avoid tumbling out of control and bouncing off the bulkheads.

Weightless Movement

Base Time: 1 second

Astronaut Skill

Modifiers:

+10 Hand Holds

+10 Braced

-20 Drifting

-10 Light Recoil

-20 Medium Recoil

-40 Heavy Recoil

Results:

Exceptional Success: +10 to hit or double movement

Success: no problems

Failure: Tumble 1d10m and -20 to hit

Exceptional Failure: Tumble 2d10m and -40 to hit

Movement In Free Fall

Without some gravity to work with it's impossible to walk or run. The easiest thing is to push off from one surface and drift to the next, it is possible to re-orient in mid trajectory but not to change course. It is also possible to redirect one's movement by grabbing passing fixtures and swinging about but otherwise any push off move continues until something gets in the way.

It is possible if ineffective to fan the air (if any is to be had) with a stiff, flat object to maneuver. A task in which those with wings will have much more success.

Push Off: 6m/s²

Fanning 0.5 m/s²

Flapping Wings 2 m/s²

Personal Thrusters

Of course, those with some kind of thrusters can maneuver with greater ease. Even so, most thrusters set up a vector which is maintained and altered by applying thrust. A chosen vector can be altered by sixty degrees by applying an amount of thrust equal to the current vector. For instance a six meter per second vector requires a six meter per second thrust to change course by sixty degrees.

Sneaking

Surprise is a crucial factor in high tech combat. Getting well aimed shots off before the enemy can respond offsets the odds significantly. As such, sneaking is also crucial. If there is clearly no line of sight to the sneak they are automatically successful. Those guys behind the barn don't need to roll. A successful sneaking roll means that the figure is not seen in spite of direct line of sight, however if the move ends in the open they can still be spotted by a successful Spotting roll.

Sneaking

Stealth

Base Time: 1 second

Modifiers:

+/- Size x -1

+20 prone

- movement in meters per second

+20 per level of bad light or other interference

Results:

Exceptional Failure: they're looking right at you.

Normal Failure: sighted by any facing opponents.

Marginal Success: opponents get free detection roll.

Normal Success: unseen for the moment.

Exceptional Success: only detected by exceptional success.

Example

Harcourt creeps out into the open towards an enemy camp. He's an elite commando with a Stealth skill of 87, it's dark and the enemy haven't got any special gear but neither has he. So he's got a nice fat +20. He opts to dash across the open ground in 2 seconds for a -6. The dice come up 45 so he remains undetected.

Swimming

Assuming a figure can float, bodies of water can be crossed by making a Swimming Skill roll. Most robots and vehicles with contact suspension don't float.

Swimming

Base Time 1 second

Modifiers:

-10 per encumbrance level

-20 rough water

Results:

Marginal Success: swim at 1/4 normal movement rate

Success: swim at 1/2 normal movement rate

Exceptional Success: swim at normal movement rate

Failure: you seem to be having trouble getting anywhere

Exceptional Failure: sink like a rock with much flailing

Vehicle Movement

Vehicles are another matter entirely, having a variable velocity in metres per second. Vehicles will often be moving so fast that their movement will need to be handled one second at a time.

Every vehicle has a "Resistance" rating that is multiplied by its current velocity to find out how much it automatically decelerates every second, the driver or pilot can then choose to add or subtract the vehicle's Acceleration. A vehicle's Top Speed is the point at which its Acceleration is equal to its Resistance times Velocity. It's only listed because some people won't want to bother with detailed vehicular movement, but the fact remains that a vehicle only achieves its Top Speed by running the engine full-out, so vehicles that use the same power plant to charge weapons may not be able to do so at the same time as they're red-lining.

A vehicle that is climbing will decelerate ten metres per second per second (or whatever the local gravity is anyhow) automatically and one that is diving will accelerate the same amount automatically. This gravity related acceleration is reduced in direct proportion to the amount of the vehicle's movement that is made horizontally. That is to say that if a vehicle only increases its altitude by half of its velocity it only decelerates half of the local gravity.

Fast moving vehicles don't turn as easily as people on foot. The driver must make a skill roll to successfully manoeuvre and maintain control when the vehicle turns tightly or encounters an obstacle. Adverse conditions include rough ground, rain, oil slicks, ice, wind, and small obstacles each of which counts for a ten point penalty to the control roll.

Maintain Control of Vehicle

Skill: Vehicle Type

Base Time: 5 seconds

Modifiers:

+ vehicle's Handling rating

-10 per 45° turned

- driver's worst wound level

-10 per adverse condition

-20 per light level from preference

Results:

Exceptional Failure: swerve sideways and roll, -50m/s.

Normal Failure: move straight ahead. Brace for impact!

Marginal Success: turn half desired angle.

Normal Success: turn as desired.

Exceptional Success: turn as desired, no penalty next second.

Collisions

When two vehicles collide, the square root of their mass times their velocity is used as the Damage. The Penetration is one. If the two vehicles are moving towards each other their velocities are added and if one is moving away from the other they are subtracted. Any remaining movement is applied along the course of the larger vehicle. Yes this is a gross oversimplification.

$$\text{Collision Damage} = \sqrt{(\text{mass} \times \text{velocity})}$$

Detection

Since you can't shoot what you can't see, finding the enemy is a vital part of combat. Every race has a range increment for eyesight, hearing, and smell. Sensor systems each have their own range increments. This is the distance at which there is a ten point penalty to the Perception or Sensors skill roll. Each time the range is doubled the penalty increases. A faster moving target is easier to notice than one at rest, so any distance the target moved perpendicular to the attacker is applied as a bonus.

Detection

Perception or Sensors

Base Time: 5 seconds

Modifiers:

+/- Target Size

+ target Velocity in metres per second

+ target Signature if any

-10 target farther than Range

- 10 per 2 x Range

- 20 per level of bad light or other interference

Results:

Exceptional Failure: change facing away from enemy.

Normal Failure: nothing to see here.

Marginal Success: hey what's that? Better investigate.

Normal Success: Detect Normally Successful sneaks.

Exceptional Success: Detect Exceptional Successful sneaks.

Example

Abernathy is on sentry duty outside his camp when Harcourt tries to sneak in. Abernathy's Perception is 65. It's dark, Harcourt is 50 meters away and just moved 12 metres, so Abernathy needs a 67. He rolls a 54 and seeing a shadowy figure cross the perimeter, raises the alarm as he readies his automatic rifle.

Sensors

With advanced motion sensor, infrared sights, and radar, sneaking around can become virtually impossible. Naturally, countermeasures are constantly being developed but the true art of stealth is misdirection, not being where the observers are looking in the first place. Each sensor is rated for both range and sensitivity. The signature observed is specific to the sensor type with visible light being the standard for natural eyeballs. Active sensors like radar and infrared spotlights have a signature of their own.

A sensor operator is constantly involved in scanning. A success roll is required when a target enters the range of the sensors being used. Good old fashioned sneaking around offers little concealment from advanced sensors but this is represented by the device's Sensitivity and Range. Advanced countermeasures can generally counter sensors but are rarely subtle, most forms of jamming will make it very obvious that someone or something is there but make precise detection, identification, and pinpointing impossible. Advanced "cloaking devices" are presently thought impossible but are well within the scope of existing science fiction which places them well within the scope of these rules.

Senses	Poor	Normal	Acute
Sight	20 meters	40 meters	80 meters
Hearing	10 meters	20 meters	40 meters
Smell	5 meters	10 meters	20 meters

<u>Sensor</u>	<u>Detects</u>	<u>Signature</u>	<u>Countermeasure</u>
Eyeball	Reflected Light Waves	Target Size	Absorbent Surfaces
Ears	Projected Sound Waves	Target Size	Absorbent Surfaces
Infrared Camera	Infrared Light Waves	Temperature	Active Surface Cooling
Infrared Spotlight	Objects In Path	Target Size	Absorbent Surfaces
Lidar	Reflected Laser Beam	Target Size	Absorbent Surfaces
Night Vision	Reflected Ultraviolet Waves	Target Size	Absorbent Surfaces
Motion Detector	Objects In Motion	Movement	Stay Still
Radar	Radio Frequencies	Target Size	Composition
Sniffer	Chemical Compounds	Exhaust	Basic Hygiene
Sonar	Reflected Sound Waves	Target Size	Absorbent Surfaces
Spot Light	Solid Objects	Target Size	Absorbent Surfaces
Telescope	Reflected Light Waves	Target Size	Absorbent Surfaces

Weapon Usage

Light Weapon	mass less than FL / 2	ready automatically
Normal Weapon	mass FL/2 to FL	-10 Reflexes, ready in one second
Heavy Weapon	mass FL to FL x 2	-20 Reflexes, ready in two seconds

Recoil

Light	less than FL / 2	retain extra time bonus
Normal	FL/2 to FL	lose extra time bonus after one shot
Heavy	FL to FL x 2	must be readied after each shot

Using Weapons

There's more than raw damage potential to consider when choosing a weapon. Generally speaking Lighter weapons are handier and faster than heavier ones, though, of course, a character's Strength has a lot to do with what they consider a light or heavy.

A "Light Weapon" weighs less than a quarter of a character's Free Load (Strength² grams) and can be readied and attacked with in the same second with a twenty point Reflexes penalty. A "Normal Weapon" weighs between a quarter and half of a character's Free Load and can be readied in one second. A Heavy Weapon weighs between half and the character's full Free Load but less than double it and takes two seconds to ready. Using a weapon two handed doubles the character's Free Load rating.

Light	0
Medium	-10 Reflexes
Heavy	-20 Reflexes

Normal weapons can be used to attack and parry in the same second. Additional weapons wielded in other hands provide an additional opportunity to attack or parry but points must be allocated from the current chance of success to do so. No more points can be allocated to a weapon than the character has skill with it. Light weapons also provide an additional opportunity but no additional points. Unbalanced weapons can only be used to attack or parry in any given second. Heavy weapons can only be used to attack or parry. Additional attacks and parries occur after the initial strike, parry, counterstrike, and parry.

Using Weapons With Extra Arms

Having more limbs means having smaller limbs so recoil and weapon weights are worked out by dividing the Free Load by the number of limbs in a set. Take instances of two handed use to indicate the use of all available hands from a single set of limbs.

Example

A human with a Free Load of 3600 grams using an 1800 gram weapon one handed counts it as medium. For a Sheth with three arms in two sets, the weapon would have to be less than 1200 grams to count as medium while the 1800 gram weapon would be considered heavy.

Example

Abernathy's Strength is 57 so his Free Load is 2899 grams. His automatic rifle masses 4320 grams. Since it is heavier than His Free Load but less than double, it counts as a Heavy Weapon if he uses it one handed and as a Normal Weapon if he uses it two handed. Since he's got both of his mitts on it, it only takes him a single second to bring it to bear on Harcourt.

Fighting

At point blank range, a knife may well be a better weapon than a gun. Naturally melee weapons cannot be used to attack at a distance greater than their length. In any given second the combatant with the higher Reflexes has the option of striking first, if they decline, their opponent may then choose to attack. Otherwise close combat is handled as a contest with the winner landing a blow and causing damage.

Fighting - Restricted by reach

Appropriate Melee Weapon skill

Base Time: 1 second

Modifiers:

+/- Target Size

- target Velocity

- 20 per light level off preference

- worst wound level

- points opponent spent parrying

Results:

Exceptional Failure: foe gets a free shot at full skill.

Failure: that's a miss.

Marginal Success: inflict half damage.

Normal Success: inflict normal damage.

Exceptional Success: inflict double damage.

Parrying and Withdrawing

Normally, "parrying" refers to using a weapon to ward-off the enemy's attack. However, sometimes an enemy will be strong enough that it is impossible to parry and at other times it may be desirable to "get the hell out of Dodge". Any attack with a Damage greater than twice the Damage of the weapon used to parry cannot be parried normally and the defender must withdraw. In these cases the roll is made against any points allocated to parrying but the defender moves, two metres back from the attacker.

Example

Abernathy has a Reflexes of 65 and Harcourt's is 79. So Harcourt has the option of taking the first strike as long as Abernathy doesn't have a ready ranged weapon (which he does) or a longer melee weapon. But for the sake of a useful example we'll look at what could happen.

When he attacks he decides to kick Abernathy in the third second of the Round hoping to keep the initiative, if Harcourt opts to kick he can strike first as kicks have a greater reach than fists. His Kick skill is 54 and he saves nothing for his own defense because the -20 penalty for striking in the third second is pretty risky. He misses with a 42 and Abernathy decides to Punch twice. His skill is 58, reduced by 20 leaves him 38 and he splits it 25 and 13. The first misses wildly with a 98, but the second strikes home weakly with a 05. Had Abernathy waited for the next second he'd have had more skill to strike with but so would Harcourt who would still have the option of striking first.

Unarmed Attacks

It has long been known that taking away your enemy's weapons won't stop them from trying to kill you. Unarmed fighting styles and techniques are often developed to a science but they're no match for a bullet or a blast of plasma.

Grapple

Reach = 0

Each successful grappling attack moves the target closer to being pinned and helpless. The target is grabbed on the first success, held tightly and only able to grapple back on the second, and pinned on the third. A pinned target can be punched or choked with no chance of being parried or resisted. The target of a grappling attack can spend points from their next attack just like parrying to reflect their efforts to avoid being pinned. The target can opt to resist with their Strength, Grappling Skill, or Agility but can only retaliate if they use their Grappling Skill.

Arm Lock

A target that has been successfully grabbed with a Grapple attack, can be very effectively controlled by putting pressure directly against one of their joints, usually an arm. Arm locks are particularly effective as they don't tie the attacker up as much as pinning the target would and can be done while both are still standing. Once an arm lock is achieved, the target's arm can be broken with a second roll. Like grappling, arm locks can be resisted by "parrying"

Choke

A target who is pinned can be strangled. It's not a really nice thing to do to someone but is an effective way of knocking them out or killing them. After one round, and every round thereafter, the target must make an Endurance roll or pass out. The round after they pass out, they must start making an Endurance roll every round or die from asphyxiation. Of course, trying to choke someone completely occupies the character and even attempting to parry will automatically break the hold.

Throw

Damage = target's Strength / 4

A standing target who has been successfully held tightly can be thrown to the ground. This is a tricky manoeuvre but it's damaging and looks cool. Better still, on a normal or exceptional success the attacker remains standing instead of ending up on the ground tussling with the target.

Kick

Reach = 2

Damage = Strength / 4

A kick does more damage than a punch but can put the attacker off balance or make it easy for the target to trip the attacker. For this reason, a kick doesn't count as a light weapon, but one's arms can still be used for parrying when kicking. Most kicks land on the legs and it takes a lot of training to kick anyone taller than half your height in the head, so add three to all hit location rolls under five. Called shots can still hit the head.

Punch

Reach = 1

Damage = Strength / 6

A punch is a light weapon and most humans have two arms and thus count as having a weapon in each hand when punching. On the down side, parrying a weapon with one's bare arm isn't much more than picking where you get hit. Not that it can't be useful sometimes. It takes a fair bit of effort to punch someone in the foot, so subtract three from any hit location rolls over five.

Tackle

Reach = 0

Damage = Strength / 4

Charging right into someone isn't always a great idea, especially if they've got a weapon handy, but a successful tackle roll that causes an injury knocks the target to the ground.

Shooting

You can't shoot at things you can't see. This means that a detection roll must be made before combatants who are sneaking can be targeted. If miniatures are being used, it also means that the attacker must be able to draw a clear Line of Sight to their target.

The aiming bonus adds to the attacker's Reflexes in the second they make the attack as well as the chance to hit. Note that the modifier for time spent aiming isn't lost after a single shot, unless the attacker changes targets or the weapon's recoil is significant.

The distance to the target is a major factor in determining the chance of success. It is important to remember that the Range of the weapon is only used if it is less than the Range of the sense or sensor being used to aim the attack.

Light weapons and additional weapons provide the opportunity to make an additional attack in the course of a second, however, the chance of success must be divided between the attacks with no more points being allocated to any weapon than the attacker has skill in its use. Heavy weapons must be readied again each time they are moved.

Recoil

Firearms, Rail Guns, Plasma Cannons, and Particle Beams all tend to kick back when fired. Weapons with Light Recoil can be fired continuously with the full modifier for the time taken, while those with Normal Recoil lose any bonus after a single shot. Weapons with Heavy Recoil must be readied after making an attack because they move too far out of line and must begin a new attack action. Automatic fire is treated as a single shot for this.

Example

Harcourt's Reflexes are higher but he's not aware he's been seen yet and Abernathy isn't taking any chances. He opens up with his automatic rifle's full Rate of Fire 6 the instant he gets a look at Abernathy. It's the first second of the Round and it's dark, they're 50 metres apart and the rifle has a range of 32, so he's at -70. Harcourt's a decent shot with a Rifle skill of 65, +30 for automatic fire so he needs a 25 to hit. He gets an Exceptional Success with a 22 and gets two hits.

Shooting - restricted by line of sight
SMALL ARMS or *Weapon Gunnery*

Base Time: 1 second

Modifiers:

- +10 one second aiming
- +20 three seconds aiming
- +/- target Size
- target's Velocity
- 10 two shots
- 20 three or four shots
- 10 per 2 x Range
- 10 per wound level
- 20 per light level off preference
- 20 prone target beyond 6m

Automatic Fire

- + Rate of Fire x 5
- 1 hit per Chance / Shots

Results:

Exceptional Failure: hit a friend in your line of sight.

Failure: that's a miss.

Marginal Success: inflict half damage.

Normal Success: inflict normal damage.

Exceptional Success: inflict double damage.

Stray Fire

Friendly fire isn't. Any time a shot misses, there's a chance of hitting anyone standing directly behind the target. There is a base 15% chance of being hit by stray fire, with exceptional and marginal successes being determined normally.

Automatic Fire

Modern weapons can lay down a hail of fire on their targets and rolling to hit for each bullet or even each target would be a chore. Autofire attacks are made with a +5 to hit per shot. Divide the chance of success by the number of shots to find the chance of each bullet hitting. For example a submachine gun with a rate of fire of four, fired with a skill of forty, has a sixty percent chance to hit meaning that for every 15% rolled, one bullet hits. These hits can be allocated between any targets in a 5 degree arc per shot fired, starting with the closest. Additional hits can be allocated to a target that is in front of another. In particular, large vehicles tend to eat all the hits for those behind them.

If an exceptional or marginal success is rolled, only one hit out of the whole volley has its damage doubled or halved.

Suppression Fire

Automatic fire is often used as an area denial tool. Laying down fire over a beaten zone makes moving through it very deadly. If an attacker declares they are suppressing an area they can automatically make an attack on anyone moving into the area. The beaten zone suppressed is one consecutive cubic metre per bullet.

Volley Fire

Some weapons, like shotguns, fire a volley of projectiles all at once. These are treated as an automatic fire attack, adding five times the number of projectiles to the chance of success, but cannot be spread.

Covering Fire

A weapon can be held ready to fire at anything that passes through the combatant's field of vision. This does not allow any bonus to be accrued, however, a bonus of +50, is added to the attacker's Reflexes in the second the attack is made. In the case of melee weapons, having a greater reach is worth an automatic +50 to the attacker's Reflexes, ranged weapons automatically receive this +50 to Reflexes against targets with melee weapons.

A light weapon can be held ready for twelve seconds. Normal weapons can be held ready for six seconds, also far longer than will normally be an issue. Heavy weapons can only be held ready for three seconds. Any weapon that is held in a braced position can be held ready for twice as long as normal, but must be repositioned to fire out of a ninety degree arc, while those on tripods or pintle mounts can be held ready for periods ten times as long. At the end of this period the user needs to shift position, stretch, shake off numbness and otherwise waste a turn before readying the weapon again.

Blast Weapons

Grenades, Explosives, Plasma Bolts, and Particle Beams have a Blast radius. Such weapons automatically hit and injure every hit location on the side facing the point of impact. This makes them exceptionally deadly. Targets within half of the blast radius take double damage as if they had been hit by an Exceptional Success. While those out to twice the radius take the normal damage and those out to twice the Blast rating suffer half damage as if they had been hit with a Marginal Success. Of course, this means that the damage inflicted by a Blast weapon is unaffected by marginal and exceptional successes.

On most battle fields, Blast weapons are too dangerous to ignore, even when they miss. Only on an Exceptional Success does the Blast land exactly where it was aimed. A ten-sided die is rolled and the result determining the distance the Blast scatters. The top point of the die indicates the direction.

Success Level	Scatter Distance
Missed	1d10 x 4 metres
Marginal	1d10 x 2 metres
Normal	1d10 metres
Exceptional	direct hit

Flash Blindness and Temporary Deafness

Blast weapons and other explosions are very loud and bright. Any combatants within eight times the Blast rating can be blinded and deafened even if they are unhurt. Usually being in the middle of a Blast makes these things inconsequential so they are ignored for those suffering an injury or worse. Make an Endurance roll for everyone else to avoid being Stunned (q.v.) For a Round. Creatures with Exceptional Vision or Hearing will be stunned for two Rounds. Hearing or vision protection with a rating greater than the Blast weapon's Damage provide full immunity.

Covering Fire

A weapon can be held ready to fire at anything that passes through the combatant's field of vision. This does not allow any bonus to be accrued, however, a bonus of +50, is added to the attacker's Reflexes in the second the attack is made. In the case of melee weapons, having a greater reach is worth an automatic +50 to the attacker's Reflexes, ranged weapons automatically receive this +50 to Reflexes against targets with melee weapons.

A light weapon can be held ready for sixty seconds, not that it will come up much. Normal weapons can be held ready for thirty seconds, also far longer than will normally be an issue. Heavy weapons can only be held ready for fifteen seconds. Any weapon that is held in a braced position can be held ready for twice as long as normal, but must be repositioned to fire out of a ninety degree arc, while those on tripods or pintle mounts can be held ready for periods ten times as long. At the end of this period the user needs to shift position, stretch, shake off numbness and otherwise waste a turn before readying the weapon again.

Cover

Cover does not reduce the chance to hit. Instead, if a hit location is struck that is behind cover, the attack must penetrate the cover before damage is applied to the character. If the character is concealed behind a vehicle, the vehicle is hit instead of the character, in the area the character occupies. The following thicknesses of materials supply an Armour of one hundred with the thickness relating directly to the Armour value.

<u>Cover Material</u>	<u>100 Armour Per</u>
concrete	10 cm
reinforced concrete	5 cm
steel	1 cm
packed earth	25 cm
loose earth	50 cm
stone	5 cm
water	50 cm
wood	20 cm

Damage

Once an attack strikes home, its effect on the target must be worked out. A roll is made on the Hit Location chart. Some attacks hit multiple adjacent hit locations. For instance Blast weapons hit all the locations on one side of a character. While this hit location table is designed for humanoids, it is easily modified to cover other creatures and situations. When striking directly from the side, there is no chance of hitting the limb on the far side, this becomes more important when fighting particularly large creatures in close combat. For instance, when fighting a huge dragon, from the front right quarter, all arm hits can be applied to the wing and all leg hits to the front right leg. When fighting a snake treat all "Near Arm" hits as hitting the chest and all "Far Arm" hits as hitting the abdomen, all leg hits are, of course on the tail. A worm, arguably has only a head and body, and no bones to break.

The parts of the target which are not covered are determined by the actions taken in the turn. Special weapons or racial abilities may allow a combatant to violate these guidelines:

Fire Pistol	One Arm, Head
Fire Rifle	Both Arms, Head, One Leg if cover is vertical
Fire Support Weapon	Head, Both Arms, Chest, One Leg if cover is vertical
Fire Two Pistols	Both Arms, Head, Chest, One Leg if cover is vertical
Run	Whole Body
Spot	Head

Hit Locations

The part of the target that is hit determines whether cover or armour offers any protection and the side effects that result from serious damage. The table incorporates options for dealing with non-humanoid aliens. In all cases the location is only hit if it is present. Hits to absent locations strike the chest or abdomen by default.

Called Shots

A combatant can choose the part of their target they hit by accepting a Marginal Success on a roll of one to twenty. If the result is a Marginal Success, the location hit is rolled randomly as usual.

d10	<u>Location</u>	<u>Wounded / Crippled / Destroyed</u>
1	Head	Stunned d10 Seconds / Incapacitated / Killed
2	Neck	Bleeding / Paralysed and Bleeding / Killed
3	Right Arm	Lose Grip / Disabled / Incapacitated and Bleeding
4	Left Arm	Lose Grip / Disabled / Incapacitated and Dying
3 - 4	Right / Left Wing*	Lose 1d10 metres Altitude / Immobilized and Falling / IFB
5	Chest	Knocked Down / Incapacitated and Bleeding / Killed
6	Abdomen	Stunned d10 Seconds / Bleeding / Incapacitated and Bleeding
2,5 B	Spine	Stunned d10 Seconds / Paralysed / Paralysed and Bleeding
6 B	Tail*	Stunned d6 Seconds / Drop / Drop and Bleeding
7	Left Hip	Drop / Immobilized and Stunned / Immobilized and Bleeding
8	Right Hip	Drop / Immobilized and Stunned / Immobilized and Bleeding
9	Right Leg	Drop / Immobilized / Immobilized and Bleeding
10	Left Leg	Drop / Immobilized / Immobilized and Bleeding

Upright / Horizontal Effect

High / Front -5 to rolls over 5
Low / Rear +5 to rolls under 6

* If present

IFB: Immobilized, Falling, and Bleeding

Bleeding: A sufficiently harmful strike from a weapon that manages to get through the armour can cause bleeding. This is determined by the relationship between Penetration and Damage and the severity of the damage. At the start of each Round every character who is Bleeding must make an Endurance roll modified by the total injury levels of all their bleeding injuries or pass out from blood loss. Naturally applying a tourniquet or bandage will help to prevent this. A character who has passed out from blood loss must make an Endurance roll every minute until they are treated or die.

Burning: If the damage would normally result in bleeding but is caused by an incendiary or an energy weapon the combatant is burning and will die in minutes if the fire is not put out.

Disabled: The damaged limb can no longer be used to hold items, climb, or use weapons until it heals.

Drop: The combatant falls to the ground in an undignified fashion. Standing up counts as an action or movement in combination with an action.

Falling: If they are flying when the damage occurs, the combatant drops out of the sky, accelerating at the local gravity each second until they hit the ground.

Immobilized: The combatant falls to the ground and can only move at a crawl until the wound heals.

Incapacitated: The combatant is knocked unconscious and will not recover to fight in the current combat.

Lose Grip: Any object held in the injured hand is dropped. If the object is held in both hands, the injured hand cannot be used for a full second.

Knockdown: Even if an attack doesn't penetrate armour, if it's Damage is greater than the target's Strength they are still knocked down by the force of impact.

Knocked Out: A character who suffers a Wound or worse to the head must make an Endurance roll or be knocked unconscious otherwise they are Stunned. An unconscious character can roll to wake up every hour after they drop.

Paralysed: The attack severs the target's spine or otherwise destroys their central nervous system, automatically crippling any limbs below the point of the break. This essentially includes Immobilized and Disabled.

Stunned: Any character suffering an Injury to the head or any Wound is Stunned. The character cannot move, attack, or defend for a full ten seconds, after which they must make an Endurance roll to shake it off. A character who is repeatedly stunned must wait an additional ten seconds for each separate stunning hit before they can try to shake it off. Once the roll is made they can get back into the action.

Fuzzy Damage (Optional)

The basic damage system can produce a large difference in effects from a single point difference. If this becomes a matter of contention, you can add 1d10 to the damage of attacks that inflict ten points or less than the target's Strength or Structure after armour and attenuation are applied.

Penetration and Attenuation

Because projectiles lose energy to air friction and beams are absorbed by the atmosphere, most weapons inflict reduced damage at extreme ranges. For each doubling of the weapon's Range between the target and the attacker, the Damage is halved. Weapons fired in space and explosive rounds (but not shape charges) ignore attenuation.

Some weapons are particularly effective against some types of armour and are described as penetrating it. These effectively half the armour level. Common examples would be sharp weapons against soft armour, blunt weapons against flexible armour, and disintegrators against inorganic matter.

Some types of armour are particularly effective against a particular type of damage and are described as resisting it. This means that the armour is doubled against the damage. Common examples would be metal armour against teeth and claws, padding against impacts, insulation against electricity, and reflective against lasers and masers.

Damage Levels

When an attack hits a damaged location, the total of all the injuries they have suffered is applied to the character's Strength when determining the new injury level, but injury levels are not otherwise cumulative.

Quick Damage

For larger fights you can just ignore the hit location system and have any combatant that's hit make an Endurance roll with a penalty equal to the attack's Injury Modifier or be eliminated.

Example

Abernathy's shots hit Harcourt in the abdomen and left arm. His automatic rifle has a Penetration of 114 and a Damage of 72. The range is greater than one increment but less than double it his Penetration doesn't Attenuate. Harcourt's flack jacket has an Armour rating of 124. This is more than the Penetration so the Damage is halved for the shot to his abdomen. His Strength is 64 so he is wounded in the abdomen and his arm is crippled. He is stunned by both shots, and both are bleeding. He needs to make an Endurance roll to avoid passing out, fortunately he's got an 84 and passes even with the -40 from the crippling wound. Each round from now on he'll need to roll a 44 to avoid passing out from blood loss.

Armour and Penetration

Armour protection is represented by reducing the amount of harm inflicted on the wearer.

Damage Penetrates Armour	Armour / 2
Armour Resists Damage	Armour x 2
Damage < Armour	Attack Deflected Entirely, May be Knocked Down
Damage => Armour	½ Damage
Damage > Armour x 2	Armour Ignored

Personal Damage

The relationship of the Damage to the Target's Strength determines how badly injured they are. An Exceptional Success doubles the Damage and a Marginal Success halves it.

Damage < Strength / 8	Annoyed	
Damage => Strength / 8	Scratched (-10)	
Damage > Strength / 4	Injured: (-20)	Head Hit Stuns
Damage > Strength / 2	Wounded: (-30)	Stunned, Head Hit: KO Chance
Damage > Strength	Crippled (-40)	Stunned, KO Chance
Damage > Strength x 2	Destroyed: (-50)	Stunned, KO Chance, Head Hit Kills

Vehicle Damage

Vehicles have their own individual hit location table and damage is applied to both the Structure of the vehicle as a whole. Usually it's good to check if there's anything left of the vehicle before worrying about the condition of the eight track player. The damage modifier is applied to any future hits against the system or structure.

If Damage is	Result:
less than Structure / 8	Trivial System Damage
greater than Structure / 8	Minor System Damage, Trivial Structural Damage
greater than Structure / 4	Major System Damage, Minor Structural Damage
greater than Structure / 2	System Disabled, Major Structural Damage
greater than Structure	System Destroyed, Structure Disabled
greater than Structure x 2	Structure Destroyed

Trivial Structural Damage: Well the good news is that you're alive, but you shouldn't have spent all that money on a new paint job.

Minor Structural Damage: That threw everything off center, take a -10 to all Driving or Piloting rolls until a full maintenance schedule can be completed.

Major Structural Damage: She's holding together but only barely, take a -20 to all Driving or Piloting rolls until a complete overhaul can be performed.

Structure Disabled: Well, that did it. Any structural features like wheels or wings fail completely, any attempt to steer, accelerate, or decelerate causes the structure to buckle and collapse. Fixing this mess will cost more than a new vehicle.

Structure Destroyed: I hope you didn't want to live forever. Crew and passengers with external access can attempt to bail out and suffer the consequences but everyone else dies in the wreck.

Trivial System Damage: Well, I hope this thing isn't a rental because that left a mark, but at least it's still working.

Minor System Damage: The system remains functional for the moment but is becoming very unreliable. All attempts to operate the system damaged are at -10 and on an exceptional success the entire system fails.

Major System Damage: The system remains functional but is rapidly coming apart from the loss of oil, coolant, or damaged connections. All attempts to operate the damaged system are at -20 and on any failure the entire system fails.

System Disabled: The system fails completely and cannot be used without repairs.

System Destroyed: Well, you're just going to have to replace that one aren't you? Apply half of the attack's Damage to the next system down the line.

Vehicle Hit Locations

Each vehicle has a hit location chart with its systems listed from one to twenty. The first slot represents the very front of the vehicle and the twentieth represents the very back. Some slots may have a letter code to indicate a system that can only be hit from one side or a sub table to represent the chance of hitting small but vital systems.

Facing	Roll
Front	1d10
Front Side	2d10-1
Rear/Side	2d10
Rear	1d10+10

Code	Facing
F	Front
T	Top
L	Left
R	Right
U	Underside
B	Back

Space Combat

Objects in a vacuum, unhindered by air friction, go on floating along until something changes their vector. These rules apply specifically to spacecraft but can also be used for people using personal thruster packs.

In case you didn't know a vector is a line with an arrow on the end of it that is used to represent movement. When force is applied you add the vectors tail to nose to find the new end point, then you can draw another line from the tail of the first vector to the nose of the second to show the final vector.

Setting The Scale

Space is very, very big, and space battles can happen over long periods of time and great distances. Ideally you'll want the distance scale to be at least a hundred times the acceleration of the fastest ship. So a ship with 10m/s^2 acceleration requires a scale of at least one hundred meters per unit (hex, square, or centimeter depending how you're doing it). The time scale should be multiplied by the distance scale. So if you want to use ten second rounds you should have a distance scale of at least one thousand metres per unit.

Standardized Scale

The standard suggested scale is 1000 kilometers per distance unit and 1000 seconds per round (roughly 1/4 of an hour). This allows reasonably sized planetary templates and a wide range of ships to be handled. Naturally a ship can unload its entire arsenal in a single round, but with the ranges represented, ships will often have to get very close together. These "firing passes" are played with ten second rounds at a scale of 10 kilometers per distance unit

and 10 seconds per round.

Method One: Vector Addition

If you're playing on a surface that you can mark and erase, like a blackboard, just draw arrows to represent the vectors of the ships. Each round, a ship will move straight ahead down its vector unless gravity or thrust comes into play. Once a ship has moved to the end of its vector, plot a new line of the same length directly ahead of it for the next turn. Acceleration is represented by measuring the acceleration's vector from the end point of this vector to find the new vector. Crossing a gravity well provides the listed acceleration directly towards its center. If a ship has a perpendicular vector that matches the gravity well's force then it is in orbit.

Method Two: The Sixty Degree Principal

If you add two vectors of equal length at a sixty degree angle, the final vector will form a sixty degree triangle and have the same length as the first two vectors. This is a handy way to track movement on a hex grid since the acceleration needed to make a sixty degree turn equals the length of the current vector. It also allows you to manage pre-plotted movement by writing down any acceleration and its heading at the start of the round. This can lend an element of surprise to encounters.

Method Three: Cartesian Plane

If you want pre-plotted three-dimensional movement, there's really only one way to go. Imagine there's a three dimensional axis in the corner of the play area and assign each ship three coordinates (x, y, z) to set its position. Vectors are listed as additions and subtractions to the coordinates. Acceleration is represented by modifying the coordinates. For instance applying an 6 m/s^2 acceleration to a vector of $(+6, -3, +2)$ as $(+2, +2, -2)$ would yield a new vector of $+8, -1, 0$. If the ship was at $(19, 12, 3)$ by the end of the turn it would be at $(27, 11, 3)$ and by the end of the next turn $(35, 10, 3)$. The down side of this is that you'll have to calculate ranges using Pythagorean theorem ($A^2 + B^2 = C^2$).

Space Travel

The great, empty distances between the stars are full of dangers. Vacuum, radiation, micro-meteors, and even running out of food and fuel can be fatal to humans and other explorers. Even the math involved might be enough to kill you. The planets are all moving at different rates determined by their mass and the star's mass and the distance between them. The orbits are elliptical and the planets slow down and speed up as they go. The "launch window" is the time when the destination is approaching the star but will pass it by just enough for the space craft to match velocities without needing to expend valuable fuel to decelerate. Over interplanetary distances, being a fraction of a degree off course could be deadly. In most popular science fiction super-science drives make it possible to cross the solar system in a day.

Scale and Scope

The distances presented here are in light-seconds and light-years. Astronomical units and parsecs are based on the position of Earth in the solar system and are not particularly universal. For those who aren't clear on the concept, a light second is the distance light moves in one second and a light year is the distance light moves in a year. They are measures of distance, not time. As far as modern science is concerned, the speed of light is a universal constant and cannot be exceeded. The mathematical theories that suggest it can be all rely on "negative mass energy" which is to say less than not existing at all. Science fiction has always had unrealistic elements ranging from time-travel to anti-gravity and faster than light drives. You can't emulate your favorite movie or television show if you're too mired down in the science.

Simply Hand Waving It

If the campaign is a space opera focused on the exploits of a band of heroic adventurers the referee can probably hand wave all that away and just assume that they can travel a number of light-seconds per day. If they're feeling really ambitious the travel time can be divided by the ship's top speed ($\frac{1}{2}$ fuel duration x acceleration usually, you need to maneuver and slow down). With reality taking a day off, chases can be resolved with piloting skill rolls. But in the end the heroes will always get there just in time and the villains will always get there first no matter how unlikely that seems.

Simplified Plotted Movement

If you can live with circular orbits and straight courses, it's easy to represent planetary motion and launch windows. Use a ruler and pencil to mark out the positions of the star and planets on a sheet of paper at a scale of one light minute per centimeter. Next, draw a circle with a compass to show each orbit. Roll 1d10 x 36 to find the planet's location along the circle and mark it using a pencil and protractor. At this point you can measure the distance between the planets by measuring it with a ruler. Orbital motion is given in degrees per day with Earth moving roughly one degree per day.

Space Navigation

Activity: 1 hour

Skill: Astrophysics

Factors:

Trajectory Passes Through:

Asteroid Cluster	-20
Nebula or Ring	-40

Trajectory Passes Near

Planet & Moons	-10
Gas Giant	-20
Star	-30
Black Hole	-40

Results:

Exceptional Success: A highly successful transit with no deviation.

Success: Transit deviates by only 1/360 of a degree.

Marginal Success: Transit deviates by 1/60 of a degree.

Failure: Transit off course by a full degree, hope you've got lots of fuel.

Exceptional Failure: Transit intercepts a sizable chunk of rock that was missed in the calculations somehow, requiring a piloting roll to avoid impact and a 1d10 degree course deviation.

Interstellar Travel

Interstellar maps are done in a ‘well’ ten spaces wide by ten deep. The distance tables show the distance between any two points within the map. The basic scales for the map are one light year per space, ten light years per space, one hundred light years per space and so on, increasing by orders of magnitude and allowing the blocks to be seamlessly integrated in blocks one size larger.

The faster a drive system is, the harder navigation becomes as the margin of error increases.

Instantaneous transit is instantaneous. The space craft gets there the moment it leaves. This requires really precise navigation because there is no ability to make course corrections en route.

Hyperspatial drives remove the vessel to another dimension with a different relationship to time and space. While the journey takes a fixed amount of time, like instantaneous transit, it’s hard to navigate when you can’t see. If real space objects have shadows in hyperspace it becomes easier but is still less precise.

Space warp drives and other such real space faster than light systems allow real-time navigational corrections but they are also the most dependant on a spacecraft as they are passing through space rather than going around it.

Faster Than Light Navigation

Activity: 1 hour

Skill: Astrophysics or possibly Quantum Physics

Factors:

- 10 / factor of 10 light years
- 10 shadowy hyperspace
- 20 blind hyperspace

Results:

Exceptional Success: Nailed It! You are right on target.

Success: arrive at destination within an acceptable margin of error, adding 1d10 minutes to the trip.

Marginal Success: sloppy calculations put arrival at very edge of acceptable margin of error requiring significant fuel and manoeuvring to correct adding 1d10 hours to the trip.

Failure: bad calculations lead to arrival far from destination but still where careful manoeuvring or a side trip to take on fuel can recover the situation at a cost of 1d10 days.

Exceptional Failure: vessel arrives in deep space far from help or fuel. A careful burn and drift will bring an asteroid into range in 1d10 weeks.

The Math

Here are some useful formulae for computing travel times. They may require a scientific calculator. Their use in play is entirely optional.

Circumference = $3.1416 \times \text{radius} \times 2$

Distance = $\frac{1}{2} \text{Acceleration} \times \text{Time}^2$

Velocity = Acceleration x Time

Travel Time = Distance / Velocity

Gravitation Force = $6.67 \times 10^{-11} \times \text{Mass One} \times \text{Mass Two} / \text{Radius}^2$

Circular Orbital Velocity = $0.25 \times \text{Circumference} / \sqrt{2 \times \text{Orbital Radius} / \text{Gravitational Force}}$

Year Length = $6.2832 \times \text{Radius} / \text{Orbital Velocity}$

Distances are usually given in meters, time in seconds, velocity in meters per second, acceleration in meters per second squared. There are 1000 meters in a kilometer, 3600 seconds in an hour, 299792 kilometers in a light second and 9.46053×10^{12} kilometers in a light year. Where possible, units have been used in such a way as these conversions aren't used in play but sometimes it's handy to know them.

When you're looking at orbital velocities for simple circular orbits. In essence the planet has to move a distance equal to a quarter of the orbit's circumference by the time it sweeps out a ninety degree angle or it will drift off or drift in.

Note that while the speed of light is an absolute physical limit, most space craft have a limited top speed as a result of limited fuel that is well below the speed of light. Faster than light drives have a fixed velocity because they're mainly a plot device and we're lazy.

SCIENCE AND TECHNOLOGY

Given that s.f.% is a science fiction game system there are rules covering the development and applications of science and technology. As always, bear in mind that these rules are intended to provide tools for managing activities that are likely to come up in games and should not be slavishly adhered to when they are not of use to the narrative. If the player characters in a roleplaying game are marines guarding a survey team, the game's focus should be on the combat encounters and not on the details of the survey. Scout ships may update surveys as they pass through known space but unless there's an anomaly the game shouldn't descend into the mechanical minutia.

Surveying

Navigation and construction require accurate measurements. Survey work is exacting and tedious but necessary. This does not mean that in game surveying can't be interesting. Before the railroads crossed the great plains of the American west, survey teams had to measure and chart the dangerous frontier. Surveys are a major part of exploration games, with survey data being the driving economic output of scouting missions. It might not be the exciting part of the job but it's the part that pays the bills.

Survey Stages

- Bearings
- Measuring
- Drafting

Bearings

As any survey requires a frame of reference. The first stage of the task is taking fixed bearings from which to make the other measurements. For stellar surveys this would be the movement of the system relative to the galactic core and nearby star. Planetary surveys generally work on a latitude and longitude grid system.

Take Bearings

Activity: hours to weeks detail matches relative time frame to area surveyed

Skill: Survey

Modifiers:

hasty effort -20

remote survey at distance -10 per x 2 sensor range

Results:

Exceptional Success: this is your Masterpiece, +10 to measuring

Success: solid foundational data provided

Marginal Success: discover an exciting anomaly, nobody else seems to care

Failure: poor data -20 to measurements based on it

Exceptional Failure: get it totally wrong, -40 to measurements based on your work

Measuring

The bulk of the work involves taking accurate measures of the subject area. For stellar surveys this covers the orbits and sizes of all the planets and moons in the system. Planetary surveys include geological information like topography and bodies of water as well as ecological features like forests and marshes.

Measure In Detail

Activity: hours to weeks detail matches relative time frame to area surveyed

Skill: Survey

Modifiers

remote measurements taken at distance -10 per x 2 sensor range

Results:

Exceptional Success: this is your masterpiece, +10 to Drafting

Success: solid foundational data provided

Marginal Success: discover an exciting anomaly, nobody else seems to care

Failure: poor data -20 to designs based on it

Exceptional Failure: get it totally wrong, -40 to designs based on your work

Drafting

Lastly the information is recorded in a detailed and readable format. Failure at this point means unreadable or missing information and can be every bit as harmful as inaccurate measurements and bearings.

Keep in mind that “drafting” is generally done with computers but that there is still an art to arranging and the information in a usable and accurate format.

Draft Plans or Maps

Activity: hours to weeks detail matches relative time frame to area surveyed

Skill: Drafting

Modifiers

+10 Exceptional Measurement

-20 Poor Measurements

-40 Catastrophic Measurements.

Results:

Exceptional Success: this is your masterpiece, +10 to construction using your plans

Success: solid foundational data provided

Marginal Success: discover an exciting anomaly, nobody else seems to care

Failure: poor plans -20 to construction based on it

Exceptional Failure: what was this thing again? -40 to construction based on your work

Researching

At times there is already experimental work that is pertinent to the work being done or even duplicates it. While it is assumed that skilled scientists and engineers keep up to date by reading trade publications and papers by their peers it can be very worthwhile to investigate the library of existing work. Sometimes it is easier to steal existing work that is legally inaccessible or held by enemy forces than it is to duplicate the research. This can at times be done electronically but may require a more direct physical approach.

Looking It Up

The basic element of research is searching through indexes and looking up information. The effectiveness of this is entirely dependant on the quality of the library or database.

Research

Activity: 5 Hours

Skill: Language

Modifiers

Common
Obscure -20
Inference -40
Current
Recent -10
Old -20
Ancient -40

Results:

Exceptional Success: find it in half the expected time

Success: find good information

Marginal Success: find partial information

Failure: find no useful information

Exceptional Failure: find erronius or inaccurate information

Hacking

Computerized data storage is the norm because it is compact and easy to search or edit. Public networks are very convenient and a large portion of a society's information can be found on-line, though some of it is kept private with encryption software. Because it is developed in reaction to new threats computer security generally runs a bit behind the curve of data penetration techniques. On the other hand physically disconnecting computers from the network is an impenetrable defence. If the target information cannot accessed from public networks it will be necessary to physically travel to the target computer system.

Hacking

Activity: 5 hours

Skill: Computer Programming

Modifiers

Well Known Exploit +10
Access To Backdoor +20
Access To Password +20
Computer Security - Rating

Tech Level Difference - difference either way, screwy old tech!

Results:

Exceptional Success: their database is yours to do with as you please!

Success: find the desired files

Marginal Success: find partial information

Failure: locked out of system, gain no information

Exceptional Failure: give yourself away, the police are coming for you

Espionage

When it becomes necessary to steal information, it will often become necessary to go in and steal it. See capers and investigations (q.v.)

Experimenting

Technological advancement follows scientific advancement. Improved scientific data is needed before one can build that faster ship or better death ray.

Hypothesis

Properly speaking, the hypothesis is simply a statement of the idea that the experiment will try to prove. For the purposes of the game it includes the planning of an experiment to test the idea. A false hypothesis can still provide new insight as the experimental data may reveal unexpected results.

It can be very worthwhile to research the subject of the hypothesis to see if anyone else has tried something similar and if so what their results were like. Scientists who are relying on outside funding, in particular will need to do plenty of research to get their backer's purse strings open.

Experimentation

Bear in mind that successful experimentation in no way guarantees new discoveries. Far more often it simply reveals the flaws in the hypothesis.

Analysing Results

Careful study of experimental results can be useful in finding errors in the experiment and may provide additional information that was unrelated to the original line of inquiry.

Experimentation and Analysis

Activity: varies with scope and complexity

Skill: appropriate science

Modifiers

reproducing / testing existing process +20
shot in the dark -20

Results:

Exceptional Success: verifiable process

Success: repeatable process

Marginal Success: inexplicable but interesting result

Failure: flawed process yields useless results

Exceptional Failure: mistake your incoherent fantasy for hard data

Publishing

Experimental data is useless if it isn't made available to others to apply to their own studies. Even highly successful experiments can be discarded by the scientific community if the results are published in a sloppy or controversial fashion.

Writing A Paper

Activity: concurrent with experimentation

Skill: Writing

Modifiers

Results:

Exceptional Success: brilliant presentation overshadows any shortcomings

Success: readable and clear work

Marginal Success: unclear and confusing but the data is there

Failure: nobody knows what you're talking about

Exceptional Failure: disprove your own theory without realising it

Designing

Scientific advancement leads to technological progress. Turning scientific data into usable devices is the task of engineers and technicians. New designs need to be rigorously tested and run through simulations before the final plans for the prototype can be drawn up.

Specifying

The initial objectives for a design are often laid down for the engineer by the people providing the funding. These are often not in a useful form from a technical standpoint. Without proper design objectives it is difficult to produce a functional design.

Produce Specifications

Activity: varies with scope of project

Skill: appropriate Science

Modifiers

Implementing new discoveries -20

Refining existing system +20

Results:

Exceptional Success: even an idiot can follow the concept +20 to design

Success: workable specifications look good on paper

Marginal Success: you're quite not sure what they want and it shows -20 to design

Failure: you have no idea how this would work, what a dumb idea

Exceptional Failure: mistake an unworkable note on a napkin for a proper concept

Designing

Producing the design it self is the primary task of the engineer. Generally a number of designs will be developed.

Design A Project

Activity: varies with scope of project

Skill: appropriate *System* Engineer

Modifiers

Innovative Design -20

Conservative Design +20

Results:

Exceptional Success: not only a workable design but an elegant one

Success: that should do the trick

Marginal Success: it looks good on paper if you squint a bit

Failure: what a mess, this thing will literally and figuratively never fly

Exceptional Failure: find a massive error weeks after you submit your work

Simulations

Even before the advent of modern computing scale models were built and tested in a variety of ingenious apparatuses. Computer simulations are so inexpensive that new designs can be run through literally millions of tests before the prototype accidentally kills anyone. It is possible that all of the original designs will fail and the engineers will need to either tweak one of the more successful designs or start from scratch.

Construct A Simulation

Activity: varies with scope

Skill: Computer Programming and Statistics

Modifiers

New Design -20

Tried and True Design +20

Results:

Exceptional Success: catch all major issues in computer testing

Success: eliminate most major issues in computer testing

Marginal Success: miss a few issues but nothing life threatening

Failure: miss a hazardous issue

Exceptional Failure: miss numerous catastrophic issues

Drafting

The final production of plans for the prototype is vital as the people who build it will need to be able to make sense of them.

Draft Plans or Maps

Activity: hours to weeks detail matches relative time frame to area surveyed

Skill: Drafting

Modifiers

Results:

Exceptional Success: this is your Masterpiece, +10 to construction using your plans

Success: solid foundational data provided
Marginal Success: discover an exciting anomaly, nobody else seems to care

Failure: poor plans -20 to construction based on it

Exceptional Failure: what was this thing again? -40 to construction based on your work

Constructing

Putting things together tends to be a massive joint effort. Parts of parts are assembled in specialized factories and shipped to factories that specialise in assembling them. Then the parts are shipped and assembled. The whole advantage of an advanced, industrial society lies in the huge variety of stock parts waiting to be combined into devices and vehicles. The construction of prototypes is still done by small teams with many custom parts and parts of parts being fabricated by hand or at least in a “hands-on” fashion.

Materials

For game purposes, materials come in three grades: industrial, raw, and scrap. Industrial materials are foundry produced sheets, extrusions, and rods in useful sizes which can readily be cut to size and shaped in a machine shop. Raw materials are unformed ingots, beads, and jugs of resins which need to be processed into useful shapes before they can be made into anything. Scrap is second-hand material which may or may not be in sizes and shapes that can be readily used. Scrap can also be melted down and used as raw materials if you have the right equipment.

Acquisitions

Before anything can be constructed the parts and materials must be obtained. In a worst case scenario, the raw materials will have to be refined and formed but most of the time a well stocked distribution catalogue and reliable shipping service will keep things rolling along. Whether it is better to order things as they are needed or acquire everything at once depends a great deal on the reliability of the supply chain. In a genuine “from scratch” situation, the supplies absolutely must be produced before the construction begins but supply bottlenecks can even be a problem when using nano-tech fabricators if they can’t keep up with the assembly work.

Gathering Materials

Activity: varies with scope

Skill: Logistics

Modifiers

New Design -20

Outdated Design -10

Established Design +10

Results:

Exceptional Success: a great find cuts costs by 10%

Success: all set to build it

Marginal Success: still need to find some fittings but there’s plenty of time yet

Failure: fundamental parts can’t be found and must be fabricated

Exceptional Failure: goodness half the budget disappeared and you’ve hardly started

Construction

Activity: 1 person / hour per kg

Skill: appropriate *System* Technician

Modifiers

Bad Plans -20

Equipment Shortages -10

Results:

Exceptional Success: final cost reduced by 10%

Success: git ‘er done on time and on budget

Marginal Success: 10% over budget and late

Failure: this project just keeps falling apart, it’s half done and the budget’s gone

Exceptional Failure: you messed this up so badly nobody will want to try again

Structure

The structure of a device or vehicle is the first thing laid down. It's all well and good to have wheels, motors, batteries, and computers, without a structure to bolt them onto, they're going nowhere. Structures are generally fabricated from raw or prepared materials.

Fittings

The parts need to be installed on the structure in such a way as they can fulfill their function and not interfere with the function of other parts. That is to say they wheels go on the bottom and the rotor blades on top.

Testing

Once a prototype is assembled it must be put through rigorous testing not only to make sure it's safe but also to discover any flaws before they have a chance to become fatal. In the interest of unbiased results, it's usually best if the testing isn't done by the same team that designed and built a device. This might involve anything from taking it out for a spin to double blind human tests on thousands of participants.

Manufacturing

Once a prototype proves successful it can be put into mass production. Before the first units can roll off the assembly line, a factory must be designed, constructed, and tested. What are you complaining about? It creates lots of jobs doesn't it?

Refitting

Most of the flaws found in testing or the field are not fatal and can be resolved with some reworking. This is a much quicker process than the original design and construction was.

Refit Issues

Activity: 1/10 time to build per issue

Skill: appropriate *System Technician*

Modifiers

New Technology -20

Results:

Exceptional Success: refit becomes a positive feature

Success: well, it works now

Marginal Success: refit is unattractive or ineffective

Failure: refit doesn't solve the issue

Exceptional Failure: refit causes cascading failures when tested

Reverse Engineering

When the competition or enemy come up with something new, you've never seen before nor even thought of, the easiest way to achieve parity is to get one, and give it to your engineers and scientists to tinker with.

Acquiring

Getting a hold on the other side's tech can be as easy as walking into the local department store or as difficult as a long and dangerous infiltration scheme. Either way, the first order of business is to actually get a physical sample to work with. This might be accomplished in combat or by a covert operation.

Deconstruction

Once you've got the hardware, the technicians need to take it apart, piece by piece and catalogue the pieces. Extensive diagrams and notes will be needed if you ever want them to get the thing back together.

Disassemble

Activity: varies with scope

Skill: appropriate *System* Technician

Modifiers

Tech Level Disadvantage

Unfamiliar Advance -20

Results:

Exceptional Success: deconstruction is a revelation, +20 to analyse work

Success: got it apart without breaking anything, what does this thing do?

Marginal Success: you can't make an omelette without breaking a few whatever that was

Failure: break a major feature trying to get it apart

Exceptional Failure: What do you know? It broke.

Drafting

As is so often the case, intelligible diagrams are essential to success. Most of the drafting work is done during the deconstruction process.

Analysing

Next the engineers and scientists try to figure out how everything works. This is partially academic and partially trial and error.

Analyse Technology

Activity: varies with scope

Skill: appropriate *System* Engineer

Modifiers

-10 Broken Subject

- TF difference

Results:

Exceptional Success: this is a major breakthrough

Success: so that's how they're doing it

Marginal Success: huh, that's weird, why would that even work?

Failure: what is this thing even supposed to be, time to whack it with a club

Exceptional Failure: somebody gets electrocuted and dies

Reassembly

Once the workings of the device have been discovered it must be put back together. This is really part of the Analysing step. If all goes well the thing will work once its put back together. If not, the chances are you didn't figure it out so well.

Rebuild Device

Activity: 1 person / hour per 5 kilograms

Skill: appropriate *System* Technician

Modifiers

-10 In the Field

-10 Unfamiliar System

Results:

Exceptional Success: it's back together and you've found a solution to an issue

Success: it's back together and it works

Marginal Success: It looks right and starts up but where did these extra parts come from?

Failure: It's back together and it looks right but doesn't function.

Exceptional Failure: What a mess! Now you'll never get it back together.

Duplication

Creating multiple copies of a reverse engineered device is much the same as constructing and manufacturing a new one.

Repairing

A damaged system isn't working anymore and that's enough information while the battle is still raging but when it's time to repair the system there's a pretty wide range of possibilities. Roll on the following table for each damaged system when the damage control teams get around to looking at it.

The severity of the damage determines how long it takes to repair and what parts are needed. A parts inventory contains replacements for fasteners and power conduits as well as some spare electronic components and coolant tubing, but parts that are specific to the system are less likely to be available and things like housings and complete mechanisms won't be in any inventory.

Repair Damage

Activity: 1 man hour / 10 kilograms

Skill: appropriate *System* Technician

Modifiers

Minor Damage -10

Major Damage -20

Results:

Exceptional Success: hey, it's not so bad, fixed in half time

Success: well that's done and working

Marginal Success: it's kinda working but will need replaced soon

Failure: nope, it's done, -20 to any future attempt

Exceptional Failure: the housing and structure is broken, good luck with that

Random Minor System Damage

1	Surge Arresters Overloaded	reset
2	Knocked Out Of Synch	re-calibrate
3	External Coolant Leak	patch leak
4	Overheating	shut down and clean cooling system
5	Mechanism Knocked Loose	reposition and tighten fasteners
6	Power Conduit Disconnected	plug it back in
7	Mounting Fasteners Broken	replace fasteners and reposition
8	Housing Cracked	mend housing
9	Vital Part Broken	disassemble, replace part, and reassemble
10	Oops	just looking at it made it worse roll for Major damage

Random Major System Damage

1	Mechanism Jammed	disassemble, remove foreign object, and reassemble
2	Overheating	disconnect from power and repair cooling system
3	Power Conduit Broken	replace power conduit
4	Electronics Burned Out	disassemble and replace all electronics
5	One Loose Connection	total diagnostic and reconnect one minor conduit
6	Housing Broken	disassemble, replace housing, reassemble
7	Mechanism Broken	disassemble, replace mechanism, reassemble
8	Internal Coolant Leak	disassemble, clean every part, patch leak, reassemble
9	Mechanism Seized Up	disassemble, realize it's hopeless, give up
10	Oh Well	take one look, realize it's hopeless, give up

Parts

For the purposes of constructing and repairing, parts are treated as a generic supply. In reality parts are very specific to devices but devices are often designed to make use of generic parts. For this reason, any parts supply is assigned a percentage chance of having the right part for the job. It is assumed that the parts in a supply are specific to the vehicle or installation but a generic supply such as a traveling technician might take with them has a much reduced chance. If the right part isn't available it may be possible to jury-rig, scavenge, or cannibalize a replacement. Part supplies never contain major structural members or large sections of body panelling but patches and braces are common.

Cannibalizing

If you don't have the part you may be able to get something that will work from some other system. A System Engineer skill roll will allow the character to think of something, however use the vehicle's hit location table to find out which system will be damaged by doing so. The chance of there being a part that will work is very dependant on how similar the devices are and how major the part is.

Salvaging

If you can't find, make or order the parts and materials you need, you can always dig around in the scrap yard to see what you can find. This acquisition method doesn't provide custom parts or even up to date ones, but it still beats making everything from raw materials. Salvaged materials and parts can be used to construct and repair devices and vehicles of the Tech Level of the scrap.

Find A Compatible Part

Activity: 1 person / hour / 10 kilograms

Skill: appropriate *System* Engineer

Modifiers

Common Part (screws, wire, sockets) +20
Specialized Part (flux capacitor, alienatuder)
-20

Lots Of Wreckage To Salvage +10

Results:

Exceptional Success: perfect fit and the other system isn't even disabled

Success: this part fits and works but the system it's from is disabled

Marginal Success: this part will do if you tape it into place and wire it in externally

Failure: sometimes you can't make do with something else

Exceptional Failure: great now you've broken the other system too

Jury Rigging

Sometimes you can get by for a bit with a little molecular bonding tape and smart wire. Jury Rigging a system reduces the penalties for major damage to those of minor damage and ignore all penalties for minor damage. This lasts until an operator fails their skill roll. On an Exceptional Failure the Jury Rigged system is destroyed.

Jury Rig

Activity: 1 person / hour per ten kg

Skill: *System* Technician

Modifiers

In the Field -10
Minor Damage -10
Major Damage -20

Results:

Exceptional Success: works like a charm long after it really shouldn't

Success: Put it back together with spit and bailing wire.

Marginal Success: that's as good as you can do but it won't hold for long

Failure: nope, now it's just a jumbled mess

Exceptional Failure: ooh, well now it's really broken

Fabricating Major Parts

If you've got a machine shop, fabricator nanites, or mater-energy device you can make a Machinist roll to make a new part.

Fabricate Parts

Activity: 1 person / hour / kilogram

Skill: Machinist

Modifiers

Inferior Materials -20
In the Field -10

Results:

Exceptional Success: a clean fitting replacement in half the time

Success: solid work if even if it doesn't bear the seal of manufacturer approval

Marginal Success: it'll do but it won't last

Failure: the part doesn't work or fit and the materials used are spoiled

Exceptional Failure: the part won't work and you damage the fabrication equipment

MEDICAL

The life and death struggle of physician and patients is a mainstay of television and movies so why not roleplaying games? The following rules attempt to quantify the medical field as seen in entertainment media for the purposes of a game. The author makes no claim of expertise nor understanding of the real issues involved in real medical practice.

Trauma

With all of the high speed collisions, failed climbing rolls, and gunshot wounds the most common in game use of medical skills and technology will be treating trauma. The base times for treatment found here will vary a great deal with the available technology though the basic activities remain the same.

Treat Wounds

Activity:

Injured 1 hour
Wounded 2 hours
Crippled 4 hours
Destroyed 8 hours

Skill: Race Treatment

Modifiers

Wounded -10
Crippled -20
Destroyed -40

Results:

Exceptional Success: patient recovers in half the time
Success: patient will recover in due time
Marginal Success: recovery time doubled
Failure: recovery time quadrupled with lingering side effects
Exceptional Failure: injury level increased by one level

Wait Times

Bear in mind that the times suggested are for the physician, if experience is any indication, the patient should wait 1d10 times that.

Diagnose Condition

Activity: 1 hour per test
Skill: *Race Physiology*

Modifiers

Diagnosis Modifier

Results:

Exceptional Success: You know what it is and how to treat it.
Success: You narrow it down to a primary theory and can attempt to treat it.
Marginal Success: You're not sure what it is but can try something common.
Failure: You have no idea what this is, try a different test.
Exceptional Failure: get it all wrong, and misjudge severity and cause

Treat Condition

Activity: x2 hours per -10
Skill: appropriate, Medicine, Gene Therapy or Surgery

Modifiers

Treatment Modifier

Results:

Exceptional Success: The patient is cured and recovers in half time.
Success: The patient is cured and recovers normally.
Marginal Success: The condition is in remission but the patient will relapse.
Failure: The patient's condition does not improve.
Exceptional Failure: The patient's condition gets one stage worse. Call the lawyer.

Random Medical Emergencies

At times the Referee may find that they need some ideas to keep the doctors busy.

d10 Condition (Diagnosis Modifier)

- 1 Injury (+30)
- 2 Viral Infection (0)
- 3 Bacterial Infection (+10)
- 4 Protozoa Infection (+10)
- 5 Parasitic Infestation (+20)
- 6 Environmental Contamination (-10)
- 7 Environmental Radiation (-10)
- 8 Congenital Defect (0)
- 9 Auto Immune Disorder (-20)
- 10 Psychological Disorder (-30)

Affecting The...

- 1 Nervous System
- 2 Skeletal System
- 3 Cardiovascular System
- 4 Digestive System
- 5 Reproductive System
- 6 Epidermal System
- 7 Sensory System
- 8 Immune System
- 9 Muscular System
- 10 Circulatory System

Severity (Treatment Modifier)

- 1 Temporary Discomfort (+30)
- 2 Recurring Discomfort (+10)
- 3 Constant Discomfort (+20)
- 4 Temporary Pain (+10)
- 5 Recurring Pain (0)
- 6 Constant Pain (-10)
- 7 Temporary Incapacitation (0)
- 8 Ongoing Incapacitation (0)
- 9 Degenerative Condition (-20)
- 10 Terminal Condition (-30)

Life Span Extension

The various chemical and genetic methods of extending the natural life span of organisms provide an increase in the racial age of majority.

Advances

Genetic - only applies if engineered into organism before gestation

Longevity -

Improved - +1 to racial aging factor per step.

Immortality - race doesn't age

Genetic Engineering

Engineer Variety, Species, Order, Class and so on

Modify existing organisms / gene therapy

- Growth Tanks
- Bio Printers
- Organ Plants
- Alter Traits in new offspring
- Alter traits in existing organism
- Create Species
- Breed True
- Psychic Traits

Genetic Engineering

Manipulating the traits of animals through selective breeding is one of the earliest technologies a herding society develops. As more advanced technologies are developed it the pattern for life is encoded in strands of deoxy nucleic acid or DNA. Even in the present, genetic engineering has leapt forward with crisper III technology. The capacity of advanced societies to adapt and change may well make humanities descendants as alien as anything that ever graced the cover of a pulp magazine.

Character Creation Options

As mentioned in character creation, building a character on a pool of points represents the results of selective breeding and building one on a larger pool of points represents significant genetic engineering.

Beyond these options, the referee can chose to reduce or increase the points allowed to represent deliberately weak slave races or super races. As more points are allotted the points should probably be considered in terms of specialized packages rather than simply allowing the players to take whatever they want. Creating super beings takes a significant investment. Genetics corporations may well produce new models for each passing year. If forced growth and neural programming are available they may well come with a fixed skill package and a shortened life span, so people will need to upgrade in a few years.

Directed Breeding Programs

The most basic and hands on method of genetic engineering is selective breeding. Producing a color change or reproducing or removing a minor mutation can be achieved in a single generation by allowing individuals with the desired trait to breed or preventing those with the undesired trait from breeding. Increasing or reducing the size of an organism requires a sizable herd to select from and takes many generations. Producing a superhuman that can see into the male and female side of the racial memory takes hundreds of generations.

Breeding Program

Activity: 1 generation for species

Skill: Genetics

Factors:

Cosmetic Traits 0

Alter Size Change in Size

Alter Characteristic -10 / point

Results:

Exceptional Success: Achieve two generations of results in one generation.

Success: The new variety meets expectations.

Marginal Success: The new variety looks good but reverts after one generation.

Failure: The new variety looks just like the old variety.

Exceptional Failure: The new variety is changed in unexpected and undesirable ways

Genetic Engineering

The default for genetic modifications is that a zygote or egg is altered and allowed to grow into a full organism. This means that any alterations grow into the entire organism as part of its natural cycle. If the changes are physically or chemically incompatible it may prevent the organism from surviving to maturity.

Genetic Engineering

Activity: species gestation period

Skill: Genetics

Factors:

Cloning	0
Cosmetic Variation	0
Add / Remove Trait	-10
Modify Reproduction	-10
Change Reproduction	-20
Modify Structure	-20
Change Structure	-30

Results:

Exceptional Success: A viable and elegant change that just works.

Success: The change is made but it still looks weird and has some side effects.

Marginal Success: The change is made but is non functional and has health consequences.

Failure: The change is made but the resulting organism is non-viable and dies well before maturation.

Exceptional Failure: The change has unexpected negative consequences only seen in horror movies. The organism is viable, intelligent, mad with pain and no longer in its cage.

Genetic Therapy

Actively altering existing genetics is harder and slower. Billions of cells need to be replaced and reprogrammed and it can't be done in an instant. Genetic therapy is usually used to cure conditions rather than to totally reshape the body, which is a horribly invasive and painful process. Genetic therapy is used to naturalize organic grafts.

Genetic Therapy

Activity: *Species* Aging Rate

Skill: *Species* Genetic Therapy

Factors:

Cosmetic Variation	0
Add / Remove Trait	-10
Modify Reproduction	-10
Change Reproduction	-20
Modify Structure	-20
Change Structure	-30

Results:

Exceptional Success: The change is made without side effects.

Success: The change has minor side effects and double the recovery time.

Marginal Success: The change has major, progressive side effects.

Failure: The change fails and has major, terminal side effects.

Exceptional Failure: The change fails and is terminal early in the process.

Reduced Gestation Time

The gestation time for a species can be reduced at the cost of a smaller organism or a less viable offspring. In nature marsupials and sea horses carry their infants in pouches until they are larger. If gestation tanks are unavailable raising infants in incubators will allow for faster population growth, and may be used to rapidly increase the population of colonies. Each stage of reduced gestation time halves the normal gestation time.

Increased Litter size

A species can have its birthrate increased by increasing the size of litters or clutches of eggs. This generally requires a larger mother or smaller infants and shares many problems with reducing gestation times.

Fast Maturation

In nature some animals take a long time to mature while others grow more quickly. A species can be modified to grow to full size faster. This generally requires a great deal more high energy food than the normal growth rate. In time, rapid growth tanks will allow organisms to be grown to full size in factories but the neural and muscular development that comes with natural activity is another technology entirely. “Quick and Floppies” may be good for organ harvesting but are a long way from being a usable product on their own.

Life Span Extension

The various chemical and genetic methods of extending the natural life span of organisms provide an increase in the racial age of majority.

Longevity

Aging is a product of accumulated micro-toxins and genetic duplication errors. Genetic therapy can do a lot to reduce the impact of aging. Improved double the species' aging rate per step. The aging factor, can also be reduced to deliberately create a short lived species.

Immortality

Immortality means the species doesn't age, however they still suffer atrophy, injury, and obsolescence. There are two stages of immortality technology. The first is a series of treatments that prevents aging. Generally the treatments are needed annually but more advanced versions come in a handy pill which is taken daily. This of course is a great money maker for pharmaceutical corporations and can have huge political implications. Especially if the treatment is a naturally occurring product that comes from a single lightly populated desert planet. The second form of immortality is generally a result of genetic engineering that creates a species that does not age. Such beings are usually created at full growth and to a template that ensures they will fill their intended role for eternity.

Modifying Racial Traits

Genetic engineering can be used to modify a species by adding or removing traits. This can also be done with genetic therapy but the process is long and painful and the result of failed experiments is often death. Nature tends to favor specialization and species with lots of extra traits seldom prove viable in a natural environment.

Psychic Traits

If psychic powers are a genetically keyed ability in the setting it is possible to clone them and modify a species to have them. It is even possible to use genetic therapy to give psychic powers to living individuals, though at great risk to their mental health and personality.

Modifying Racial Structure

Changing the very structure of an organism is best done with genetic engineering. It's always easier to start with something that's already close to what you want. Genetic therapy approaches to alter the skeleton or size is often lethal. Trying to turn a arthropod into an anthropod is madness but you'll show them. You'll show them all!

Modifying Reproductive Systems

The genetic modification of species reproductive cycle is complex but can be used to tailor a species to a social role or to make cloning easier. It might also mitigate some of the nastier issues of natural competition for reproductive opportunities.

Grafting

Printed and cultivated appendages and organs can be surgically bonded to an existing organism to give it a tail, wings, or perhaps another heart. This essentially allows new traits to be added to the organism. Creating the neural pathways to control the grafts and suppressing the immune system's inclination to attack parasites requires gene therapy.

Graft Appendage or Organ

Activity: 6 hours surgery, 6 months recovery

Skill: Species Surgery

Factors:

Organs	0
Skeletal Structure	-10
Brain	-20

Results:

Exceptional Success: Graft takes hold and flourishes independently. Half recovery time.

Success: Graft takes hold with only minor side effects and treatments required occasionally.

Marginal Success: Graft takes hold and functions but has health side effects, like rejection, that must be treated constantly.

Failure: The graft is rejected and dies, and the patient suffers a serious wound.

Exceptional Failure: The graft begins to spread into the patient's body and consume it, slowly replacing their natural cells with its own.

Cultivated Symbiotes

Instead of permanently grafting appendages it may be possible to grow them as symbiotic organisms. These creatures graft themselves to their host and feed on their blood in exchange for the specialized capacities they offer. Cultivated Symbiotes are a very advanced genetic engineering technique.

Brain Swapping

Growing a new organism and transferring the brain or neurally programming a copy is another technology entirely, though one with some awkward implications regarding identity and the rights of the original and copy. With psychic technology a true transfer of consciousness is possible but still leaves a functional husk and questions surrounding its personhood. Can it relearn and become another person entirely?

Neural Programming

The ability to guide and accelerate neural development is key to creating that army of cloned super soldiers. Using the mind of an existing person is the easiest approach, especially if the soldiers are all clones of the mental template. While printing a copy of a brain might produce this result, there's always the problem of neuromuscular development. Virtual reality uploaded directly to the cortex provides an opportunity for basic neuro-muscular development if the growth tank is at least twice as large as the organism. Neural programming can also be used to add or remove personality traits from individuals.

Cloning Apparatus

The equipment for making clones is fairly simple as single cells are quite small, it's the scanning electron microscope and laser that are a bit bulky. Still, a cloning bay is probably no larger than a breadbox. It's the gestation tank that's the problem.

Gestation Tanks

A mechanical device that replaces the womb or egg as an environment in which the zygote can grow into a viable organism before being exposed to the hazards of the environment is exceedingly complex and needs careful adjustment for each species. Once developed they have some advantages as they can integrate a growth tank cycle or act as a VR neuromuscular development tank to allow the organism to be better developed. Advanced gestation tanks reduce the gestation time for the species by half which can be combined with genetically engineered reduced gestation time for really quick turn around. Gestation tanks must be large enough to contain the organism, and count as machinery.

Growth Tanks

A mechanical device that speeds up a species' maturation can be fairly simple. Cells duplicate when they're fed. A growth tank doesn't offer much stimulus and muscular and skeletal development need to be provided for or the results are weak and floppy clones.

Bio-Printers

With the advent of three dimensional printing, a lot of what is known about life has become, printable. Meat and organs printed from cell cultures will likely be

available in the near future. Even printing an entire organism is not out of the question. This may make gestation and growth tanks somewhat irrelevant. While three Dee Printing is fairly slow and cell cultures take time to grow, and organisms are incredibly complex. It's quite possible that children in the future will print hamsters on their home bio-printer for their science project. In game terms, a bioprinter is a useful tool for creating transplants and skin grafts in the sick bay or a common kitchen appliance, much as a fabricator is a useful feature in an engineering bay.

Organ Plants

One interesting possibility is hybrid plants that grow organs for transplant. Such farms and hydroponic operations make an interesting setting feature and get away from the issue of growing clones for their organs. 3D printed organs may make this irrelevant but modified plants might also be used to grow the tissue cultures used in bio-printers. Trees full of hearts swaying in the breeze are certainly atmospheric and creepy.

Creating Species

Creating a species from scratch is a complex task. The in game method is basically taking the organism creation rules and writing down whatever the would be deity wants. On the simpler end, hybridized, anthropomorphic animals and chimeras are modified versions of existing species and may explain all the furry people with animal heads wandering around in space operas. One decision that is quite important is whether the species will be capable of reproduction. Creating a viable species capable of multiplying in the natural habitat is much more difficult than one that lives in a carefully tended aquarium.

The Powers of The Mind

While they are not particularly scientific, the powers of the mind feature in many science fiction settings. The source of these supernatural powers depends a great deal on the nature of the setting. How powerful psychics are depends a great deal on how and why their powers work.

Psi and Skill

The Psi Characteristic indicates brute force capability. It is often a genetic capability. Skill in the various psychic abilities is used to focus and achieve psychic feats. Each feat has its own difficulty and specific modifiers to the psychic's skill which must be overcome in order to produce the intended result. Psionics are not commonplace in most cultures and generally have no default rating.

A Psionic Culture

If a psychic race exists and has a culture in which mind reading and other extrasensory abilities exist and are learned by all, Awareness, Telekinesis, Scanning, Sheltering, Acceleration, Distortion, and Might could have default ratings. However this is at the cost of Lying, Criminal Subculture, Weight Lifting, Running, Stealth, and Criminology not existing in the society or having a default. This would also apply to cults that begin training their students at a very young age. In some cultures all communication might be psychic in nature and Sending and Reading being fundamental skills and spoken and written language being unknown. Such races might have a very hard time communicating with other races.

Alternate Psi

In some settings psionics may be a matter of training or force of will. In such cases the referee may choose to use Knowledge, Talent, or Willpower in the place of Psi

Classification

In order to provide a simple metric for assessing the availability of less scientifically feasible capabilities, a simple classification system has been applied, throughout the rules on technological advances and psychic powers. Class one indicates capabilities that are largely supported by our current understanding of the universe. Class two covers things that are moderately unrealistic but still somewhat plausible. Class III covers stuff that's pure fantasy.

Classification

- I Realistic
- II Somewhat Plausible
- III Pure Fantasy

Electrical Fields

Class I (some sea creatures do this stuff)
Magnitude 1/10

It may be possible for the electrical fields in the mind to be read by delicate sensory capabilities, this is probably the most realistic and limited form of psychic powers, allowing only limited telepathic sending and receiving and perhaps, awareness.

Particular Consciousness

Class II
Magnitude 1

If Consciousness in the setting is the result of connections between subatomic particles which can, through interaction between fields influence the behaviour of other subatomic particles and psychic phenomena manifest as a result of this, psychic powers will be more measurable through scientific experimentation and psychic technology may well be possible but

will also be bounded by other physical laws.

Ambient Field

Class III
Magnitude 2

If the universe, in the setting, exists on a psychic membrane which is pliant and flexible, consciousness is a manifestation of stress points in this membrane. The psychic mind reaches out into this sensitivity to manipulate the matter which rests in this aether. The ambient field is less susceptible to the laws of physics because those laws are a result of the underlying field and thus the mind takes precedent over them.

The Great Illusion

Class III
Magnitude: 3

The universe is a projection of conscious thought and as such, disciplined thought can shape and mould it. In fact, the universe as it is experienced by conscious beings is actually a projection caused by mass expectation and even the laws of physics are mutable. This is a particularly magical approach to psychic powers and there may well be gods and other such psychic entities controlling the show behind the scenes.

Outright Fiat

Class I (reality could be a simulation)
Magnitude: II or more

As suggested by the holographic universe theory that is currently popular in theoretical physics, the universe is a simulation. As such, while it generally obeys the laws of physics it is quite possible for there to be Easter eggs, back doors, and indeed intentional exceptions. At this point, giant psychic space whales and superheros are entirely possible because, "why not?"

Psychic Skills

AWARENESS

- Premonition (I, PSI)
- Presence of Mind(II, Premonition)
- Precogniton (III, Presence)
- Navigation (III, Precognition)
- Remote Sensing* (II, Presence)
- Retrocognition (II, Presence)

KINETICS

- Deflection (III, Telekinesis)
- Electrokinesis (III, Telekinesis)
- Force Beam (III, Telekinesis)
- Levitation (III, Telekinesis)
- Pyrokinesis (III, Telekinesis)
- Telekinesis (III, PSI)
- Vibrations (III, Telekinesis)
- Shield (III, Telekinesis)

ENHANCEMENT

- Phasing (III, Distortion)
- Transference (III, Regeneration)
- Acceleration (III, PSI)
- Distortion (II, PSI)
- Might (II, PSI)
- Regeneration (II, Acceleration)
- Armour (III, Might)

TELEPATHY

- Beacon (III, Sending)
- Scanning (I, PSI)
- Sheltering (I, PSI)
- Seeming (III, Sending)
- Domination (III, Sending)
- Cloaking (III, Sending)
- Sending (II, Sheltering)
- Reading (II, Scanning)
- Shout (II, Sending)
- Subversion (II, Sending)

Psychic Careers

In settings where there are psychics there are bound to be professionals who use those abilities in society.

Apprentice

Psychic powers are very personal and there has been little success in mass psychic education in educational settings. Thus psychics are usually trained through apprenticeship.

Entry Requirements: PSI 60+

Certification Requirement: 4 Studied Skills 50+

Benefit: official commendation gives good reputation

Event: mentor dies

Annual Savings: 0

Learning Opportunities: Premonition, Presence, Scanning, Sheltering, Sending, Telekinesis

Future Opportunities: Guardian, Navigator, Seer, Sorcerer

Guardian

Some societies value their psychics and give them broad social licence as enforcers, mediators, and diplomats. Such guardians are both idolized and feared but sufficiently few in number and self policing to maintain their position of power and authority. This delicate balance requires guardians to be very conservative and closely watched by their colleagues.

Entry Requirements: Premonition, Presence, Sheltering, and Telekinesis 50+

Benefit: gain a government contact or a psychic contact

Event: Injured or Gain a Bad Reputation in society

Annual Savings: Rank

Occupational Skills: Deflection, Diplomacy, Premonition, Presence, Psychology, Scanning, Sheltering, Sword, Telekinesis

Gear: Hooded Cloak, Sword

Future Opportunities: Inquisitor

Inquisitor

Psychics are often disruptive to society. Their special powers often come with arrogance and a sense of entitlement. Inquisitors are psychics who have been trained to police and control rogue psychics.

Entry Requirements: Presence, Premonition, Scanning, and Sheltering 50+

Benefit: Elite Sanction: given authority to police upper class and government

Event: morale quandary kill a powerful psychic child or show mercy

Annual Savings: Rank + 2

Occupational Skills: Premonition, Sheltering, Scanning, Reading, Criminology, Pistol, Sword, Criminal Law

Gear: mask and hooded cloak, pistol, sword

Future Opportunities: Law Enforcement

Navigator

The details of interstellar navigation are complex and mainly handled by computers. Navigators use their ability to look into the future to get around the math.

Entry Requirements: Premonition 50+

Benefit: acquire a personal Lander

Event: Stranded or Injured

Annual Savings: Rank + 3

Occupational Skills: Astronaut, Precognition, Navigation, Space Craft, FTL Drive Technician

Gear: Light Space Suit, Hooded Cloak

Future Opportunities: Space Force

Psychocrat

If psychic powers exist in the setting, those thus endowed may rise to dominate society through their use. Psychics aren't particularly better suited to govern, they just have significant advantages when climbing the ladder.

Entry Requirements: Psi 75+ and Status 95+

Benefit: Psychic Artifact

Event: Awakening, a powerful astral disturbance occurs roll 1d10: 1-5 -10 PSI, 6 -10 +10 PSI

Annual Savings: Status

Occupational Skills: Management, Precognition, Dominance, and Subversion

Gear: Personal Computer, Razor, Simple Robes,

Future Opportunities: Governor if rank 10+

Seer

The future is big business and there will always be those who are willing to pay for a glimpse of it. A seer is a psychic to the stars.

Entry Requirements: Premonition 50+

Benefit: famous entertainment contact

Event: run in with criminals, Injured or gain a criminal contact

Annual Savings: Rank + 3

Occupational Skills: Premonition, Precognition, Project *Sense*, Reading, Retrocognition, Salesmanship, Scanning, Sending

Gear: elaborately decorated hooded robe

Future Opportunities: Politician

Sorcerer

The lure of power corrupts many psychics. Such individuals are seldom interested in petty crime seeking rather to dominate and subvert others.

Entry Requirements: Scanning 50+, Premonition 50+

Benefit: Follower (Minion)

Event: run in with Guardian or Inquisitor

Annual Savings: Rank x 5

Occupational Skills: Premonition, Presence, Telekinesis, Electrokinesis, Sending, Dominance, Sheltering, Subversion, Politics

Gear: Black Tunic, Boots, Gloves, Cloak

Future Opportunities: Criminal, Politician

Scope of Psychic Powers

Most psychic powers are active in nature, requiring constant attention and focus to achieve any result at all. As a result the duration of an effect is almost always equal to the length of time the psychic spends focussing on it. Achieving multiple feats at one time is particularly difficult.

Similarly, the range of most psychic powers is more related to the psychic's awareness of the situation. They must be able to see or hear a target to affect it. This means that they must project their senses in order to target anything they cannot see and the difficulty becomes greater because they must maintain multiple feats.

-20 per feat already being maintained

Orders of Magnitude

Many psychic power modifiers have a ten point penalty for every factor of ten effects scope. A table breaking this modifier down point by point has been presented for the detail obsessed. This value can be used to reflect the relative power of psychics in a specific setting or circumstance. For example an Arisien Lens might multiply effects by a factor of a million or more.

-1	x1.259
-2	x1.585
-3	x1.995
-4	x2.512
-5	x3.162
-6	x3.981
-7	x5.011
-8	x6.309
-9	x7.943
-10	x10

Handling Information Powers

Telepathy and precognition provide information that is largely narrative in nature, however, there are some concrete ways of representing their effects in game terms. A hidden map can be revealed, if there isn't a constant telepathic link to the source, only a brief glimpse should be allowed. A key motivation or relationship detail of a non-player character can be revealed providing a bonus when attempting to convince them to act in a certain way. A skill known by a non-player character can be accessed to answer a technical question. A plan, password, or time line can be revealed.

The Untrained Mind

Without training, psychic powers tend to broadcast use. That is to say that they are scattered and thus weak and ineffectual. Due to experiential bias most species project to the area they can see, hear, and smell indiscriminately and ineffectually.

Trances and Drugs

Many psychic abilities require focus and self control, this is often easier without distractions. Meditation is a common practice among psychics seeking to block out interference. Some turn to esoteric drugs to induce trances or open their subconscious mind, of course there are risks to such behaviours and there is always some uncertainty as to the clarity or even actuality of visions experienced while stoned. In either state, the psychic cannot take any other action and benefit from the bonus. It takes at least a minute to enter into a meditative trance or for a pharmaceutical to take effect which greatly limits their utility in combat. After a minute the meditating individual must successfully test their Willpower to enter into a trance. A drug

user must test their Endurance every minute until they fail, at which point the drug takes effect.

+20 meditating or stoned

Organisms

The rules for creating creatures don't include psychic powers, but if such things exist it is entirely likely that some creatures have psychic powers. Indeed some may be simple anchors for much more complex astral life forms. Increased PSI is common in such creatures. Roll for a random psychic ability.

Awareness

Psychic powers that engage with the surroundings providing feedback as a veritable sixth sense are common. To the unskilled they provide little more than hunches and flashes of insight but with focus and training they can reach into the past and future and across great distances to provide immersive visions and experiences.

Exceptional Failure: False or Misleading Information

Marginal Failure: Incomplete Information

Success: Good Information

Exceptional Success: Detailed Information

Premonition

Class: I

Aptitude: PSI

The most simple form of extrasensory perception is a heightened sense of personal danger or conflict. A successful roll against Premonition automatically negates any surprise attack or sudden shock. For example a board room meeting where the board turns against the chairperson will come as no surprise should the psychic chairperspon make their Premonition roll. If such an event is approaching the referee should make a secret Premonition roll to decide if they should start dropping hints of the approaching problem.

Presence of Mind

Class: II

Aptitude: Premonition

The esper's awareness extend in a full field around them eliminating blind spots and any disruptions like darkness and white noise.

-10 per x10 metres radius

Precognition

Class: II

Aptitude: Precognition

The future is a moving target but as probabilities converge moments and events occasionally solidify. Precognition is the least reliable esper ability with flashes of prescience being out of sequence or symbolic in nature.

-10 per x 10 hours

Navigation

Class: III

Aptitude: Precognition

Faster than light travel is complex and prone to a wide range of variables relating to gravitation and causation. Normally this work is done with advanced computers but it can also be managed using ESP. If for some reason computers are not used in the setting or are disrupted by FTL drive fields, psychic navigators may be the sole means of navigation.

-10 per x10 light years

Remote Sensing

Class: III

Aptitude: Premonition

Sensory projection in the present is fairly reliable if prone to deviation over distance. An esper will often project their senses outwards from their current point to allow themselves to steer their inner sight. Such sensory projections can pass through solid obstacles but can also get off track and lost. It is also possible to use a telepathic link to connect remote viewing to the position of another mind. The view point can be moved at 200 metres per second with reasonable acuity.

-10 per x 10 view point movement rate

Retrocognition

Aptitude: Premonition

Class: II

The past is more rigid than the present and less prone to interpretation and interference. It can be difficult to gauge the exact time of events and thus difficult to find exact information or place a vision in time and running awareness is much like rewinding a video tape.

-10 per x 10 generations out of familial line

Kinetics

If the mind can effect matter, moving it without contact, a number of interesting effects become possible. The Strength of kinetic effects is equal to the psychic's Kinetics skill.

Deflection

Class: III

Aptitude: Telekinesis

Projectiles can be knocked aside telekinetically. As many projectiles move faster than the eye can follow, having Presence active is necessary in order to deflect bullets. Roll against Kinetics skill to block attacks. Beam weapons can only be deflected by jostling the weapon.

-10 per x10 Damage

Electrokinesis

Class: III

Aptitude: Telekinesis

The psychic draws on ambient electrical fields to create powerful electric arcs that can burn flesh or short out electronics.

Force Beam

Class: III

Aptitude: Telekinesis

A tightly focussed blast of telekinesis can cause damage like a fist or even a bullet. Naturally, spreading out the energy to engage multiple targets weakens the power considerably.

-10 per x10 metres

Damage = Kinetics

Exceptional Failure: knocked back 1d10m

Failure: No Result

Marginal Success: $\frac{1}{2}$ Strength

Success: effect achieved

Exceptional Success: 2 x Strength

Levitation

Class: III

Aptitude: Telekinesis

Lifting oneself off the ground is a tricky feat. As with Telekinesis, Levitation produces a constant movement rate rather than continual acceleration.

-10 per x 10 metres per second.
Flying Movement Rate = Kinetics

Pyrokinesis

Class: III

Aptitude: Vibrations

Inducing molecular level vibrations can produce heat and even fire.

Damage = Pyrokinesis

Telekinesis

Class: III

Aptitude: PSI

The simple movement of objects through force of will. There are limits to how fast telekinesis can operate and how finely it can manipulate things, particularly the limitations of sight relating to small objects at a distance. Objects can be thrown around hard enough to cause injury but telekinesis is not a source of continual acceleration it imparts velocity to an object at a constant rate. The movement imparted can be reduced by orders of magnitude to increase the mass that can be moved, though this can be time consuming.

-10 per x 10 metres per second moved
Strength = Kinetics

Vibrations

Class: III

Aptitude: Telekinesis

Inflicting shaking requires careful focus and control but can be remarkably damaging.

-10 per x10 metres to target

Damage = $\frac{1}{2}$ Kinetics, Ignores Armour

Shield

Class: III

Aptitude: Telekinesis

Projecting a general protective field is harder and less effective than deflecting objects. On the other hand it works better against volleys and doesn't need to see an attack coming to stop it.

-10 / metre radius

Armour = $\frac{1}{2}$ Kinetics

Enhancement

Enhancing the body is a natural use of psychic energy. There are no distances to cross or thoughts to filter and understand. On the other hand the body has its physical limitations and can be badly damaged by such exertions.

Phasing

Class: III

Aptitude: Distortion

The psychic pushes their body through matter allowing them to pass through walls or draw a beating heart from a victim's chest.

- obstacle's armour

Transference

Class: III

Aptitude: Regeneration

The psychic transfers psychic energy to another to enhance their abilities. This is harder than self improvement. Even wounds can be transferred, allowing them to be regenerated or the ability to regenerate can be transferred to another.

Armour / Harden skin

Aptitude: Might

Projecting power to the surface of their skin, the psychic can shrug off blows and even energy weapons.

Armour = Enhancement

Acceleration

Class: II

Aptitude: PSI

Funelling their psychic aura into their body, the psychic increases their movement rate on land or in water.

Movement Rate + Enhancement

Distortion

Class: II

Aptitude: PSI

The psychic contorts their features to better match those of another. It is easier to push skin around than muscle and even bone structure. Distortion cannot increase mass or bodily composition. Telepathy can be used in conjunction with Distortion to model speech patterns and body language to better effect. While telepathic Seeming is easier and more effective in some ways Distortion will fool cameras and sensors.

-10 muscle

-20 bone structure

Might

Class: II

Aptitude: PSI

Using psychic energy to enhance their limbs and provide superior stability and grip the psychic can accomplish great feats of strength.

Strength + Enhancement

Regeneration

Class: III

Aptitude: Acceleration

The psychic wills wounds to close, bones to mend, and even neutralize toxins. In essence they accelerate their natural healing.

- wound level modifier

Telepathy

Thoughts can be plucked out of the air or projected into the minds of others. It takes skill and power to send thoughts over great distances or large areas. A telepathic link is established by reading a target, this allows a constant flow of information. Due to the intimate nature of the connection it becomes harder to maintain as more minds are linked. A gesalt is a special form of link where a group of telepaths actively link to each other. In this case there is no penalty for linking additional telepaths but it becomes virtually impossible to keep secrets and can even result in personality transfers. The realistic classification for some telepathic abilities relates to the ability of some sea animals to sense electrical fields and the ability of modern machines to map brain activity. These capabilities are only realistic in those limited cases but the capacity to read such information is at least plausible.

Each mind linked after the first -10.

Exceptional Failure: lose sense of self -1d10 Willpower

Failure: no effect achieved

Marginal Success: weak link, target must roll Perception to notice

Success: effect achieved

Exceptional Success: automatically undetected or unresisted

Beacon

Class: III

Aptitude: Sending

Rather than merely broadcasting a narrow beam of thought can be produced to act as a signal that can be detected and followed by scanning. If the range is great enough the beacon might even be usable for interstellar navigation. Sacrificing other psychics to power it is generally seen as bad form.

Scanning

Class: I

Aptitude: PSI

It is difficult to sort a single mind out from a crowd. Too many thoughts and feelings can unnerve and confuse even powerful telepaths. If the species is latently psychic it makes the task even harder as they all project on a low level. Trained psychics don't count towards the size of a crowd because they exert more control over their own thoughts.

Familiar Mind +20

Alien Mind -20

/ x 10 minds -10

Sheltering

Class: I

Aptitude: PSI

An unskilled telepath often suffers from a weak persona due to constant unwanted contact with the thoughts of others, as a result the first lesson a telepath must learn is how to shut out the constant psychic static of those around them. This skill is also useful for blocking telepathic attacks.

Normally Passive, Active in Gestalt
Resists Telepathy with Telepathy

Seeming

Class: II

Aptitude: Sending

The psychic projects an illusion into the minds of observers to make them see things. It is usually more practical to erase individuals and objects as a pure fantasy illusion will be quickly recognized as incongruous and lead to questioning of what is seen.

Talent resisted by target's Perception to detect

Cloaking

Class: III

Aptitude: Sending

The idea that one isn't actually there can be broadcast to onlookers to achieve a kind of invisibility. This generally doesn't work on sensors and cameras unless the telepath is able to actively target the mind of the person looking at the monitor.

Detected by Logic
Broadcasting -10 per 10x minds

Domination

Class: III

Aptitude: Sending

Controlling the minds of others is a form of projection and thus can be exercised over large groups with a diminishing degree of control. Because it is a projection it is possible to command dominated individuals without sharing a language by visualising actions and evoking common emotions but such control does not provide as precise or complex instruction.

Detected by Logic
Resisted by Willpower
Broadcasting -10 per 10x minds

Sending

Class: I

Aptitude: Sheltering

Thoughts and feelings can be projected to other minds. Projecting to a single mind is actually than projecting to a crowd which is called broadcasting. Feelings are easier to project as they are simpler than words and do not rely on language. There is little point in broadcasting words to someone who doesn't understand them.

Broadcasting -10 per 10x minds

Reading

Class: I

Aptitude: Scanning

Thoughts and feelings can be read, it is a dangerous thing because there is always a two way connection and even those without psychic powers can have strong wills and sufficiently unusual thought processes to effect the telepath. In particular the brilliant, insane, and fanatical pose a particular risk. The rational mind will prove more likely to recognize foreign thought patterns. Reading emotions is safer than reading thoughts as they are strong, surface information and thus less structured.

Detected by Logic

Resisted by Willpower

Shout

Class: I

Aptitude: Sending

A powerful psychic projection of focussed emotion can stun or even incapacitate its target. A psychic shout is an area effect attack centred on the user. Treat the attacker's skill as the damage, the target's Sheltering skill as armour, and their Willpower as Strength. The damage is automatically treated as a blow to the head.

Broadcasting -10 per 10x radius

Blast

Class: II

Aptitude: Sending

A focussed pulse of psychic energy can overload the target's nervous system causing unconsciousness or even death. Treat the attacker's skill as the damage, the target's Sheltering skill as armour, and their Willpower as Strength. The damage is automatically treated as a blow to the head.

Subversion

Class: II

Aptitude: Sending

Subversion is a thought projection technique in which low level instructions are repeatedly sent over a longer period of time to produce an attitude or idea which grows in a more natural fashion and is thus hard to separate from the target's own thoughts.

Detected by Logic

Resisted by Willpower

Psychic Entities

If there is an astral plane or other psychic dimensions it may well be inhabited by entities and echoes of psychic resonance.

Ghosts

Class: III

A ghost is a persistent emanation of psychic energy with the personality and knowledge of a dead person. In essence an astral projection without a physical body to return to. The exact nature of ghosts varies from one setting to the next. In some it takes extreme trauma to remain in the spirit plane and not pass on and in others supreme training and force of will. If the astral plane is actually the shallows of the land of the dead, ghosts may be commonplace or even ubiquitous. A ghost has the Knowledge, Logic, Reflexes, Talent, Willpower, and skills it had in life. Psi will often be very high, in the nineties at least. A ghost will only be able to see the material plane as through a haze of mist without using Remote Sensing but sending will be as clear as talking aloud and "Shouting" can even cause harm to a ghost like an area effect Psychic Blast. Ghosts will often use Domination to possess a living person to give them access to the material world. Ghosts with Telekinetic powers are called Poltergeists.

Spirits

Class: II

There may be other things lurking in the psychic plane. Animals may well have souls or powerful gestalts with far greater intelligence than any individual beast. Deep social conventions and expectations may take on form on the astral plane giving rise to demons, angels, and even gods. Alien races may interact with the astral plane in different ways. Psychic hive minds will be really powerful monsters and may not even recognize other species as sapient. There may also be beings which are purely native to the astral plane. Some psychic entities may be extremely powerful or native to the astral plane. Some may even have the ability to incarnate or animate matter. Naturally such beings cross into the realm of fantasy. Like ghosts they will have Knowledge, Logic, Reflexes, Talent, and Willpower as well as skills but many will be far beyond the human range.

Psychic Artifacts

Natural materials may have psychic resonance which can influence the psychic field in various ways, producing static, storing energy, or enhancing connections. If psionics are understood from a scientific perspective there may even be technological devices which produce specific effects.

Bone

The remains of a psychic organism may connect with its energy or spirit in the astral plane. Bits of bone or teeth may provide a psychic an echo of a racial ability or characteristic. They might also provide a point of contact with the individual from which they came giving an advantage to read, subvert, or dominate them. The bonus for such a relic is the originator's PSI rating minus fifty, divided by five.

Crystals

Frequently associated with supernatural powers, various types mineral may have psychic resonance. This seems to be tied with the appearance of the crystal with each colour associating with a particular ability. Only one crystal in a million will have any psychic resonance. Fortunately a Presence skill roll will reveal if there's one in the area. Once one is found, roll for a random psychic ability for the crystal to enhance and a random modifier level.

d%	Bonus
01	-20
02 - 03	-15
04 - 07	-10
08 - 15	-5
06 - 85	0
86 - 93	+5
94 - 97	+10
98 - 99	+15
00	+20

Devices

If the fundamental principles underlying psychic activity are understood through science, it may be possible to construct machines that can reproduce and enhance psychic abilities. This necessitates an additional skill "Psychomatics" which may fall under the Psychology or Biology category depending on its exact nature. In any case, as Psychic abilities defy reason, the skill is based on Knowledge of reproducible effects and outcomes.

Drugs

Various narcotics are commonly used to amplify, emulate, or suppress psychic abilities.

Amplifiers

An amplifier is a technological device that enhances psychic abilities. Providing a bonus of one fifth of the Technology Factor.

Emulators

Devices that reproduce a specific psychic effect are called emulators. The skill rating for the power is generally equal to the Technology Factor.

Suppressors

Psychic suppression devices prevent the use of abilities. Generally this is a penalty to skill rolls equal to the Technology Factor.

Random Psychic Traits

Weak

d10	Trait
1	Sheltering
2	Awareness
3	Premonition
4	Distortion
5	Might
6	Scanning
7	Acceleration
8	Shout
9	Electrokinesis
10	Roll On Strong Table

Strong

d10	Trait
1	Deflection
2	Shield
3	Armour
4	Acceleration
5	Pyrokinesis
6	Levitation
7	Sending
8	Presence
9	Remote Sensing
10	Roll on Powerful Table

Powerful

d10	Trait
1	Blast
2	Subversion
3	Reading
4	Domination
5	Precognition
6	Retrocognition
7	Phasing
8	Telekinesis
9	Seeming
10	Beacon

Creating Star Systems

Tracking Planetary Motion (Optional)

If we simplify orbits down to circles, it's easy to keep track of all of the planetary motion in the setting, for the purpose of In System Travel (qv), by setting an initial orbital position for each planet. This starting point is rolled on d% x 36. Every "Orbit #" days of the campaign, it's position advances by one point. Thus, by keeping track of the length of the campaign in days and dividing it by 360 x orbit number, the orbital position can be updated when it is needed.

Star Systems

STEP 1: Number of Stars

- 1-5 one
- 6-9 two
- 10 roll again
 - 1-6 three
 - 7-8 four
 - 9 five
 - 10 six

Companion Star Orbits 2d10 from largest

STEP 2: Star Classes

- 1-2 IV + 2 H
- 3-8 V Main Sequence +1
- 9 VI Dwarf
- 10 roll again
 - 1-2 Ia Super Giant +6 H
 - 3-4 Ib Super Giant +5 H
 - 5-7 II Giant +4 H
 - 8-10 III Giant +3 H

Star Type, +1 if Ia, Ib, or V

- 1 O White +6 H
- 2 B Blue-White +5 H
- 3 A +4 heat
- 4 F Yellow-White +3 H
- 5 G Yellow +2 H
- 6 K Orange +1 H
- 7-11 M Red

* Multiple Star Systems

If there is more than one star in the system, any instances of H - Orbit Number must be calculated from both stars, ignoring results less than zero for the farther star.

STEP 3: Orbital Contents

- 1 Asteroid Belt
- 2 Tiny Planet: 3000 km diameter
- 3 Small Planet: 6000 km diameter
- 4 Medium Planet: 9 000 km diameter
- 5 Large Planet: 12 000 km diameter
- 6 Huge Planet: 15 000 km diameter
- 7 Small Gas Giant 15000 km diameter
- 8 Medium Gas Giant 30000 km diam.
- 9 Large Gas Giant 60000 km diameter
- 10 Huge Gas Giant 120000km diameter

If the orbital content roll is greater than the orbit number that is the final orbit.

Fun Stuff

None of this stuff is particularly realistic and should only be used if the referee feels the need.

Nemesis: There's another planet in the same orbit, directly opposite to this one.

Retrograde Orbit: This planet's spinning the opposite direction as the rest of the system.

Rosette: When you get more than two planet's of equal size in the same orbit it's safe to assume it's not coincidental.

Ring World: There's a super strong ring around this star and no other planets. The inner surface of the ring is habitable. These things are artificial constructs and their unstable orbits require constant maintenance.

Dyson Sphere: The whole star is enclosed in a vast spherical structure and every last watt of power it puts out is being caught and used. There's a really good chance that the people who built that thing are very scary.

STEP 4: Planetary Details

A planet's gravity is largely an issue of it's size, but some planets may be more or less dense than average. The density of a planet's atmosphere is also a function of gravity. A planet with a higher than normal gravity will have plentiful mineral resources, while they will be limited if the gravity is weaker.

Size	Gravity
Tiny	Minimal (under 0.25 G)
Small	Low (0.25 to 0.75 G)
Medium	Average (0.75 to 1.25 G)
Large	High (1.25 to 1.75 G)
Huge	Crushing (Over 1.75 G)

Gravitational Variation

1	Up One Step and Plentiful Mineral Resources
2-9	Normal
10	Down One Step and Limited Mineral Resources

Note that atmosphere and water are directly related to the world's gravity, not its size.

Atmosphere

The composition of a planet's atmosphere is a pretty important factor in determining if anyone wants to live there. One of the major factors is whether the temperature is in the range that will allow simple organisms to flourish. For simplicity's sake we'll assume this means liquid water. If you want to allow for exotic life forms with different requirements it's best left to your discretion. The most basic life forms are those that can survive on chemicals and a little heat, these generally will give an unbreathable atmosphere a bump in the direction of breathable. Particularly hot worlds are assumed to have more pollutants in the air, while colder worlds have lower oxygen contents and more unfixed carbon floating around. Very cold worlds may well have large quantities of flammable hydrocarbons in the atmosphere.

Gravity

- Minimal (under 0.25 G)
- Low (0.25 to 0.75 G)
- Average (0.75 to 1.25 G)
- High (1.25 to 1.75 G)
- Crushing (Over 1.75 G)

Atmosphere

- Trace -2 Temperature
- Thin -1 Temperature
- Average
- Thick +1 Temperature
- Dense +2 Temperature

Hydrosphere

The presence of water on a world is largely determined by the world's gravity, worlds with lower gravity will have less water while those with higher gravity will have more. This is mainly because less water vapour escapes into space over time. That being said, some worlds may just have more or less water for other reasons.

Gravity	Water
Minimal (under 0.25 G)	Minimal
Low (0.25 to 0.75 G)	Limited
Average (0.75 to 1.25 G)	Average
High (1.25 to 1.75 G)	Plentiful
Crushing (Over 1.75 G)	Excessive

Water and Atmosphere Variation

- | | |
|-----|---------------|
| 1 | Up One Step |
| 2-9 | Normal |
| 10 | Down One Step |

Gas Giant Moons and Object Masses

	<u>Small</u>	<u>Medium</u>	<u>Large</u>	<u>Earth Masses</u>
Asteroid	2d10	3d10	4d10	1/64
Small Moon	1d10	2d10	3d10	1/32
Medium Moon	1d10-2	1d10	2d10	1/16
Large Moon	1d10-4	1d10-2	1d10	1/8
Tiny Planet	1d10-6	1d10-4	1d10-2	1/4
Small Planet	1d10-8	1d10-6	1d10-4	1/2
Medium Planet		1d10-8	1d10-6	1
Large Planet			1d10-8	2
Huge Planet				4
Small Gas Giant				8
Medium Gas Giant				
Large Gas Giant				
Dwarf Star				

Moons

The total mass of a planet's moons will be much lower than the mass of the planet itself. Thus the largest moon any planet is likely to have is a good two steps smaller than the planet.

- | | |
|------|-------------------------------|
| 1-2 | No Further Moons |
| 2-3 | Planet Size -2 |
| 4-6 | Planet Size -3 and roll again |
| 7-10 | Planet Size -4 and roll again |

The total size scale for astronomical objects is as follows:

Temperature

	Star Temperature - Orbit Number + Atmospheric Density Modifier	
1	Completely Frozen to the Core	Unbreathable Flammable
2	Frozen Atmosphere	Tainted Flammable
3	Frozen Water, Frozen Atmosphere at Poles	Tainted
4	Cold, Frozen to Tropics	Tainted
5	Cool, Frozen to	Breathable
6	Average, Frozen at Poles	Breathable
7	Warm, Small Frozen Poles	Breathable
8	Hot, Scalding Steam Common in Tropics	Tainted
9	Boiling, Hot at the poles	Tainted
10	Boiling at Poles, Melts metal in tropics	Unbreathable
11	Molten Surface	Corrosive

Life

Life is probably ubiquitous to worlds with liquid water. Simple proteins formed from common chemical reactions probably evolve into more complex forms as long as sufficient energy and materials are available.

1d10 Biosphere Maturity

- 1 - 3 Barren
- 4 - 6 Prions
- 7 - 8 Bacteria
- 9 Protozoa
- 10 - 14 Primitive
- 15 - 17 Basic
- 18 - 19 Advanced
- 20+ Civilized

Temperature

Frozen	-10
Cold	-1
Average	+3
Warm	+1
Hot	-1
Boiling	- 10

Water

Minimal	+1
Limited	+2
Average	+3
Plentiful	+4
Excessive	+5

1d10 Civilization

0	Bands
1 - 2	Tribes
3 - 4	Villages
5 - 6	Towns
7 - 8	Cities
9 - 10	Kingdoms
11 - 12	Nations
13+	Blocs

Solitary -1

Small Groups +1

Large Groups +2

Constructing Societies

The referee is faced with the task of constructing the interstellar societies in the setting. The values of various institutions govern their approach to their circumstances. There's a whole lot of "isms" to consider in here. These can be thought of as the characteristics of a society and rolled for on percentile dice to indicate where people stand. The actual, modified roll should be recorded and rolled against when it is necessary to determine how the population reacts to events and policies.

Technology 1d10 + Civilization Total

1 - 5	Sticks
6 - 9	Sticks and Stones
10 - 13	Stone Tools
14 - 15	Agriculture
16	Copper Tools
17	Bronze Tools
18	Iron Tools
19	Steel Tools
20	Gun Powder
21	External Combustion Engines
22	Intensive Agriculture
23	Internal Combustion Engines
24	Radio
25	Radar
26	Fuel Cells
27	Computers
28	Space Travel
29	Interstellar Travel
30	Intergalactic Travel

Population

Values

<u>01- 30</u>	<u>31 - 70</u>	<u>71 - 100</u>	<u>Species Trait Modifiers</u>
Idealism	Neutral	Cynicism	Improvisation -10, Planning +10
Spiritualism	Neutral	Pragmatism	Trickery -10, Debating +10
Asceticism	Neutral	Materialism	Hoarding +10, Counting +10
Individualism	Neutral	Collectivism	Solitary -10, Large Groups +10
Pacifism	Neutral	Militarism	Herbivore -10, Carnivore +10, Colonization +10

Alien Organisms

While life on other worlds may seem strange to our eyes, it will still be governed by the laws of thermodynamics. Motion requires energy and energy is acquired from the environment in recognizable ways. In the main, carbon and water based life is assumed to be the most likely. Even so, protein incompatibility, alternate genetic structures, and other chemical variations will almost certainly prevent the consumption and cohabitation of extra-terrestrial life-forms. Less rigorous assumptions may be applied, of course, to meet the needs of the setting. Indeed most popular media science fiction requires the assumption of largely compatible building blocks across the cosmos. This might yet prove to be the case as the chemistry of life is complex and may be so limited as to only allow for relatively earthly life forms. Even so, it is not so long ago that scientists doubted the now proven reality of extra-solar planetary systems.

The creation of life forms begins with the development of the planet itself, as the rise of featherless bipeds requires a course of billions of years of evolution. On earth, hundreds of millions of years of single celled organisms and plants predated the appearance of the first land animals. While even the lowliest viruses and bacteria can have interesting characteristics, they can largely be discounted as irrelevant in regards to star travelling adventurers. In any case generating the untold billions of varieties seems beyond the scope and purpose of this work.

Creating Organisms

The nature of a life form is largely dependent its environment, dietary, and reproductive strategies. The lists that follow provide some fanciful options but are mainly based on Earth's ecology. The initial rolls for General Structure and Reproductive Strategy are uniform for an entire Class of creatures, with minor variations resulting in Orders, Genus, Species, and Varieties. For instance all Mammals are Live Bearing, with an Endoskeleton and two sets of two limbs. Other traits can be randomly generated or selected by the referee.

Traits

A random trait is rolled for Order, Class, Genus and Species. Environmental traits can be substituted in at whichever level makes the most sense. For instance all fish have fins at the Order level of distinction but some mammals like dolphins and seals have it at the family level. In some cases, the

referee may wish to include additional traits to match a life form from fiction. In general it is suggested that these should be balanced with negative traits to avoid creating ecologically unbalanced super monsters, but particularly in the case of races that are available as player characters wherein the greater sin of a play imbalance might be found.

<u>Tier</u>	<u>Traits</u>
Kingdom	Basic Structure
Phylum	Specific Structure
Family	Genders / Breeding
Order	Ecological Niche
Class	Random Trait
Genus	Random Trait
Species	Random Trait
Variety	Colouration Environmental Adaptation Size Surface

Initial Characteristics

Every organism is assumed to start at Size 0. Their basic movement rate is 120 meters per round running or swimming. Don't worry, after a few rolls, they won't look anything alike.

Base Ratings

Maturation Time: 10 years +/- Size

Movement: run 120 meters per round

Sight Range: 40 m

Hearing Range: 20 m

Smell: 10 m

Size: 1d10 - 1d10

Agility: 0

Dexterity -20

Endurance 0

Knowledge -20

Logic -20

Perception +20

Reflexes +20

Strength 0

Talent -20

Willpower 0

Size

Size has a number of major impacts on an organism's abilities. Not the least of which is making it easier to hit. It takes longer for a large organism to grow to full size, which will take more food, it will be slower and less mobile, but it will also be stronger.

+/- 1 Target Size

+ 10 Base Mass

+/- 10 Strength

-/+ 5 Agility

-/+ 5 Reflexes

Basic Structure

1-7 Immobile

8-10 Mobile

Maturation Time

The number of years a organism takes to reach its full growth. If either falls below zero, the time is measured in months. So a Maturation time of -3 would indicate 9 months. If a species maturation time is less than 18 years set one skill to base 0 for every two years shorter and add one Fundamental skill for every two years over 18.

Aging

The aging rate of a species affects its knowledge. Short lived species have a distinct disadvantage in points when compared to longer live ones. It is suggested that species intended for player characters be in the 15 - 20 year aging range.

Maturation Time = 5 + Size + 1d10 years

Aging Rate = Maturation time + 5 - 1d10
+ (Knowledge Modifier) / 5

Short Lived / 2 Long Lived x 2

Mobile Structure

1-3 Endoskeleton:

Size 1d10 - 5

Basic Limbs: Legs or Fins

Basic Surface: Fur

5-8 Exoskeleton:

Size 1d10 - 7

Basic Limbs: Legs or Fins

Basic Surface: Carapace

Larval Form

9 No Skeleton:

Size 1d10 - 9

Basic Limbs: Tentacles

Basic Surface: Thick Hide

+1 reproductive strategy

10+ Amorphous:

Size 1d10 - 11

Basic Limbs: Pseudopods or Scilla

Basic Surface: Thin Membrane+

+3 reproductive strategy

Location of Sensory Organs

In most cases, sensory organs are found on a structural extension, or a specialized limb.

Immobile Structure

- 1 Cluster: Size 1d10 - 7
- 2 Filament: Size 1d10 - 6
- 3 Sheet: Size 1d10 - 5
- 4 Enclosed Pod: Size 1d10 - 4
- 5 - 8 Telescoping Stem: Size 1d10 - 3
- 9-10 Branching Stem: Size 1d10 - 2

Symmetry

Limbs are acquired in matched sets following a pattern across entire phyla. The number of limbs and sets of thereof must be determined for creatures with Endoskeleton, Exoskeleton, and No Skeleton structures. The limbs generated are initially unspecialized legs. Creatures adapted to a fluid environment will have fins or tentacles instead.

Having more limbs means having smaller limbs so out recoil and weapon weights are worked out by dividing the Free Load by the number of hands the organism possesses.

Symmetry

- d10 Set
- 1-7 2
- 8 3
- 9 4
- 10 5

Limb Sets

- 1 0
- 2 1
- 3-7 2
- 8-9 3
- 10 4

Reproductive Strategy

In the long term an effective reproductive stratagem is more important to the survival of a species than claws and camouflage. All of the organisms within a given Phylum will have the same reproductive strategy.

Mobile

- 1-3 Live Birthing
- 4-6 Egg Laying (Gestation Time / 2)
- 7-10+ Division (Gestation Time x 2)

Immobile

- 1-3 Seeds (x 2 Litter Size)
- 4-6 Spores (x 4 Litter Size)
- 7-10 Expansion

Litter, Clutch Size

- 5- Small (1 - 2)
- 6 - 10 Medium (2 - 4)
- 11+ Large (4 - 8)
- Short Lived x 2
- Long Lived / 2

Gestation Time

The length of time between litters is generally set by the environment. On earth, a one year reproductive cycle is common due to the seasonal availability of resources. In some cases this will be the result of a long gestation and in other cases it will be due to the cycle of reproduction. Fundamental skills are the result of maturation time and one is received for every two years. The cultures presented in the Characters chapter assume an eighteen year maturation time.

- 4 months +1d10 + Size + Litter Size
- Egg Laying / 2
- Division x 2
- Short Lived / 2
- Long Lived x 2

Sexual Reproduction

Live Bearing, Egg Laying, and Seed Dispersing are all methods of sexual reproduction whereby the genetic material of multiple parents is combined and the offspring have a blend of their parent's traits. It is possible for a species to have more than one gender that carries out a given role. Not all races exhibit all of the gender roles, but there must always be a Breeding Male and Female, single gender species just undertake both roles.

For example, human females are Breeders, Incubators, Workers and Nurturers, so all their modifiers cancel out. Similarly human males are Guardians, Breeding Males, Hunters, and Directors so all of their modifiers cancel out.

<u>Roll</u>	<u>Sexes</u>	<u>Roles Per Sex</u>
1 - 9	1	none
9 - 10	2	4
11 - 16	3	3
17 - 20	4	2
21 or more	5	2

Small Groups +1
Large Groups +2
Not Amorphous +9

Gender Specialization

1 - 5	None
6 - 8	+ 1d10 - 5 Size
9-10	Random Trait + Random Negative Trait

Dietary Strategy

Immobile

- 1 - 2 Chemo-Synthesizer: Size +1d10 - 8
- 3 - 5 Biological Reducer: Size +1d10 - 7
- 6 - 10 Photo-synthesizer: Size +1d10 - 5

Mobile

1-5 Herbivore

- 1 - 3 Grazer: Size +3, Spines, +10 Endurance
- 4 - 6 Browser: Size +2, Built For Speed, +10 Agility
- 7 - 8 Forager, Size +0, Acute Smell, +10 Dexterity
- 9 - 10 Gatherer: Size +0, Hands, Hoarding

6-8 Omnivore

- 1 - 3 Hunter: Size +0, Sharp Bite, +10 Perception
- 4 - 6 Scavenger: Size +0, Claws, +10 Endurance
- 7 - 8 Filter: Size +5, +10 Endurance, +10 Willpower
- 9 - 10 Devourer: Size +3, Sharp Bite, +10 Endurance

9-10 Carnivore - All - Sharp Bite

- 1 - 2 Stalker: Size +0, Camouflage, +10 Agility
- 3 - 4 Chaser: Size +0, Built For Speed, +10 Endurance
- 5 - 6 Parasite: Size -5, Sedative Poison, +10 Willpower
- 7 - 8 Pouncer: Size +0, Leaping Legs, +10 Strength
- 9 - 10 Trapper: Size +0, - 5 Spinnerettes , +10 Willpower

Traits

Adaptations are the result of changes in the environment and don't affect the basic structure and strategies of the organism. Some adaptations are only appropriate to certain climates or in combination with certain other adaptations. In these cases the adaptation is generally vestigial or otherwise no longer functional.

Environmental Adaptations

Dry	Moisture Storage
	Size -2
High Pressure	+10 Endurance
	Size -3
Low Pressure	Size +1
High Temperature	Size +1
	Cooling Surfaces or Water Storage
Low Temperature	Size -1
	Fur or Blubber Layer
Fluid Medium	Size
	Primary Limbs Are Fins or Tentacles
Tide Locked Terminator	Preferred Light: Twilight
Tide Locked Dark Side	Preferred Light: Night

Immobile Organism Traits

Common Traits	
1	Deep Roots
2	Diffuse Structure
3	Nutritious Fruit
4	Rough Surface
5	Sticky Seeds
6	Subterranean Reserve
7	Symbiotic Reproduction
8	Thorns
9	Tough Surface
0	Uncommon Trait

Uncommon Traits

1	Gliding Seeds
2	Hallucinogenic Secretion
3	Needles
4	Poisonous Fruit
5	Rigid Stem
6	Sticky Surface
7	Strong Flavour
8	Tangled Vines
9	Water Storage
0	Rare Trait

Rare Traits

1	Carnivorous
2	Crystalline Surface
3	Flying Seeds
4	Mineral Deposit Crust
5	Needle Pods
6	Razor Sharp Edges
7	Spikes
8	Torsion Whips
9	Hallucinogenic Mist
0	Bizarre Trait

Bizarre Traits

1	Caustic Secretion
2	Electrical Discharge
3	Explosive Pods
4	Incendiary Pods
5	Manipulators
6	Mind
7	Mobile
8	Torsion Spears
9	Toxic Vapours
0	Radioactive

Random Traits

These traits are probably the result of significant events that occurred in the organism's long history. Generally these traits mark the difference between geni and species, so two rolls would be appropriate for most creatures. If a trait is rolled a second time use the same roll and check on the next table.

Common Traits

- 1 Claws
- 2 Structural Extensions
- 3 Camouflage
- 4 Built For Speed
- 5 Amphibious
- 6 Acute Sense
- 7 Thick Hide
- 8 Nocturnal
- 9 Complex Courtship
- 10 Uncommon Trait

Bizarre Traits

- 1 Bio Incendiary
- 2 Bio Laser
- 3 Acid Spray
- 4 Darts
- 5 Pellet Tube
- 6 Gas Bags
- 7 Metabolic Overdrive
- 8 Bioluminescence
- 9 Chemosynthesis Metabolism
- 10 Photosynthesis Metabolism

Uncommon Traits

- 1 Stalks
- 2 Leaping
- 3 Wings
- 4 Migratory
- 5 Whiskers
- 6 Cognizant Behaviour
- 7 Carapace
- 8 Relentless
- 9 Spines
- 10 Rare Traits

Cognizant Behaviours

- 1 Building
- 2 Husbandry
- 3 Hoarding
- 4 Improvisation
- 5 Marking
- 6 Planning
- 7 Tool Use
- 8 Colonization
- 9 Trickery
- 10 Cultivation

Rare Traits

- 1 Long Lived
- 2 Echo Location
- 3 Pincers
- 4 Chameleon
- 5 Infrared Pits
- 6 Irritant Spray
- 7 Spinnerettes
- 8 Poison Gland
- 9 Hands
- 10 Awareness

Negative Traits

- 1 Diminished Limb Set
- 2 Short Lived
- 3 Inefficient Metabolism
- 4 Poor Hearing
- 5 Poor Sight
- 6 Poor Smell
- 7 Slow Moving
- 8 Cold Blooded
- 9 Thin Skin
- 10

Acid Spray:

The creature has a specialized gland that contains concentrated digestive acids that can be spewed a short distance to discourage unwanted attention. There is enough of the chemical for six shots after which a full day and a specialized diet is required to refuel.

x 2 Life Support Requirements

Range = Strength / 20

Penetration = Endurance / 2

Damage = Endurance / 4

Acute Sense

It is common for animals to possess exceptional senses which aid them in surviving and acquiring food in the wild. While broader sensory abilities are represented by the Perception Characteristic many creatures have more specialized senses.

Hearing

Many creatures have a broader range of hearing and a greater ability to perceive their environment through hearing.

Double impairment from loud noises.

+20 to identify sounds

+10 to Play *Instrument*, Compose Music, and Singing

Hearing Range: 40 meters

Smell

With such finely tuned olfactory reception a creature can follow trails, identify individuals, and even detect a wide range of substances such as drugs and explosives.

Double Impairment From Irritant Spray and Strong Flavour
+20 to differentiate smells and track by scent
+10 to *Culture* Cooking
Smell Range: 20 meters

Vision

The creature's eyes are best suited to detecting and identifying objects at great distances, usually for locating prey from an elevated position.

+20

Vision Range: 80 meters

Amphibious

Creatures living near lakes or oceans are often well adapted to both environments, as are those living close to shores. These adaptations range from limbs that function as legs and flippers, waterproof fur, and improved oxygen storage capacity.

Awareness

This species is particularly intelligent and introspective having adapted to many different environments and circumstances.

+10 Knowledge

+10 Logic

-10 Perception

-10 Reflexes

+1d10 Age of Maturity

Bio Laser

In rare instances, biological lenses and bioluminescence combine to allow a creature to fire low powered laser beams. These are generally emitted from the eyes. This ability generates significant waste heat as well as consuming a great deal of energy so the creature must rest until it can make an Endurance roll before using it again.

x2 Life Support Requirements

Range	Endurance / 10
Damage	Endurance / 4

Bioluminescence

Generally the ability to generate light is only found in creatures native to places that are always dark. However, it is possible that such a creature could migrate to brighter realms while retaining the ability.

Light Level: Twilight

Radius = Strength / 10 m

Bio Incendiary

This ability allows the creature to secrete a highly flammable chemical, possibly even hydrogen, but more likely an oily hydrocarbon, that is ignited as it is sprayed either through bioelectricity or sparks created by grinding stones in a gullet. The creature only carries enough fuel for a single gout and requires a full digestive cycle to refuel.

Range = Strength / 20

Damage = Endurance / 4

Blast Radius = Strength / 20

Blubber Layer

This creature stores excess energy in a thick layer of fatty tissue that covers the surface of its body. This, allows it to live in Cold conditions. In combination with Fur, a Thick Hide, or Feathers it can retain its body heat, survive and even thrive in frozen conditions.

+10 Natural Armour

-10 Agility

+10 to endure cold environments

-10 to endure hot environments

Built For Speed

The creature is lean, streamlined, and otherwise well adapted for sudden bursts of speed. It can double its primary movement for a single round. It cannot do so again until it rests. Make an Endurance roll for each round spent resting to recover the ability.

Primary Movement Rate x 2 for one round

Camouflage

Most creatures have surface patterns that allow them to blend in with their surroundings, but this species has particularly excellent camouflage.

Stealth is a Fundamental Skill.

+20 to hide in native environment

Carapace

This creature's carapace is particularly heavy and protective. If it has a chemosynthetic metabolism the protection and penalties are doubled.

-20 Agility and Reflexes

Natural Armour = Strength / 2

Chameleon

This creature can blend into its surroundings by changing its skin colour to match them.

This makes it particularly good at hiding in any environment.

Stealth is a Fundamental Skill
+10 to hide in any environment

Chemosynthetic Metabolism

Instead of deriving nourishment in the usual way, this creature consumes particular

chemical deposits that are fairly common in the dirt and rocks of its environment. Such creatures can still be predatory if not literally carnivorous in order to protect rich deposits. The creature also benefits from the presence of the minerals being deposited in any spines, claws, teeth, and carapace receiving doubled penetration or armour from these traits.

Claws

This creature has hard cartilage on its feet or hands that serve as a weapon, specialized claws can help it to climb or dig as well as being formidable weapons that are excellent for grabbing onto prey. Claws on Hands do (Strength / 6) Damage but count as Light Weapons.

Dexterity -10
Damage = Strength / 4

Cognizant Behaviours

Some species exhibit behaviours in which they actively alter their environment to meet their needs. These activities are common among sapient beings and a combination of these behaviours is what qualifies a species as sapient. Any such race will develop the capacity for all these endeavours, but will always excel in specific fields. From the perspective of the game, these behaviours modify mental characteristics and the possession of these in the range of the human norm is defined as sapience.

Cultivation	+10 Knowledge, +10 Logic, -10 Reflexes
Building	+10 Knowledge, +10 Logic, -10 Perception
Husbandry	+10 Logic
Hoarding	+10 Knowledge
Counting	+20 Logic, -10 Perception
Planning	+20 Logic, -10 Reflexes
Recording	+20 Knowledge, -10 Perception
Teaching	+20 Knowledge, -10 Reflexes
Trickery	+10 Talent
Debating	+10 Willpower

Cold Blooded

This creature's metabolism is dependant upon its surroundings, not generated by its own body. This is very efficient but not so great in colder climates. It ignores and indeed prefers Hot climates.

$\frac{1}{2}$ Life Support Requirements
-20 Infrared Signature
-10 Agility, Reflexes, and Endurance
for each temperature gradient below Hot.

Complex Courtship

The males of this species must really compete to attract the females. This results in dances, bright coloration, fighting, gift giving and similar displays and carrying on.

+10 Talent

Cooling Surfaces

These flaps, fins, or folds of skin act as heat radiators and allow the creature to endure Hot environments.

+20 to endure hot environments

Darts

These modified feathers, quills, or hairs can be fired short distances by muscle action. This is usually a defensive measure as the darts are too low powered to kill prey, unless of course they're poisonous. While it can take a long time to grow new darts the creature is amply supplied with ammunition and unlikely to run out.

Range = Strength / 20

Penetration = Strength / 4

Damage = Strength / 4

Echo Location

This creature's vocal mechanism and hearing are adapted to allow it to perceive its environment in three dimensions from reflected vocalizations. Creatures with Echo Location can manoeuvre and even fight in complete darkness without penalty but cannot read or discern fine details or colour.

Range = Hearing Range

Fur

The creature is covered in dense hair that is an excellent insulator as well as acting much like a wet suit when soaked. Creatures with fur can survive in Cold environments and even in Freezing environments when combined with a Blubber Layer.

+30 to endure cold environments

-10 to endure hot environments

Feathers

These highly specialized surface coverings are virtually water proof, and provide good insulation allowing the creature to survive in Cold environments.

+20 to endure cold environments

Gas Bags

These highly specialized organs are filled with a lighter than air gas allowing the creature to float in the air. Given biological chemistry, it's usually hydrogen. Shooting these things is generally a very bad idea since it may explode if wounded.

Flight Speed = Wind Speed (and direction)
Explosion

Blast Radius = Strength / 20

Damage = Strength

Hands

One of this creature's limb-sets ends in fingers capable of manipulating fine objects. Humans have a more refined set of limbs that terminate in hands providing improved Dexterity at some cost in limb strength and overall agility. But this is not always the case.

+20 Dexterity
or
+10 Dexterity, +10 Agility

Inefficient Metabolism

This creature eats lots and doesn't move much.

Life Support Requirements x 2
Endurance -10

Infrared Pits

These specialized organs found on terrestrial snakes and lizards allow the creature to perceive their environment by temperature differences. Creatures with Infrared Pits are able to manoeuvre and fight in total darkness as well as being unaffected by Camouflage and Chameleon detection modifiers.

Range = Eye Sight Range
-20 to detect Cold Blooded creatures

Irritant Spray

This creature can excrete a mildly acidic spray that has a terrible smell to dissuade predators.

Blast Area = Strength / 20

Range = Strength / 20

Effects:

- 50 to all attempts to detect other scents
- 50 to all attempts to track by scent
- 50 to all social actions for a week
- +50 to be detected or tracked by smell

Larval Form

Creatures with an exoskeleton have to grow in a less rigid form and then metamorphasize in order to have a hard exterior. The Larval form is a Devourer with none of the distinguishing traits normally found in adults.

Larval Form Size = Adult Size - 3

Leaping

One of this creature's limb sets is exceptionally long and powerful allowing it to make incredible leaps.

Bound Movement
Vertical = normal move
Horizontal = 2 x normal move

Long Lived

This species has a long life span, as well as smaller litters and longer gestation.

Maturation Time x 2
Gestation Time x 2
Litter Size / 2

Metabolic Overdrive

This creature has a specialized organ that essentially acts like a biological capacitor. When under stress it can act incredibly quickly but at the cost of burning a great deal of oxygen and stored energy at the same time. Overuse of a Metabolic Overdrive can literally kill the creature. Make an Endurance roll each round, on a normal failure the creature drops to the ground exhausted until it can make another Endurance roll. On an exceptional failure it suffers a crippling wound to a randomly determined hit location.

+20 Strength and Reflexes and
-20 Logic and Perception while engaged

Migratory

This creature has a broad range and is always traveling. This may result from population pressures, curiosity, or environmental requirements.

+10 Knowledge and Logic, -10 Perception

Nocturnal

This creature is adapted to being active at night. Its preferred light is night.

x 2 impairment from bright flashes
½ sight range, x 2 hearing range
Stealth is a Fundamental Skill

Pellet Tube

A quirk of evolution has granted this creature a long boney tube attached to its lungs or digestive system, which can fire small rocks or pellets formed from digestive waste products at high velocities. Pellet Tubes are fairly effective weapons as far as biological ranged weapons go, allowing more consecutive shots than a biolaser and more power than darts.

Range = Strength / 10
Damage = Strength / 2

Pincers

The creature has a limb set that ends in huge, serrated, clamp-like shells that can be used to grab and crush prey.

-20 Dexterity
Damage = Strength / 2

Poison Gland

One of the creature's natural weapons, is hollow and connected to a gland that secretes a powerful poison. The poison can cause paralysis or confusion. The target must roll their Endurance each round to resist the effect and the referee must make a matching roll for the creature to see if the poison becomes diluted and ineffective.

-10 to resist per active dose

Poor Hearing

This creature no longer relies heavily on its hearing for communication or information. It doesn't differentiate sounds well and cannot readily discern the direction of their source.

-20 to understand spoken languages
Hearing Range = 10 meters

Poor Smell

This creature doesn't mind how it smells and doesn't understand why it bothers you.

-20 to identify scents

Smell Range = 5 meters

Poor Sight

This creature doesn't see very well it has reduced peripheral vision and can't see in colour.

-20 to visually identify objects

Vision Range = 20 meters

Relentless

This species is on the move and nothing gets in its way. Generally this is a result of overpowering size or numbers but plain stubbornness is not unheard of.

+10 Willpower, +10 Endurance,

-10 Reflexes

Sharp Teeth

This creature's teeth are long and pointy the better to gobble you up my darling. They can also be used to grapple at the end of a tackle as a free attack.

Penetration = Strength / 2

Damage = Strength / 4

Short Lived

The candle that burns brighter must burn shorter, or at least this creature doesn't live very long. Short lived creatures have shorter gestation periods and multiple births which compensate them on the evolutionary scale.

Maturation Time / 2

Gestation Time / 2

Litter Size x 2

Slow Moving

Whatever the reason, this creature is not very fast moving. It likely has short legs and a heavy torso.

Movement Rate / 2

Spines

Some creatures have bony plates that are long and sharp, providing a very effective defense against attackers that try to slam their prey to the ground. Horns are essentially spines on the head.

+10 Initiative

Penetration = Strength / 4

Damage = Strength / 2

Spinnerettes

This creature has glands that produce strong, sticky fibers it can use to trap prey. While the fibers are individually fine and thick, larger creatures usually have multiple spinnerettes that produce thicker, wrapped cables. The web essentially Grapples the target with the creature's Strength, while it is free to leave.

Range = Strength / 20

Stalks

The creature possesses a number of short tentacles on which it has developed sensory or respiratory organs. These are generally eyes but infrared pits or even ears might be on stalks. This allows the creature to see around corners, or while concealed in tall grass or even submerged without exposing any more of its body. Stalks are a very hard target so the target size is twenty points less than is normal for the creature.

Stalk Target Size = Creature Target Size -20

Structural Extensions

The spine or core structure of the organism is often extended to provide the flexible members on which sensory organs and digestive orifices are mounted. A creature can have a number of structural extensions such as heads or tails equal to the number of limbs per set.

Head

The creature has its sensory organs and possibly its mouth mounted on a flexible extension. In terrestrial vertebrates, the brain is located in the head, and it is assumed this arrangement would be common due to the advantages of it being close to the major sensory organs.

Tail

The creature has a long extension of its spine or long axis that can be used to wrap around objects or provide a brace. If the creature has a poison gland its tail can be a stinger.

Counterbalance Tail

The creature's tail is used to improve its balance and ability to twist in mid air.

+10 Agility

Heavy Tail

This creature's tail is long and heavy enough to act as an extra leg, providing it with excellent balance and a brace in a pinch. It can be swung for impact like a kick to the rear.

+10 to resist tackling, throws, and grapples

Prehensile Tail

The creature's tail is long and flexible allowing it to grab objects. If the creature's size is -5 or less it can even hang from its tail leaving all of its other limbs free. In some cases like the terrestrial elephant, the prehensile tail is on the front instead of the back.

+5 Dexterity, +5 Agility
+10 to Grapple

Stinger Tail

A stinger is a sharp barb of bone that is connected to a gland that produces a strong paralytic poison. The target must roll their Endurance each round to resist the effect and the referee must make a matching roll for the creature to see if the poison becomes diluted and ineffective.

+ 10 Initiative
Penetration = Strength / 4
Damage = Strength / 8
-10 per active dose to resist

Thick Hide

This creature has a thick, tough surface, possibly composed of scales or dense hair.

Natural Armour = Strength / 4

Thin Skin

This species is ill prepared for cold weather or rough treatment and as such has minimal natural armour.

Natural Armour = Strength / 16

Whiskers or Antennae

This creature has long hair like organs which serve to detect vibrations and feel what is around it without having to actually look. These allow it to navigate very well in the dark even if it cannot see, almost as if it were possessed of a sixth sense. Whiskers allow it to ignore a shift of one light level when sneaking or searching.

Wings

One of this creature's limb sets has evolved into a functional set of wings. If its Size is less than -5 the creature can fly. The creature can glide if its size is 0 or less. Larger creatures can only control their falls and make exceptional leaps.

Flight Move = 180

Water Storage

One common solution to a dry environment is the storage of water when it can be found. This creature can super saturated specialized tissues in its body allowing it to gorge on water and then go for as much as ten days without more water.

-10 Agility when Engorged

Stationary Organism Traits

Carnivorous

Most stationary organisms draw their nutrients from the ground and energy from their star. However some adapt to substandard conditions by preying on mobile organisms.

Caustic Secretion

This organism deals with various chemical impurities in its environment by isolating and storing them as a deterrent to local herbivores. Any attempt to consume a part of this organism will result in nasty chemical burns.

Crystalline Surface

Various environmental chemicals are combined to produce a thick, hard, non-organic shell for this organism. The crystals tend to be transparent enough to permit photosynthesis.

Deep Roots

This organism's structure extends as far into the ground as it does above it. This makes the organism very hard to kill and allows it to collect moisture and nutrients.
+1d10 - 3 Size.

Diffuse Structure

This organism is really a colony of many smaller organisms, this allows it to survive tremendous amounts of damage but also renders it less structurally sound.

Electrical Discharge

The static electric charge carried by this organism is strong enough to kill. It is probably built up by the motion of its foliage rubbing together in the wind. While this is a powerful defense, the charge takes more than a day to build up to lethal levels.

Explosive Pods

The chemicals secreted in this organism's pods are unstable and explode violently if damaged.

Flying Seeds

The seeds or spores of this organism defy the distinction between plants and animals by actually flying with simple wings. This allows the seeds to escape deep fissures and travel farther in search of fertile soil.

Gliding Seeds

This organism's seeds or spores are shaped like wings or parasols to take advantage of the wind to transport them away from their source.

Hallucinogenic Mist

The chemicals exuded by this organism to attract pollinators are very relaxing and produce delusions and confusion if inhaled.

Hallucinogenic Secretion

This organism is a source of a mildly addictive hallucinogenic drug that effects those who eat any part of it. The drug can be concentrated with simple chemical procedures to make it more addictive.

Incendiary Pods

There are volatile chemicals in this organism's seed pods that are very likely to ignite if disturbed. The chemicals are sticky and hard to remove. The organism is fast growing and its life cycle benefits from being burned to the ground on a regular basis.

Manipulators

This organism has simple hands or tendrils that can be used for a variety of purposes. +10 Knowledge and Logic.

Mind

The orderly growth of this organism and the well tended environment around it is the result of it having developed intelligence. If it doesn't have manipulators, the organism communicates and interacts with its environment in a very slow and methodical manner compared to that of mobile organisms.

Mineral Deposit Crust

This organism draws up minerals from the soil and excretes them on its surface in a thick cement shell.

Mobile

The environment has proven unreliable for this organism so it has developed the capacity to get up and go. Generally this is a very slow sort of movement through capillary action or the caterpillering of limbs and roots.

Needle Pods

The bristling pods on this organism are a particularly effective deterrent to browsers. Each spine sets on a tightly coiled strand of cellulose and can be fired a significant distance as a result of ground vibrations caused by the movement of organisms.

Needles

The surface of this stationary organism bristles with long sharp fiber bundles making it very difficult for any mobile organism to take a bite out of it.

Nutritious Fruit

This organism is a source of delicious food. Thus it tricks the foolish mobile organisms into distributing its seeds, spores, or sprouts into the wider world. Conquest will surely follow.

Poisonous Fruit

This disagreeable organism grows fruit that will poison most mobile organisms and thus enrich the soil with delicious nutrients.

Radioactive

The luminescent surface of this organism is actually toxic radiation. No I really can't imagine why, ask it yourself.

Razor Sharp Edges

The edges of the organism's surface form a sharp serrated blade that can catch and tear the flesh of incautious organisms. Given time it might even wear down and topple larger organisms that are blocking its sunlight.

Rigid Stem

This organism has a woody central column which allows it to grow taller and receive a greater amount of sunlight and rain until the nasty little plant next door saws it down.

Rough Surface

The surface of the organism is thick, dry, tough, and scratchy and as such undesirable for consumption by rapacious mobile critters.

Spikes

The structure of this organism lends itself to the production of long, sharp barbs which stab any mobile organism foolish enough to try taking a bite.

Sticky Seeds

The surface of this organism's seeds is coated with tiny barbs or a viscous liquid that cause them to stick to passing mobile organisms, allowing them to travel great distances.

Sticky Surface

A viscous liquid or small barbed hairs cover the surface of this organism causing it to stick and cling to neighboring stationary organisms and passing mobile organisms. This may be to climb and choke other stationary organisms or to entrap mobile organisms to provide rich nutrients for the soil.

Strong Flavour

The taste and smell of this organism burns painfully. This discourages casual snacking by most mobile organisms but also is much coveted by creative sapients looking for a little spice.

Subterranean Reserve

The bulk of this organism is a massive underground network. The network has everything the organism needs to regrow any surface structures.

Symbiotic Reproduction

This organism is dependant on a mobile species native to its area for sexual reproduction. The common arrangement in the real world is bees gathering nectar and transporting pollen from one flower to the next.

Tangled Vines

The ground, neighbouring stationary organisms, and rock formations are covered in this organism's long, ropey growths. This makes the ground very difficult to walk across without tripping, falling, or becoming entangled.

Torsion Spears

This aggressively defensive organism stores energy in winding coils of fiber that are linked to large, sharp spikes. When marauding mobile organisms approach it the coils relax, flinging a spike with deadly force.

Thorns

The structure of this organism is covered in small, hooked protrusions which snag passing creatures and discourage the eating of structural growths. Thorns do not grow on edible fruits or leaves as they only serve to protect the core organism not its expendable extensions.

Torsion Whips

Parts of this organism resembles a collection of tightly coiled balls of fiber. These lash out viciously, like long whips at anything that brushes against it.

Tough Surface

The surface of this organism is particularly hard and thick and thus hard to chew.

Toxic Vapours

This organism exudes poison gas as a part of its life cycle, likely in an effort to rid itself of parasites. None the less breathing in the vicinity is highly inadvisable. The vapors have a strong odor but by the time one figures out what it is, it is too late.

Water Storage

This organism is well provisioned against drought because it has an internal reservoir that fills with water when it rains.

Technology

The general technological advancement of a society is represented by its Technology Factor. This is a measure of core technologies such as materials, power generation, and information processing. Since we can't really say what the efficiency and power output of an antimatter reactor will be, and indeed the effectiveness of any hypothetical technology will be different from one setting to the next, Galactic Adventures focuses on the effects of devices rather than their names. For example a TF 40 power plant might be a fusion reactor, fuel cell bank, or antimatter reactor. Indeed it's safe to assume different power sources and materials are appropriate to different scales of use. In modern society we use electric motors, internal combustion engines, and nuclear reactors to power different sizes of vehicle.

Coupled with Technology Factors are individual "Advances" these represent shifts in thinking which may not be entirely linked to the general material and mechanical progress, much like the stirrup could have been produced by neolithic cultures. In particular, a variety of hypothetical and downright impossible technologies are implemented as Advances rather than being tied to a specific level of technology, allowing them to be inserted or eschewed from settings without re-writing the rules entirely.

Setting Costs

The base cost of manufactured goods in standard monetary units is its mass in kilograms times the Technology Factor it at which it was manufactured. Other factors relating to availability, legality, and complexity are applied to the base cost to find a final price.

$$\text{TF} \times \text{Mass (kg)} \times \text{Availability} \times \text{Use}$$

Availability

Rare	x10
Scarce	x5
Common	1/5
Ubiquitous	1/10

Use

Raw Materials	1/8	
Prepared Materials	½	Boards, Beams, Fabric

Disposable	1/4	Fuel, Food
Expendable	½	Bullets, Batteries
Weapons	x2	
Illegal	x2	
Hand crafted	x2	

Vehicle Structures

Sealed	x2
Smart	x2

Advances

“Advances” are options that can be applied to base line technology. As suggested by their name, Advances represent refined techniques and capabilities that some societies will develop while others don’t. Advances allow existing vehicle designs to be easily retrofitted to reflect the technological assumptions of a setting without requiring a complete re-design. Hypothetical technologies are always presented as advances allowing them to be easily left out of the design systems.

Computers and skills

After TF 20, almost everything has dedicated chips and similar technology built into it. These, along with nanotech, are assumed to be a part of the technological advances that cause the improvements in efficiency and capacity. For our purposes a computer is any device that stores, manipulates, and applies information. As such, a book is not a computer but a slide rule or mechanical cash register is.

A computer can be a very useful tool when faced with difficult tasks. Computers have a batch of random access skill points and a set of maximum ratings in skills based on specific Characteristics. The random access skill points are allocated to specific skills when the computer is programmed, and the points dedicated to a skill cannot be moved around without erasing that skill. But the computer can run multiple copies of a skill for multiple users if it has unallocated skill points available.

While computers will often have very high ratings in skills, it is important to remember that a computer needs very specific instructions to operate properly. Any set of instructions that are supposed to function without supervision, only have a chance equal to the programmer’s Computer skill rating of functioning as desired in any given circumstance. Furthermore, the computer is only able to operate equipment it is linked to. A computer with the Mechanic skill is only a reference work, if it isn’t linked to a set of arms.

Computers can use their skill ratings on a character’s behalf. However, a computer that is not connected to an appropriate set of robot arms (really big ones being useless for surgery, for instance) can only assist in an action as if it were an additional person. Computers can only make up half of the workforce on any project that requires hands.

Computers are not prone to aging in the same sense as sapient life forms, however they are prone to obsolescence.

Agility	TF
Dexterity	TF + 40
Endurance	-
Knowledge	TF + 60
Logic	TF + 60
Perception	TF + 40
Reflexes	TF + 60
Strength	-
Talent	-
Willpower	TF +40

$$\text{Total Skill Points} = \text{Mass} \times \text{TF} \times 10$$

Cybernetics

Mechanical limb and organ replacements are available by the middle ages with elaborate systems existing that allow a hand to be locked in an open or closed position and simple pivoting ankle joints. These are rare, labour intensive and rarely much better than a good solid hook or peg. In modern times, rapid improvements in computers and electric motors are making great strides towards functional replacement limbs. Connection to the body and nervous feedback are still major barriers, of course.

The majority of cybernetic devices amount to a characteristic rating replacement. An arm's rating would replace that arm's Strength and Dexterity, while an eye would replace Perception for visual spotting. Artificial hearts and kidneys provide specific replacements to the character's Endurance score. Weapon, tool, and sensor mounts are also possible if less practical.

Nervous System Interfaces

Skills Default To 0 - This device is too primitive to provide any real ability. In fact it basically acts as a penalty equal to the character's normal default.

Skills Default To TF - The cybernetic device's usefulness is largely dependant on the quality of computers and mechanical apparatus so it provides defaults based on the hardware.

Skills Default to the device's ratings
- The complexity of the cybernetic device is so completely interfaced with the user that it's ratings act as if they were the character's own Characteristic ratings. With such devices the character's skill ratings can even improve and interact with the device's Characteristics normally.

Arm	Strength + TF - 30*
Leg	Agility + TF - 30
Heart	Endurance + TF - 30
Lung	Endurance + TF - 30
Liver	Endurance + TF - 30
Kidney	Endurance + TF -30
Stomach	Endurance + TF - 30
Wing	Power Capacity = TF x Mass
Eye	Perception + TF -30
Ear	Perception + TF -30
Interface Device	

* An individual arm's Free Load is equal to $\text{Strength}^2/\text{Number of Arms}$

Nanotech

Machines composed of a few molecules are often presented as having virtually magical powers. These range from metamorphosis into various devices to eating everything around, like a super acid. The main role of nano-tech in these rules is seen in the improvements in manufacturing and medical technology. In these roles the nano-tech can be contained within the factory environment and controlled by central servers reducing the risk of unfortunate accidents.

While this powerful technology has its applications it also has its limits. As much as computers continue to get more powerful, the processing power of nano machines is limited by their infinitesimal size. Molecules are sticky and there's really no way to lubricate them, so many traditional mechanical structures are less than optimal. As they can only store a very limited amount of information, individual nano-machines need to be able to receive and carry out on-going instructions. The low level radio emissions used to communicate commands are vulnerable to disruption by strong electromagnetic fields. The laws of motion and thermodynamics apply to nano-tech as surely as any other matter.

Nanotechnology is generally powered by the ambient electromagnetic field and can be burned out by surges. This low power level is insufficient to power many macroscopic roles and will need to be supplemented with a better power supply. It is also quite vulnerable to high temperatures. Reducing it to plasma is a sure fire way to know nano-tech has been eliminated.

It is important to keep the conservation of energy in mind. Nano-technology has access to plenty of electrostatic energy on the nano-level but nano-tech objects still require sufficient energy to work on the macro level. It may seem magical but it doesn't get to violate physics.

Each nano-machine will probably have a single function and a receiver that turns it off and on and three or four socket / grippers that link it to the next machine or a radio frequency receiver by which it can be instructed.

Biological Nano Tech

One branch of nano-technology emulates methods found in natural biological organisms rather than machines. The line between biological nano-tech and microbial bio-engineering is very fine. Biological nano-tech uses chemical coded molecules to store and transmit data like organisms and thus need to be in contact to transmit instructions.

Lattice Nano-Tech

If every machine has at least one socket/gripper, broadcast commands become unnecessary but the reach of the nano-tech is limited to a physical object like a ball of goop or a block and cannot spread out into a cloud. This limits the aerial capabilities of the nano-tech as it cannot simply disperse though it may organize into an aerodynamic form with ducted fans or propellers.

Node units receive and relay instructions, in a lattice arrangement, nodes will have six to eight socket/grippers to link up more machines and can receive and send radio instructions.

Disruptors generate electromagnetic pulses much like a capacitor to break down molecules into their component atoms and rearrange them into new ones. Note that nano-technology cannot break down atoms and rearrange them into other atoms.

Burners generate precision laser bursts that can be used to transmit energy, join atoms into molecules, and relay tight beam communications to receiver units.

Receiver units are sensory apparatus that attempt to provide the system more information than it can accumulate through contact. Receivers can receive information pulsed by burner units to allow clearer communication than radio waves allow especially in high static conditions.

Generator units can produce and store power which can be passed to other units through gripper/sockets.

Manipulator units can attach to objects and manipulate them. Manipulators need to be able to move and grip objects. Manipulators generally resemble a spiky ball that uses its spines to grip and move.

Aerostatic units use a hydrogen gas bag to generate lift and are common in aerosol nanotech.

Heli units use a tiny rotor to generate lift this is generally less efficient than aero units but provides an alternative.

Filler

Nanotech needs raw materials to build things with, while it can harvest from the surrounding environment it is normal to include a percentage of the necessary raw materials. If the nano-tech is supposed to make bullets it's a good idea to include gunpowder as filler. More commonly, biomass, concrete, and plastic are common materials loaded into a nano-tech colony for production purposes and if the nanotech is intended to turn into a power plant it's helpful to include fuel compounds in the mix.

Superscience Units

Generally nano-tech is limited by the laws of physics and it's a good thing too. The anti-gravity and force field projectors are simply too bulky and complex to function at a molecular level but, supposing they aren't, a variety of new capabilities become available. All super science units are assumed to be power hogs requiring an equal number of generator units.

Anti-gravity units allow nano-tech to ignore gravity, letting it fly and drift freely without a medium to interact with.

Force field units allow nano-tech to isolate itself from its environment, allowing it lubricate its passage through the microverse.

Gravity generator units allow molecules to be pushed away creating a clear path, allowing the nano-tech to move much faster. They can also be used to drag down and manipulate macro-scale objects. Nano-tech carpeting may well be a standard feature of super advanced star ships, compensating for acceleration and negating the deleterious effects of life in free fall.

Plasma Tech

At very high Technology Factors it may be possible to create currents in plasma that function as nano-technology in a very high energy environment. Such machines could work in the corona of a star or a fusion reactor. These things would be larger than nano-tech, indeed, they might be larger than worlds. Outside of a star or fusion reactor, plasma-tech is very short lived. Plasma is very susceptible to magnetic fields and temperature. Without a source of constant energy input a plasma-tech device will quickly revert to a gaseous or solid state. For the most part plasma-tech is the stuff of stellar engineering and directed fusion demolitions. One way in which such technology might manifest in a more human scale is plasma weaponry that can produce holographic blasts or chase star ships as they maneuver at warp speeds.

Self Replicating Nano-Tech

Nano-tech becomes truly dangerous when it can produce more nano-machines. This is the world eating grey goo of fiction. In order to reproduce itself, a nano-tech colony requires manipulators, harvesters, disruptors, burners, and a program directing it to do so. Self replication slows a nano-tech glob or swarm down as resources must be devoted to deconstructing materials encountered and manufacturing more nano-machines. The faster a nano-tech colony grows, the slower it moves.

Self Terminating Nano-Tech

Given the danger of uncontrolled self replication nano-tech, it's safe to say that safety features may be required by societies that use it. One common safe guard is a command that causes the nano-tech to destroy itself when it finishes a set of instructions. This may also be useful in preventing the copying of proprietary technology.

Nano-Tech Neural Networks

A sufficient concentration of linked node units can function as a neural network, inherently making nano-tech a computer. While the information density is much lower than a standard computer due to the nodes with other functions, large nano-tech colonies may even achieve self awareness. H.P. Lovecraft's "Shoggoths" may have been a prophetic warning.

Nano-Active Materials

There's a real difference between an object with some nano-machines in it and a blob of solid nano-tech. In some societies it is not uncommon for humans and others to have paramedic nano-machines in their blood to boost their immune system and speed healing. Nano-tech in the muscles can boost strength and endurance. Highly flexible and durable fabrics may well be nano-tech latices that enhance the physical abilities of the wearer while providing excellent protection from environmental hazards. Nano-tech in the eyes may be able to reconfigure the rod and cone structure to provide adaptive vision allowing the host to see a broader range of the spectrum. Much of this is assumed in the basic technology factor used to establish ratings for devices.

Fixed and Open Nano-Tech

A nano-tech unit may be designed to fulfil a single function or to be an open and flexible universal resource. Fixed nano-tech has fewer node and receptor units and can generally carry the program that fulfils its function. Self replicating nano-tech goop is usually form of fixed nano-tech that is only capable of reproducing itself. Open nano-tech has a higher percentage of node and receptor units and a more generalized and balanced mix of other unit types to allow it the flexibility to operate however it may be directed.

The functional limitation of nano-tech is the amount of it in the system as a percentage of mass.

Active nano-tech is less durable than traditionally manufactured materials due to the active element in the material. Nano-tech that produces high temperature environments like furnaces and power plants fuses and becomes inert. Self forging nano-tech is designed to do so, with a load of filler of appropriate high melting point materials like ceramics or titanium.

Primitive nano-tech can form itself into vague objects with obvious functions like sofas and tables.

Standard nano-tech can form crisp mechanical machinery and basic electronics like light switches and bulbs.

Advanced nano-tech can replicate complex electronic devices

Hacking Nano-Tech

While the small instruction set used to control nano-tech is easy to work with, it is fairly limited in terms of exploits and interfaces. The radio frequencies used to communicate within a nano-tech colony are very low powered and low frequency. It takes a very precise transmitter and receiver to interact with them and even then only at close range. Nano-tech lattice cannot be hacked without directly linking into the grasper/sockets of the targeted colony. If nano-tech is being directed by a central control computer that broadcasts instructions, as is often the case when dealing with complex or precise functions, the hacker must access and take control of that computer or broadcast matching signals while blocking or cancelling out the original source of instruction. Nano-tech cannot do anything it does not have an instruction set for and directing any complex operation is too complex for any spur of the moment notion. Without the proper software it isn't possible to do much more than turn the nano-tech off or on.

Nano-tech can absorb objects and deconstruct them molecule by molecule. The damage is the square root of the mass of the nano-tech times the technology factor. It penetrates softer materials and flesh and is resisted by hardened materials like armour.

Nano-tech is expensive, costing $10 \times$ its mass times the Technology Factor. Each class of Nano-active bioware costs ten times the Technology Factor times the mass of the patient.

Performance

Paramedic nano-machines in the blood give a bonus equal to the technology factor to Endurance rolls to resist poisons and diseases and to cut the healing time for wounds by the technology factor as a percentage.

Hero nano-machines in the muscles and skeleton give a bonus equal to the technology factor to Strength even when resisting physical impacts.

Ocular nano-machines allow the eyes to adjust their lens shape and rod and cone structures to alter the portion of the spectrum the host can view. These provide Acute vision, low light, and infrared vision traits.

Nano-tech is vulnerable to electric and heat attacks including lasers, plasma blasts, particle beams, electrostatic discharges, and burning fuel.

Machines and vehicles with nano-machines imbedded in them or coating them can heal damage as if they were organisms with an Endurance score equal to the technology rating.

A nanotech colony can act as a computer of the same Technology Factor of a mass half the proportion of the colony composed of node units. Thus a 10 kg cloud of nano-machines with 1 kg of node units in it will function as a 0.5 kg computer.

A standard or advanced nano-tech colony of sufficient mass can replicate any tool or mechanical weapon. Advanced nano-tech can replicated energy weapons. The range and damage of firearms morphed out of

nano-tech is usually halved as the components for propellant contained in the nano-tech are generally limited. The ammunition of energy weapons is similarly halved. . Fixed nano-tech that is intended to turn into weapons does not have this limitation.

Locomotion

The medium in which nano-machines move is quite unlike the macroscopic universe. Movement through air is more like crawling through a sticky ball pit and solid objects are more like a spongy field of rocks with frequent large pits and gaps. Nano-tech deals with its environment on a very direct level making climbing and walking more effective than rolling or floating.

Any nano-tech can ooze along at the manipulator unit proportion of its mass times the technology factor meters per second. If it has at least thirty percent aero-static or rotor units it can drift through the air instead. Eating everything in its path to make more nano-tech slows it down by fifty percent. Anti-gravity nano-tech moves at twice the technology factor times the proportion of anti-gravity units.

A standard or advanced nano-tech colony of sufficient mass can take the form of a vehicle and move and function as a vehicle of that type. It's fuel tanks will only be a tenth full unless there are appropriate volumes of fuel volatile filler units in the mix. The armour and structural ratings will be half normal. Yes, self aware nano-tech colonies could change from a vehicular form into a robot. I can't imagine why you'd ask.

Vehicle Design

Make no mistake, in spite of the use of some realistic formulae, the vehicles designed with these rules are primarily rules oriented abstractions rather than realistic simulated models. In part this is because any advanced or hypothetical technologies presented here are, as of yet, based on speculation rather than actual working models. A “fusion plant” in one setting may function differently from one setting to the next but a Level 80, Efficiency 50 plant is clear in its workings from the perspective of the rules.

While some will undoubtedly argue that these rules should have been reduced to a point system or even just left to the referee’s discretion to avoid the math involved, this system is intended to provide consistency of method and acceptable results that pay at least lip service to the laws of physics and are reproducible. Yes, different power plants should have different output levels, and various fuels have specific densities and handling requirements, but Galaxies in Shadow is a game and it doesn’t need to be any more complex than it already is.

Vehicles are designed by making a list of desired components and totalling their mass and volume. A structure is then designed to contain the components. The volume of the components is based on their contents and accessibility. Many components are assumed to be part of the structural mass of the vehicle and have no mass of their own. This assumption serves to remove the need to account for every seat and seat belt. Similarly, machinery is assumed to have a uniform mass based on half the density of iron to allow for moving parts.

Units of Measure

Vehicle Volumes are measured in cubic metres, mass in tonnes, power in kilojoules, and surface area in square metres.

Variable System Volume

The volume of the various systems installed in a vehicle depend a great deal on how accessible they are. For this reason systems have their volume set by their relationship to the exterior of the vehicle. Things mounted outside of the armour are described as external systems and do not benefit from the vehicle’s armour. Things that are right on the surface of the vehicle are defined as external access. Anything that has space provided inside the vehicle to make it accessible is called internal access. Some systems cannot be reached without removing other systems, these are called inaccessible.

The volume and surface area requirements are given in cubic and square metres per tonne.

Tight External Access	Volume x 4
Tight Internal Access	Volume x 2
External Access	Volume x 2
Internal Access	Volume x 1
Roomy Internal Access	Volume x 0.5
Fuel	Volume x 0.5

Tight Access systems must be physically removed from the vehicle before they can be serviced or repaired.

Multiple Units

Most systems will be installed in multiple units but there isn't much mechanical difference in the design rules. In combat, however, the separate units are smaller and thus more likely to be disabled but only that portion of the output is lost. Thus, while a four engine system is more likely to have individual units destroyed it only loses a quarter of its power when that happens.

Surface Area

One of the fundamental truths of engineering is that surface area increases at the square of linear measurements and volume at the cube. The following formulas can be used to generate specific shapes. The rough shape of the vehicle is good enough, don't feel the need to calculate the surface area and volume of every turret.

Square & Rectangle

$$\text{Volume} = \text{Length} \times \text{Width} \times \text{Height}$$

$$\text{Area} = 2 \times \text{Length} \times \text{Width} + 2 \times \text{Width} \times \text{Height} + 2 \times \text{Length} \times \text{Height}$$

Wedge

$$\text{Volume} = \text{Length} \times \text{Width} \times \text{Height} / 2$$

$$\text{Area} = \text{Length} \times \text{Width} + \text{Height} \times \text{Length} + \sqrt{\text{W}^2 + (\text{L}^2 + \text{H}^2)}$$

Cylinder

$$\text{Volume} = \pi \times \text{Radius}^2 \times \text{Length}$$

$$\text{Area} = \pi \times \text{Radius}^2 \times \text{Length}$$

Sphere

$$\text{Volume} = \frac{3}{4} \pi \times \text{Radius}^3$$

$$\text{Area} = 4 \pi \times \text{Radius}^2$$

Dome

$$\text{Volume} = \frac{3}{8} \pi \times \text{Radius}^3$$

$$\text{Area} = \pi \times \text{Radius}^2 \times \text{Length} + \pi \times \text{Radius}^2$$

Note that the bottom of a dome that's attached to a larger object doesn't have to be armoured at which point its surface area is simply half that of a sphere.

Distributing Hit Locations

A vehicle hit location chart has twenty numbered slots, each representing five percent of the vehicle's surface area. The first slot represents the very front of the vehicle and the twentieth represents the tail end.

To fill in the hit location chart, calculate five percent of the vehicle's surface area by dividing it by twenty. Then list the existing systems using as many slots as necessary. Some small systems can be lumped in with large systems but at times it will be better to integrate an additional one to ten chart to allow half a percentage increments as long as this doesn't turn the chart into a gigantic monster.

Systems that only face one side can be indicated by a letter code next to the location 'F' for front, 'T' for top, 'L' for left, 'R' for right, 'U' for underbody, and 'B' for Back. Treat these as a single percentage or a fifth of a slot. Again, this shouldn't be allowed to bulk out the chart. Most systems can be hit from at least two sides.

Sometimes systems are contained within structures. Such as weapons in turrets or wings. These have an overlapping hit location range. If the wing is hit on 12-14 and the weapon is hit on a 13, both the wing and the weapon are hit on a roll of 13.

Full Slot	5%
1/10 Slot	0.5%
Side Slot	1%

Over Thinking Vehicle Hit Locations

If you visualize your vehicle inside of a 20 x 10 x 10 cube with the very front at 1,1,1 and the very end at 10,10,20 you'll realize that there are 2000 possible hit locations, with six corner points, 16 edge spots with two external sides, 108 squares that are not corners or edges and 704 internal cubes. At this point either you're visualizing your vehicle crushed into a cube or that cube has been stretched out over your vehicle. While the idea is to keep hit location tables small and simple, being able to map out hit locations in more detail can be useful. Just remember that things on opposite sides can generally have the same location as each other because the one facing the attacker will be hit and that most vehicles are basically symmetrical in at least one dimension.

Structure

The most basic element of a vehicle or a building is the structure that contains the various components.

$$\text{Structure} = \text{Mass} \times \text{Acceleration} / \text{Surface Area}$$
$$\text{Structural Capacity} = \text{Structure Mass} \times \text{TF}$$
$$\text{Integrity} = \sqrt[2]{(\text{Structural Capacity} \times 50)}$$
$$\text{Structure Volume} = \text{Structure Mass}$$

$$\text{Requirement} = \text{Mass} \times \text{Acceleration} / \text{Surface Area}$$

Target Size

There is a plus ten to hit for every doubling of facing surface area. It is easiest to figure this out when working out armour.

Structural Features

Some components, such as unpowered wheels and wings are really just a part of the structure and contribute nothing to the empty mass of a vehicle.

Grapples and Trailer Hitches

These are just structural features that add no mass and consume no volume. However the designer must provide a structure and motive power supply that can withstand the extra load. Grapples can even be built to handle the thrust of an external vehicle like a tug.

Buoyant Hulls

A buoyant hull is a structural feature that requires at least 20 points of armour on the sides and bottom of the vehicle. If the mass of the vehicle is no more than 50% of its volume it can float in the water. Yes, technically the mass just needs to be less than the volume, but if a properly hydrodynamic shape and reasonable draft are desired a better ratio is necessary.

$$\text{Stability} = 250 \times \text{volume} / \text{mass}$$
$$\text{Resistance} = 250$$

Dive Tanks

This system of tanks and pumps allows the vehicle to take on water in order to sink and perhaps more importantly, rise out of the water. Dive tanks require a sealed vehicle with a life support system. Dive tanks are a structural feature. Water masses one tonne per cubic metre and the vehicle's mass in tonnes must be increased in excess of its volume.

$$\text{Crush Depth} = \text{Structural Capacity} / \text{Pressure}$$

Armour

A good thick layer of something hard between you and a hostile universe. There are actually four Armour Ratings, however, for the sake of simplicity it is assumed that most vehicles are designed to provide a well rounded defense. Heavier armour can be applied to a side of the vehicle at one sixth of the normal mass.

Chameleon Armour: The vehicle's surface layer is an advanced liquid crystal display that always counts as appropriate camouflage.

Photo Voltaic Armour: The surface of this armour acts as a solar panel 50% of the vehicle's surface area.

Power Sink Armour: This advanced form of Photo Electric Armour is sufficiently advanced to absorb fire from laser attacks and redirect it to the vehicle's batteries.

Stealth Armour: The surface coating on this armour is radar and light absorbent making it hard to detect the vehicle with sensors.

Specialized Armour: Each of the four armour sub ratings is assumed to make up an equal part of the armour's mass. Penetration Resistance (or surface hardness) resists the Penetration of physical weapons. Impact Distribution (or padding) reduces the damage done by projectile weapons and other physical impacts. Energy Deflection (or reflectivity) resists the Penetration of energy weapons and Energy Absorption (or insulation) reduces the damage done by them.

Armour

$$\text{Armour Volume} = \text{Armour Mass} / 10$$

$$\text{Armour Rating} = \sqrt{\text{TF} \times \text{Armour Mass} / \text{Surface Area}}$$

$$\text{Target Size} = \text{Surface Area} / 2^n$$

Accommodations

Transporting things is the primary role of a vehicle. As such room for passengers and cargo are key features. Most of these are structural features consuming only volume and only adding to the loaded mass of the vehicle when filled.

Cargo

One of the most basic roles of a vehicle is carrying stuff. Cargo volume can be loosely or tightly packed with just about anything. It is assumed to contain all the necessary shelving brackets, hooks, pulleys, and tie down rings needed to properly secure cargo.

Structural

Average Cargo mass = Volume

Hangers

A hanger requires at least twice the volume of any craft intended to land in it.

Launch Tubes

A launch tube is designed to fit a specific vehicle and only needs 120% of that vehicle's volume.

Life Support

The ducts, tanks, filters, and scrubbers for a life support system are installed throughout the vehicle and as such, there is no life support hit location. On a larger scale, rest rooms are included in the life support system and often linked to a greenery or recycler. A life support system can include external vents if there is any advantage to having them. Like structure and armour, the volume of the life support system is not included when building a hit location table unless the vehicle has a large central processing unit.

Closed Systems

A life support system that is large enough can produce fresh air and even food as part of its process. At lower Technology Factors this is a greenery compartment while in higher tech systems it's a recycling system.

Seats

There are real advantages to sitting in a nice, safe seat with safety restraints when compared to standing around in a cargo bay. External access seats are close enough to the surface of the vehicle that a passenger can just climb out of the exit directly from the seat. Internal seats allow room for a access corridor.

Rooms

The volume of a room is easy enough to calculate from its dimensions. Most rooms will have a height of 2.5 metres. For extended trips assume each person needs 10 cubic metres of living space.

$$2.5 \times 4 \times 5 = 50 \text{ cubic metres}$$

Air Tanks

By re-mixing the air in a life support system with fresh oxygen the vehicle can operate without external air for a certain length of time.

Greenery

This complex series of tanks, screens, and vats recycles air and bodily waste by growing algae which is then dried and compacted into edible if bland bricks. A life support system coupled with a greenery system can run indefinitely so long as it is not over taxed.

Recycler

Advanced nanotechnology or replicator systems cycle waste air and back into base materials for re-use. Like a greenery a recycler allows a life support system to run indefinitely.

Spin Simulated Gravity

While artificial gravity is an unlikely development it is possible to use centripetal force to simulate the force of gravity. The rotating section needs to be large enough that the corolis effect doesn't snap people's necks when they turn and there will always be an odd drift in the direction of the spin. Two counter spun spin sections are needed to cancel out the torque effects on the ship's heading but other than that the concept is functional. Treat a spin section as a large turret or mount the habitat section on an extensible boom.

Artificial Gravity

The use of artificial gravitational fields is pure fiction but it allows for people to walk around on laterally arrayed decks and is quite convenient for low budget science fiction television shows. If it exists, artificial gravity is a life support system advance. Vertically arrayed decks under constant thrust provide a similar effect without the hardware.

Inertial Dampers

These magical fields make everything in the ship move relative to the motion of the ship and thus protects them from impacts and acceleration effects. In settings where they exist they are a structural life support system advance. They may increase the structural strength of the vehicle as well due to the reduced structural strain of acceleration and would go a long ways to explaining those absurdly sized ships jumping to absurd velocities in absurdly short period of time not breaking up.

Life Support Statistics

Machinery

$$\text{Total Mass} = \text{Supported Mass} / \text{TF}$$

$$\text{Self Contained System Threshold} = 1000 / \text{TF}$$

$$\text{Maximum Supported Organism Mass} = \text{System Mass} \times \text{TF} / 100$$

Power Plants

The exact type of a power plant that is most efficient for a vehicle of a given size varies enormously. In the modern world we use everything from internal combustion engines to nuclear power plants to do the job. Since the actual workings of advanced power plants vary greatly from one science fiction universe to the next, we won't bother defining the nature of power plants in rules terms. This makes it easier to convert vehicles from one setting to another.

Machinery

n = any number

$a = 2$ for self contained power plants and 1 for air breathing power plants

Power Output = TF x Mass x n

Fuel Consumption = $a \times \text{Volume} \times n^2 / \text{TF}$

Air Breathing: A power plant that uses atmospheric gases as a component of its reaction is able to run for longer than one that is self contained.

Batteries: A self contained power storage device that can have its fuel recycled by applying power. Batteries are built just like power plants, except their fuel and the power plant are a single unit. Battery fuel has a mass of four tonnes per cubic metre instead of being a Structural Feature.

Solar Panels: Photo electric cells and their advanced cousins turn sunlight into power, of course this is only good if the sun is shining on them.

Output = TF x Surface Area m² / Orbit #

Reactors: Fission, fusion, and antimatter power sources are big and bulky and what they save in fuel they lose in cooling and shielding. Fission plants are highly radioactive. Fusion plants produce ten times as much power but run extremely hot and containment failures are generally instantly deadly. Antimatter requires extensive shielding and containment for its minuscule fuel supply but produces one hundred times as much power. While these things are partly represented by the efficiency factor. Nuclear reactors have coolant rather than fuel in proportion to their efficiency as normal and are then able to run non-stop. A reactor must have coolant equal to its mass divided by the technology factor or it can only run at a fraction of its normal output of its normal output without overheating.

Fission Reactor Threshold = 1000 / TF

Fusion Reactor Threshold = 10000 / TF

Antimatter Reactor Threshold = 100000 / TF

Fission Reactor Output = 1 x Mass x TF

Fusion Reactor Output = 10 x Mass x TF

Antimatter Reactor Out = 100 x Mass x TF

Fuel

It's assumed that the vehicle is carrying fuel that's appropriate to its power plant's needs. Atomic and Antimatter fuels tend to be small, dense, and requiring massive storage facilities. Which are removed with the fuel, since it's usually even more dangerous after its used up. Reactors have very low fuel requirements but require a great deal of coolant which might as well be fuel.

n = power plant efficiency multiplier

Fuel Mass = Fuel Volume / 2

Explosion = $10 \times \sqrt[4]{\text{Fuel Volume} \times n \times \text{TF}}$

Propellers

A power plant can be attached to an external propeller to turn its output into thrust with a minimal increase in mass. Propellers are just a design feature, but they aren't protected by armour and if the power plant is hit from the direction they face, the propeller is automatically destroyed.

External, Machinery

Propeller Mass = Power Capacity / TF

Rotors

A very large propellor or perhaps, a pair of long thin wings is rotated by a jet's turbine or power plant to create lift and propulsion. Vehicles with rotors can hover, lift off, and land vertically. Rotors are a structural feature that takes up two percent of the vehicle's volume. The rotor is attached to the top of the vehicle out side of the armour and is destroyed by any hit to the top of the vehicle or any hit to the power plant from other angles. Rotors can be installed in a turret, allowing the vehicle to use wings to fly at greater velocities.

Rotor

External, Machinery

Rotor Mass = Power Capacity x 2 / TF

Top Speed = $50 \times \sqrt[3]{(\text{Motive Power} - \text{mass} \times 0.5) / \text{mass}}$

Rockets & Jets

Hot gas directed out of a nozzle at high speeds pushes the vehicle forward. The difference is that a jet sucks in gas from the surrounding atmosphere and heats it up, while a rocket must carry its own propellant.

Machinery

Jets: Volume x 2, Fuel Consumption / 2

n = any number

$a = 2$ for rockets and 1 for jets

Thrust Output = TF x n x Volume

Fuel Consumption = $a \times n \times \text{Volume} / \text{TF}$

Vectored thrust: a system of vents can be installed on any rocket or jet powered vehicle, allowing it to hover, land, and lift off vertically. These jets are not designed for long term flight, just to get the aircraft off the ground and up to its airframe's stall speed. There must be thrust in excess of the vehicle's mass times local gravity in order to lift off and hover. For a long term hovering system just install rockets or jets on the bottom of the vehicle or mount them on pivots. The local gravity is subtracted from the vehicle's acceleration while it is using vectored thrust.

Advance

Hybrid Rockets: eventually systems are developed that use turbines to take in air but gradually switch over to internal reaction mass to maintain performance as the atmosphere gives way to vacuum.

Contact Suspensions

Wheels, legs, and tracks are all represented by a contact suspension. While these are all structural features, they require a transmission system (q.v.) to change power into motive force. The Stability of a contact suspension is also its safe off road speed.

$$\text{Stability} = \text{TF} \times \text{Suspension Volume} / \text{Vehicle Volume}$$

$$\text{Legs Top Speed} = 10 \times \sqrt[3]{\text{acceleration}}$$

$$\text{Tracks Top Speed} = 20 \times \sqrt[3]{\text{acceleration}}$$

$$\text{Wheels Top Speed} = 30 \times \sqrt[3]{\text{acceleration}}$$

$$\text{Transmission Capacity} = \text{TF} \times \text{Mass}$$

Hover Fans

A large fan, and a set of flexible skirts allow this vehicle to float on a cushion of air. Hovercraft can cross water and land at high speeds, but a hover fan doesn't provide any motive force. Hover fans and are a structural feature skirts take up 10% of the vehicle's volume and require power equal to half of the vehicle's mass.

$$\text{Stability} = \text{Fan Volume} / \text{Vehicle Volume}$$

$$\text{Top Speed} = 250 \times \sqrt[3]{\text{acceleration}}$$

Airframes

The shape of a wing causes air to take longer to pass over it than under. This creates a pressure difference that, at sufficient velocities, lifts the vehicle into the air. Wings are assumed to include retractable landing gear with fuel and other items being moved into the wing volume to make up for any assemblies that are needed in the main body of the aircraft. The things in the wing can be hit when the wing is.

Structural Feature

$$\text{Air Speed} = 10 \times \text{Stall Speed} \times \sqrt[3]{\text{acceleration}}$$

$$\text{Stall Speed} = 10 \times \text{Total Volume} / \text{Wing Volume}$$

$$\text{Stability} = 1000 \times \text{Wing Volume} \times n / \text{Total Volume}$$

$$\text{Manoeuverability} = (100 \times \text{Wing Volume} / \text{Total Volume} \times n) - 10$$

Wing In Ground

A wing generates considerably more lift when it is very close to the ground. Some vehicles are designed to fly right along the surface.

Variable Airframe

This airframe includes machinery that allows it to cut it's Resistance in half by doubling its Stall Speed.

Machinery

$$\text{Mass} = \text{Volume} / 4$$

Dynamic Airframe

The airframe is designed to be radically reconfigured to match conditions. Not only can it quarter its Resistance by increasing its Stall Speed by a like amount but it can also function as a Wing In Ground.

Machinery
Mass = Volume / 2

Ornithopter Airframe

This airframe moves and flexes like a bird's, adjusting individual vanes precisely to match the air around it. This allows limited hovering and very tight maneuvering at the cost of powering the wings.

Machinery
Mass = Volume

Thrusters

Systems that draw power from a power plant to accelerate reaction mass, such as atomic rockets, ion drives, and reaction-less drives are treated as Thrusters. The advantage of Thrusters over Rockets and Jets is that less reaction mass is consumed.

Machinery
Thrust Capacity = Mass x TF
Reaction Mass Consumption = Mass / TF

Reactionless Thrusters

While they manage to violate all of the laws of physics we know and probably the ones we don't know too, thrusters that don't need to expel reaction mass are quite common in science fiction. They certainly make space travel much simpler to manage. Coupled with Quantum Flux generators and Replicators they can be extremely problematic and powerful in play.

Anti-Gravity

If technology that can turn off gravity exists in the setting it becomes much easier to get off world, which is why it is so common in space opera settings. Anti-Gravity makes space travel cheap and easy. An anti-gravity system can cancel mass equal to the Technology Factor times the unit's mass and is generally installed as plates in the floor. Anti-Gravity materials whether wood or metal are a great unobtainium for prospectors to seek on strange worlds. Anti-Gravity materials may be necessary for the creation of anti-gravity units or they may be self powered and simply float around.

Anti Gravity Unit Capacity = Mass x TF
Anti Gravity Unit Power = Mass x TF
Anti Gravity Material Capacity = Mass x 25
Top Speed = $1000 \times \sqrt[3]{\text{Acceleration}}$

Faster Than Light Drives

Faster than light travel is exceedingly unlikely under the standard model of physics. As such a setting specific advance is required to obtain or build them. Most faster than light drives function much like any other engine, except that they supply a fixed maximum velocity rather than an acceleration rate. The actual pseudo velocity achieved is very dependant upon the story needs of the setting. A few alternatives have been provided below. These can be considered advances which must be developed in sequence. With the basic unit being discovered first.

$$\text{Drive Speed} = \text{Drive Mass} \times \text{TF} / \text{Vehicle Mass}$$

Advances:

Basic: Drive Speed x 1 light year / 10 days

Slow: Drive Speed x 1 light year / day

Average: Drive Speed x 10 light years / day

Fast: Drive Speed x 100 light years / day

Incredible: Drive Speed x 1000 light years / day

Chronal Sump

One of the big problems with faster than light travel is that you actually arrive before you left. This is a problem for any story that requires continuity as you can turn around and get back before you left. Assuming that the time ratio in transit adjusts accordingly is a simple work around for this problem. If a ship would have arrived 100 years earlier than it left on a one year journey, the perceived time in transit is actually 1/100 the actual time. The creators of faster than light drives might even build such features into the drive deliberately to preserve the integrity of the stock markets.

Space Warp

A rare gravitic lensing effect creates a natural wormhole connecting two points in real space providing instant transit between two points with a heading and velocity determined by the vessel's motion upon entering the gate but correcting for the relative motion of the gates themselves. As they have a weak gravity field, space warps may orbit a star or a world.

Gate

A warp gate is an artificial space warp and requires no faster than light drive, passing through the gate instantly transports the object through time and space. Gates may require another gate as an end point but might just require a gate on the other end to get back. Exploration ships might carry folding gates to allow them to get home.

Inertialess Drive

Inertia is the property of mass that resists acceleration. One way of looking at the problem of faster than light travel is that the apparent mass of the accelerating object becomes virtually infinite as it approaches C. If it was possible to turn off the inertia, it would be possible to instantly accelerate to any velocity. In practice most such drives just reduce the inertia and thus still require power to accelerate and have a finite top speed even if it is faster than light. In game terms the drive allows ships to move Technology Factor times the speed of light.

Instantaneous Transit

A drive that functions by scaling up quantum entanglement or by passing through another dimension might not take any time at all to get from point A to point B. The accuracy of such a process still might require a space ship as planets are pretty small targets compared to the vastness of space and minute angular errors can really add up. Gates and worm holes often allow instantaneous transit.

Repulsion Drive

A drive that produces negative gravity inversely proportional to distance that pushes objects away. This can be used to explain the ridiculous performance of space opera vessels. Especially if the field is exponentially stronger as it moves out of a natural gravity field. Thus a vehicle that moves much like an airplane in atmosphere but can kick out thousands of gees in deep space. Naturally this field makes the apparent acceleration within the vessel minimal from the perspective of the passengers.

SENSORS

It is assumed that the sensors installed are extremely comprehensive wide spectrum arrays. A sensor system normally faces in only one direction but can be installed in a turret.

Machinery

Sensor Range = TF x Volume x 1000

Active Power Requirement = TF x Volume

Passive Power Requirement = TF x Volume / 10

Sensor Range = TF x Surface Area

Sensor Volume =

Sensitivity =

Wavelengths

Infrared

Visible Light

Ultraviolet

Broad Band Radio

High Frequency Radio

Low Frequency Radio

High Frequency Radiation

Low Frequency Radiation

High Frequency Vibration

Low Frequency Vibration

Chemical

Neutrino

Gravitation

Hypothetical

Meson

Tachyon

such a great deal of effort is put into deceiving sensors. They may know you're out there but they don't need to know exactly where or what you are, right?

Machinery

ECM Range = TF x Volume

Power Requirement = TF x Volume

Target Lock and Identify Penalties =

TF

Specialized Sensor Systems: A normal sensor system can emit and detect ten different types of emission: Infrared, Visible Spectrum Light, Ultraviolet, Low Frequency Radiation, High Frequency Radiation, High Frequency Radio Waves, Low Frequency Radio Waves, Gravitation, and Neutrinos. For simplicity's sake, a sensor that only takes in one of these will have twice the normal range for its volume and a sensor that only works passively will have twice the normal range.

Electronic Counter Measures

It's pretty hard to hide in space, any vessel will have an infrared signature that is significantly hotter than the background. As

Shields

While the transparent bubbles composed of pure force or energy are at best an unlikely hypothetical technology, cold plasma fields and electromagnetic fields are at least theoretically possible.

Machinery

$$\text{Projector Capacity} = \text{TF} \times \text{Mass}$$
$$\text{Rating} = \text{Power} / \text{Surface Area}$$

Cold Plasma Field

One type of shielding that is feasible according to modern science is a field of cold plasma much like the stuff used in modern high definition televisions. The plasma is magnetically manipulated and contained and provides protection against micro-meteors and other high energy impacts. Cold plasma fields cannot be used in atmosphere but the field can be manipulated to provide openings for weapons fire and thrust.

Electromagnetic Field

Strong electromagnetic fields can be used to deflect plasma and ferrous projectiles. These systems use a great deal of power but are only activated from capacitors in the projector the instant before impact. Naturally this requires functional sensors that actually manage to detect the incoming attack. The magnetic fields used to manipulate cold plasma aren't strong enough to offer this kind of protection unless both systems are installed.

Debris Field

A layer of metal fragments is magnetically moved around the ship to provide protection against lasers and missiles. The debris can be moved out of the way when firing weapons or applying engines.

Deflector Field

A deflector field is almost essential for vessels moving at significant velocities. Too weak to absorb energy a deflector field's shape and vibration cause objects passing through it to change course a tiny bit and thus miss the vessel. Deflector fields can intercept and deflect plasma but not lasers or particle beams.

Force Field

A barrier of pure force is pure fiction but found often enough in science fiction. These devices encircle a vessel, absorbing it in a bubble that is tied to the ship's power plant. If the shield is overloaded it loses power. Force fields are often ablative, losing ten percent of their protective power with each penetrating hit. The default force field is transparent but some settings have opaque fields which have to be flickered in order to fire weapons or use sensors.

Cloaking fields redirect energy around them, making it impossible to see or detect the vessel from a given direction.

Transparent fields allow specific wavelengths of radiation to pass through them allowing sensors to see out of the field.

Selectively Permeable fields can allow objects and radiation through specific sections, allowing weapons fire and shuttle launches.

Stasis Fields freeze time inside of them making everything within indestructible but also frozen, unable to act or change course. Stasis is generally more of a plot device than it is a useful technology.

Gravitic fields are deflector fields that use gravity waves to deflect incoming objects a gravitic field may also be able to attract objects to alter their course. Gravitic fields are often used in conjunction with debris fields.

Hot Plasma fields are hard to miss as the vessel is engulfed in highly energetic ions. Hot plasma fields consume fuel, fast. They protect the ship by melting incoming objects and scrambling most energy weapons fire, while the fuel lasts.

Fixed Weapon Mount

Weapons in a fixed mount are just bolted on facing the direction the designer wants them to fire. Usually straight ahead. This is a light weight solution that allows the pilot to aim by simply steering but it's not particularly accurate or fast to track the target.

Machinery
Tracking Modifier = Vehicle's Target Size

Robot Arms

A robot arm is the most flexible and adjustable system for mounting a weapon on a vehicle. They also automatically count as a stabilized mounting. The downside is that robot arms are heavy, complex, and cannot be targeted at all without computer and sensor assistance. Robot arms with a capacity greater than half the mass of the vehicle they are mounted on lack the leverage to exert their full power.

Machinery
Capacity (maximum $\frac{1}{2}$ vehicle mass) = TF x Mass / 4
Power Requirement = Mass
Free Load = (Capacity / 20)
Strength = $\sqrt[2]{}$ Free Load

Turret

A simple, unpowered turret is a structural feature that doesn't increase the weapon's volume, though the turret must include room for the gunner. A powered turret allows weapons to rotate and track their targets independently of the rest of the vehicle. While this gives them a lower targeting modifier it also means that they often face much greater relative velocity penalties to hit.

Machinery

Total Volume = Component Volume x 2

Total Turret Mass = (Turret Volume x 1 t/m³) + Component Mass

Power Requirement = Total Turret Mass

Targeting Modifier = $\sqrt[3]{\text{Total Turret Volume}}$

Weapon Stabilization

Weapons mounted on ground vehicles and other unstable platforms need to be stabilized in order to fire accurately on the move. The system adjusts the weapon's position so it remains relatively level in spite of bumps in the road. Weapon stabilization is an advancement of the powered turret and is soon integrated as a standard design feature.

Machinery

Turret Mass and Volume x 2

Dischargers

Chaff: This unit fires a shower of metallic strips that distorts the vehicle's radar signature.

Flare: This unit fires a white hot flare that distorts the vehicle's heat signature and can draw off infrared guided missiles.

Nail Bomb: Space battles are often fought at tremendous velocities at which any impact can cause tremendous damage. A nail bomb fills an area with hard metal shards making it very dangerous to pass through. Most nail bombs are composed of magnetic materials to make them easier to clean up when the fighting is done.

Particle Screen: This unit fires a spray of fine, prismatic, particulate matter that refracts and distorts laser fire.

Firearms Design

When designing firearms keep in mind that while the masses are in grams and linear measures are in millimeters, when working out Damage and Penetration it is being used as indicator of volume and surface area.

$$\text{Bullet Mass} = 3.14 \times \text{Radius}^2 \times \text{Length} / 100$$

$$\text{Cartridge Mass} = \text{Bullet Mass} + \text{Casing Mass}$$

$$\text{Empty Magazine Mass} = 0.2 \times \text{Cartridge Mass} \times \text{Number of Rounds}$$

Modern pistols tend to have a casing mass of around half the bullet's mass while rifles have a casing mass ranging between the bullet's mass and twice that. The casing tends to get smaller at higher Technology Factors due to the limits imposed by recoil.

$$\text{Mass} = n^2 \times \text{Cartridge Mass}$$

$$\text{Energy} = \text{Casing Mass} \times \text{TF} \times n$$

$$\text{Rate of Fire} = 1$$

$$\text{Range} = \text{Energy} / \text{Bullet Mass}$$

$$\text{Penetration} = \sqrt{\text{Energy}} \times 50 / \text{Bullet Mass}$$

$$\text{Damage} = \sqrt[4]{2500} \times \text{Energy} \times \text{Bullet Mass}$$

$$\text{Recoil} = 2000 \times \text{Energy} / \text{Loaded Mass} \text{ (in grams)}$$

Advanced Materials and Construction

$$n = \text{any number up to TF} / 10$$

$$\text{Recoil} \times n$$

$$\text{Empty Mass} / n$$

$$\text{Cost} \times n^2$$

Breach Loader

$$\text{Empty Mass} \times 1$$

Before Technology Factor 12, even Simple Mechanical Actions are unavailable. Instead the chamber of the weapon is hinged and held with a clasp allowing it to be opened and a cartridge inserted directly. Breach loaders continue in use into the foreseeable future due to their simplicity and light weight. It takes five seconds to reload a breach loader.

Simple Mechanical Action

$$\text{Empty Mass} \times 1.5$$

Before Technology Factor 15 semiautomatic weapons are unavailable and the weapon must be readied after each shot to reload it.

Heavy Automatic

Empty Mass x 4

Rate of Fire = $\sqrt{\text{TF}} + 1$

Adding a muzzle brake, tripod, bipod socket, cooling jacket, and heavier receiver allow a fully automatic weapon to be fired continuously at the expense of increasing the weapon's weight significantly. Heavy automatics can fire ammunition from a belt (ammo mass x 0.05) or a gravity fed hopper (ammo mass x 0.1)

Light Automatic

Empty Mass x 3

Rate of Fire = $\sqrt{\text{TF}}$

A fully automatic weapon that isn't intended to fire continuously doesn't need a cooling system or a belt or hopper feed system. Light automatics fire from a spring loaded magazine (ammo mass x 0.2)

Multi-Barrel Rotary Automatic

Empty Mass x Number of Barrels x 1.5

Rate of Fire = $\text{TF} \times \text{Number of Barrels} / 4$

A very high rate of fire is achieved in some weapons by increasing the number of barrels and rotating them into position in front of the chamber. This allows the barrels to cool more between shots and reduces the chance of a jam. The first Rotary machine-guns actually appear before semiautomatic weapons at around TF 14. Rotary machine-guns fire from a hopper or a belt.

Semi Automatic

A self loading firearm that feeds ammunition from a spring loaded magazine. The difference between semiautomatic and fully automatic is small but in practice automatic weapons are heavier and have improved cooling. A semiautomatic weapon can be converted into a fully automatic one but won't survive much firing.

Empty Mass x 2

Rate of Fire = 1

Cheap Materials and Construction

Cost / 2

Empty Mass x 1.5

Range / 1.5

The weapon is made from stamped out parts that have been bolted together with limited testing and calibration. This makes it heavier, less accurate, and prone to malfunction. Cheap weapons come out of the case with a weapon quirk.

Shoulder Stocks and Recoil Shocks

Folding Stock: Mass +0.5

Hollow Stock: Mass +0.5

Solid Stock: Mass +1

Recoil Shocks: Mass +1

A weapon outfitted with a shoulder stock is better equipped to overcome its recoil and is generally handier and better balanced for two-handed use. Recoil shocks are used to overcome recoil on vehicle mounted weapons that would significantly affect their carriage. For the most part, the game effect of these systems is simply to increase the weight of the weapon and thus reduce its recoil.

Munitions

People are always trying to fire something other than a lump of lead out of their guns.

Explosive Rounds

There are three primary types of explosive round: Concussion, Fragmentation, and Shape Charge.

$$\text{Explosive Blast Radius} = \sqrt[3]{\text{warhead mass} \times \text{TF}}$$

$$\text{Explosive Damage} = \sqrt{\text{warhead mass} \times \text{TF}}$$

$$\text{Shape Charge Damage} = \sqrt[4]{2500 \times (\text{Ballistic Energy} + \text{warhead mass} \times \text{TF})}$$

$$\text{Shape Charge Blast Radius} = 1 \text{ meter}$$

Nuclear Warhead Damage

$$\text{Plasma} \times 10$$

$$\text{Fission} \times 100$$

$$\text{Fusion} \times 1000$$

$$\text{Antimatter} \times 10000$$

$$\text{Conversion} \times 100000$$

Shot and Flechettes

Multiple projectile rounds provide an effect similar to automatic fire from a single cartridge. Flechettes are tiny aerodynamic needles that are fired in clusters.

$$\text{Range} = \sqrt{(\text{E} / \text{Total Shot Mass})}$$

$$\text{Penetration} = \sqrt{(\text{E} / \text{Individual Shot Mass})}$$

$$\text{Damage} = \sqrt[4]{(\text{E} \times \text{Individual Shot Mass})}$$

Flechettes: Penetration x 2, Cost x 4

Electrokinetic Rounds

The so called “zap rounds” are a hotly debated advancement in small arms munitions. They are designed to convert a portion of their kinetic energy to electricity with the intention of stunning organic targets, shorting out electronics, and sparking fuel explosions. In practice the rounds are never quite everything the manufacturers claim.

“Thor” rounds are electrokinetic bullets for conventional firearms. Their spiral structure and laminated composition

are designed to generate a charge when the layers collapse upon striking a hard target. **Thor** rounds suffer or perhaps benefit from reduced armour penetration. Any time a Thor round fails to penetrate armour or fails to shatter a bone it generates an electrical pulse with half its normal Penetration and Damage.

Zeus rounds draw their charge from the magnetic fields in a railgun and discharge on impact. As with Thor rounds, they suffer from reduced penetration but are a more effective non-lethal round because they don’t need to strike a solid object in order to discharge.

Thor Rounds

Damage / 2

Penetrates Metal Armour

Stun Effect

Zeus Rounds

Range / 2

Penetrates Metal Armour

Stun Effect

Rocket and Missile Design

Rockets and missiles are designed like vehicles with some considerations being taken when calculating their weapon statistics. For example, the weapon range of a rocket is generally based on its acceleration. The accuracy of a rocket or missile is initially determined by its launcher. One feature of such weapons is that their damage increases as they accelerate.

Short Rail

Launcher Mass = Rocket Mass x 5

Range = 1/16 Acceleration

Short Tube

Launcher Mass = Rocket Mass x 10

Range = 1/8 Acceleration

Long Rail

Launcher Mass = Rocket Mass x 10

Range = 1/8 Acceleration

Long Tube

Launcher Mass = Rocket Mass x 20

Range = 1/4 Acceleration

Magazine Fed

Launcher Mass = Mass x 2

Magazine

Magazine Mass = Shots x Shot Mass x 0.2

Guidance Systems

Rockets are inherently less accurate than guns. They leave their launcher slower and accelerate on the way to the target. Fins can impart spin to help a rocket fly straighter but what makes a rocket into a missile is a guidance system.

- Basic Stabilization
- Wire Guided
- Radio Guided
- Heat Seeking
- Radar Seeking
- Beam Rider
- Smart

Energy Weapon Design

There are no functional energy weapons from which to draw data to build a functional model of how they work, so the following material is intended broadly model how they work in fiction. Of all these weapons, only lasers and particle beams are even remotely realistic but the “fiction” in “science fiction” certainly allows those boundaries to be stretched.

$$\text{Energy Output} = \text{Emitter Mass} \times \text{TF}^2 / \text{RoF}$$

$$\text{Power Requirement} = \text{Mass} \times \text{TF} \times 100 \times \text{RoF}$$

$$\text{Range} = \text{Energy} / n$$

$$\text{Damage} = \sqrt[4]{n} \times \text{Energy}$$

Note that the value of “n” must be increased for more powerful weapons, just as the mass of the bullets is increased for a firearm.

Power Supply

While energy weapons can be powered by a battery, they are often powered by a vehicle's power plant. Man-portable energy weapons usually use the most powerful battery possible. Multiply the battery's endurance by 3600 to find how many shots it has.

$$\text{Cell Mass} = \text{Power Requirement} / (\text{TF} \times n)$$

$$\text{Ammo} = \text{TF} \times \text{fuel mass} \times 3600 / (\text{cell mass} \times n^2)$$

Rail Guns

The barrel of a rail gun is a series of concentric magnets much like those in a particle accelerator, however it accelerates a far larger projectile to far lower velocities. A rail gun is designed much like any other energy weapon, however it has less heating problems and requires ammunition.

Use bullet mass as “n” factor when figuring Range and Damage

½ Cooling Requirements, Recoil, Requires Bullets

Blaster

Blasters fire bolts of low energy plasma contained in a magnetic field, causing impact and burn damage to the target. The magnetic field decays quickly and limits the range of these weapons. The cold plasma can be electrically charged to stun targets with the flip of a switch. Magnetic shields are particularly effective against blaster fire.

Resisted by Magnetic Fields
Stun Setting

Death Ray

Microwave beams are particularly lethal to living things while causing very little damage to inorganic materials.

Penetrates Living
Resisted by Un-living

Disintegrator

A disintegrator works by stimulating microscopic harmonic vibrations in the target. These weapons are particularly effective against heavily armoured targets.

Penetrates Un-living
Resisted by Living

Disruptor

The phased impulses fired by this weapon are particularly effective against forcefields.

Penetrates Force Fields
Resisted by Armour

Laser

Laser weapons emit focused beams of coherent light that burn their target. Lasers have exceptional range and accuracy. Laser stunners produce an intense strobe effect that overloads the target's nervous system and causes a seizure. A laser beam is a continuous stream that lasts for the entire second. If focused on a single point for the whole second, its Penetration is doubled. However, in combat it is treated as Automatic Fire, because the attacker and defender just don't stand still. A laser can have as much automatic fire from a regular emitter as is supported by the cooling system. This still sucks down the ammunition.

Penetrates stationary targets
Stun Setting

Force Beam

Force field projectors can be evolved into a weapon that essentially smashes its target with brute force. Force beams are less than effective against armour but can be sufficiently powerful to cause course changes or even collisions.

Penetrates Armour
Resisted by Force Fields
Recoil

Gravity Beam

Highly specialized and advanced artificial gravity devices can be used to distort space time around a target causing it to crush and buckle under gravitational stresses.

Ignores Armour

Needle Beam

A further advancement of the force beam focuses it to a very fine point providing exceptional penetrating power and accuracy.

Penetrates Armour
Penetrates Force Fields

Plasma

A plasma weapon fires a focused blast of superheated gas down a magnetic tube that is projected from the weapon using the blast as a conduit. Plasma weapons are short ranged and indiscriminately destructive but magnetic fields are particularly effective in deflecting them.

Blast
Resisted by Magnetic Fields

Particle Beam

A single molecule is accelerated to nearly light speed by a powerful magnetic coil similar to the one in a gauss or rail gun. Particle beams are prone to punching right through anything that gets in their way. Should a particle beam strike armour that is heavy enough to slow it down, it releases its energy in a terrific explosion.

Penetrates Deflector Fields
Blast

Sonic

Sound is particularly difficult to focus and direct but it is highly effective in disorienting and stunning individuals. Extremely powerful sonic weapons can also cause harmonic vibrations that are effective against particularly hard and brittle substances.

Penetrates Rigid materials
Stun

Tractor Beam

A particularly advanced Force or Gravity beam can be used to move targets around rather than crushing them.

Strength = Damage

Melee and Thrown Weapons

There are three factors that determine the effectiveness of melee weapons, their mechanical advantage, impact pressure, and the durability of the material. The base damage of any weapon is calculated from its mass.

$$\text{Damage} = \sqrt{\text{Mass in grams}}$$

This matches exactly with the free load calculation for Strength so a medium, two handed weapon will generally do damage equal to the user's Strength. Unbalanced weapons sacrifice speed for mechanical advantage, trading a +10 to damage for a -10 to hit or parry. Long weapons provide a reach advantage. Sharp weapons penetrate soft armor. Blunt weapons penetrate flexible armour.

Sheering Blade

This specialized field cuts off all forces crossing its arc. In essence it is infinitely sharp as nuclear and molecular bonds burst apart. Fortunately the "blade" is infinitely thin and only hits a few atomic nuclei as it passes releasing only a brutal flash of heat and light as it passes through its target.

Force Blade

A projected force field forms a durable blade which can cut through most armor with ease. Utility force field projectors can often project a variety of tools and weapons, which are essentially unbreakable, but use a great deal of power.

Plasma Blade

The plasma contained in a magnetic bottle and projected from a fine loop of tubing isn't hot enough to cook the blade's wielder, instead the disassociated ions corrode their way through their target

creating additional heat and light.

Powered Blade

This blade is hooked up to a powerful battery and capacitor, giving it a powerful electrical discharge on contact. The power consumption is quite low but the charge takes time to build up after the blade strikes.

Chain Blade

Messy and inefficient, this weapon is a light weight electric chainsaw. It is effective at cutting flesh and softer materials but is also prone to jamming and breaking if it meets too much resistance.

Vibro-Blade

The blade vibrates back and forth rapidly causing it to blur slightly the vibration makes it slightly more effective against rigid and brittle surfaces and better at prolonged sawing and cutting.

Design Examples

Ground Car @ 20

	Volume	Mass	
4 Seats XA	2	(.4)	
Cargo	0.5	(0.5)	
Power Plant	1	1	20 out
Fuel	0.5	(0.25)	5 hours
Wheels X	(1)	<u>1</u>	8m/s^2
Subtotal	4 (5)	2 (3.15)	
Structure	0.15	0.15	3 capacity, rating 245
Armour	<u>0.035</u>	<u>0.35</u>	rating 45
Total	4.185 (5.185)	2.5 (3.65)	

Helicopter @ 20

	Volume	Mass	
10 External Access Seats	5.0	(1)	
Power Plant XA	5	5	x2 = 100 out
Landing Gear XA	0.5	0.5	
<u>Fuel</u>	<u>5</u>	<u>2.5</u>	<u>$100 / (5 \times 4) = 5 \text{ hours}$</u>
Sub Total	15.5	5.5	
Structure	1	1	20 Capacity
<u>Armour</u>	<u>.05</u>	<u>.5</u>	<u>Rating 268</u>
Total	16.55	7 (11.5)	

100kg Missile @ 20

	Volume	Mass	
Rocket	20	20	x10 = 4000 out / 100kg = 46m/s ²
Fuel	40	(20)	/100 = 12 min
Payload	20	20	Damage 251 blast
<u>Electronics</u>	<u>5</u>	<u>5</u>	
Sub Total	85	45 (65)	
Structure	20	20	400 capacity, Rating 168
<u>Armour</u>	<u>1.5</u>	<u>15</u>	<u>Rating 258</u>
Total	105.5	100	

Heavy Machine Gun @ 20

15g bullet + 15g case = 30g cartridge

$30 \times 144 = 17280 \text{ kg}$

$12 \times 15 \times 20 = 3600$ j

Range = $3600 / 15 = 240$ m

Damage = 152

Clothing	Cost	Distillation Canteen	30	1
Shirt	20	Distillation Jug	120	4
Pants	40	Filter Canteen	20	1
Tunic	40	Lunch Box	40	1
Coverall	80	Meal Pill (1000)	TF / 2	1
Overall	60	Nutrient Pills (1000)	TF / 10	1
Suspenders	20	Nutrient Bricks (6)	TF	1
Belt	20	Nutri-Paste, Individual Can	4	1
Jacket	40	Economy Can	16	4
Dress, Short	40	Salt Pills (1000)	0.5	1
Dress, Long	60			
Skirt	30	Respirators		
Shorts	20	Filter Mask	10	0.5
Shoes	40	Bubble Helmet	20	1
Boots	80	Air Tank	100	5
Sandals	20	Rebreather	20	1
Climate Control	x 2	Tools		
Active Weave	x 2	Active Pad (TFm ²)	2	1
Impact Resistance	x 2	Autojack	TF x 10	5
Livewear		Boring Ball	TF x 2	2
Fursuit	180	Entrenching Tool	TF	1
Hawksuit	240	Folding Supports	TF x Mass	1+
Electronics		Database	TF	-
Personal Link	TF 0.5	Expert System	TF x 2	-
Personal Computer	TF x 4 2	Jack	TF x 2	2
Hand Scanner	TF 2	Lift	TF x Mass	100+
Optical Scope	TF x 2 1	Crane	TF x Mass / 2	100+
Electronic Scope	TF x 2 1	Arm	2 x TF x Mass	1+
Climbing Gear		Sealant (Tube)	TF / 2	1
Claw, Crawling	TF x 2 1	Putty (Pack)	TF / 2	1
Foot Hold (TF pack)	TF 1	Fabricator	2 x TF x Mass	5+
Rope, Spool (TF x 10 m)	20 2	Object Printer	TF x Mass	5+
Rope, Active Braid ("")	40 2	Milling Machine	2 x TF x Mass	10+
Provisions	Cost	Welder	TF x 4	4
Bioscanner	TF x 2 2	Bonder	TF x 8	4
Camp Kitchen	TF x 5 5	Clamp	TF / 5	1
Canteen / Urinal	30 1	Vise	TF / 5	2
Condensation Canteen	40 1	Adhesive (Tube)	TF / 5	1
Condensation Jug	160 4	Camera	TF / 2	1
		Speaker	TF x 2.5	2
		Light	TF / 5	1
		Holographic Projector	TF x 4	2

First Aid Kit	Culture Vat
Crash Kit	Tissue Printer
Stretcher	Medical Scanner
Medical Bay	Pharmacopia
Surgical Suite	

Weapons	TF	Mass	Cost	Ammo Mass	Ammo Cost
Light Pistol	20	0.7	29	1.2	12
Machine Pistol	20	1.2	50	1.2	12
Heavy Pistol	20	1.15	46	1.5	150
Submachine Gun	20	3.3	134	1.5	150
Carbine	20	1.59	64	2	20
Assault Rifle	20	3.6	142	2	20
Squad Assault Weapon	20	5.08	203	2	20
Rifle	20	2.45	98	2.4	24
Battle Rifle	20	5.18	207	2.4	24
Machine Gun	20	8.66	347	2.4	24
Shotgun	20	4.9	196	5	50
Grenade Launcher	20	1.8	72	15	150
Anti Tank Missile	20	2.75	110	2.75	110
Pistol	40	1.12	90	1.5	30
SMG	40	3.13	251	1.5	30
Combat Rifle	40	4.1	328	2	40
SAW	40	6.17	493	2	40
Railgun	40	2.5	100	2b + 1.5n	40b + 30 n
Rocket Pistol	40	0.55	44	2	40
Rocket Rifle	40	2.23	179	2	40
Rocket Assisted GL	40	1.1	88	10	200
Laser Pistol	40	0.5	40	0.125	13
Heavy Laser Rifle	40	4	320	2	40
Blaster Pistol	60	0.5	60	0.125	4
Blaster Rifle	60	2	240	0.25	8
Support Blaster	60	4	480	1	30
Knife	0.5	TF			
Sword	2	TF x 4			
Hatchet	1	TF x 2			
Axe	4	TF x 8			

Ammunition cost and weight are for a box of 100 rounds.

Railgun needle ammunition and battery are listed separately.

Armour Costs

Base Cost: Mass x TF

Sealed x 2

Partial Suit x Hit Locations Covered / 10

Equipment

The potential range of possibly useful technological devices is endless. The fantastic tools of the future are as much a hallmark of science fiction as magic spells and swords are hallmarks of fantasy.

Clothing

Advanced clothing is often more durable and adaptable. Most active military and outdoors wear offers some protection as armor. Bacteria in the fabric neutralize odors and absorb stains.

Climate Control

The threads in this clothing are flat like ribbons and can rotate to seal up the spaces between threads for increased insulation or widen them to make the outfit cooler. Heavier suits can seal up tightly enough to withstand vacuum and are often used by space force personal.

Active Weave

This clothing is composed of thread thick robotic tendrils which allow it to offer muscular resistance training in zero-gravity and enhances the wearer's strength by the Technology Factor. Active weave reads and interprets signals in the nerves and duplicates and enhances them. Active weave under a suit of hard armour essentially makes it into a light battle suit.

Impact Resistance

This fabric stiffens in response to impacts making it soft and flexible until struck. This allows the clothing to provide a level of armor protection to the wearer. Military uniforms are often made of impact resistant fabric.

Livewear

The fabric of this garment is a living organism. It consumes dead skin cells and sweat as well as regrowing damaged portions of cloth and developing a thicker and tougher layer in areas that rub, and is thus always dry and clean. Livewear offers excellent protection against biological poisons and diseases. Finally fabric that really breathes.

Fursuits are cold weather livewear that grows a thick coat of fur for improved insulation as if the wearer had the fur and blubber layer traits.

Hawksuits have feathers and wings which allow the wearer to glide. Tendrils in the hood allow the suit to read and respond to the wearer's surface thoughts. The suit is a more intelligent organism than most livewear and offers an instinctual understanding of its flight abilities to the wearer.

Provisions

An army (and pretty much everyone else) marches on its stomach. Advanced technology can make rations lighter and more palatable but in general they can be light, tasty, or healthy, pick two.

Bioscanner

A simple chemical spectrometer gives an assessment of compounds in any material placed into it and flags toxins.

Camp Kitchen

Being a larger model of the Lunch Box, Camp Kitchens convert nutri-paste into simulated dishes. The menu is exponentially larger and the cans are bigger, but the system can crank out a dozen different hot meals in half an hour from an economy sized nutri-paste can.

Canteen / Urinal

This is exactly what it sounds like. A canteen that processes waste water back into pure drinking water. It works better than it sounds. Still, consumer market sales are generally unimpressive, even though most military forces adopt them. Interestingly, consumer sales of traditional canteens are very high in retail locations around military bases.

Condensation Canteen

This plastic container has ventilated sides that allow air to pass in and out of it freely. A battery powered condensation core cools the air and causes water droplets to be collected. A condensation canteen is cool to the touch and is occasionally rigged to a body suit to reduce the overall temperature and infrared signature of the person inside.

Condensation Jug

A four liter version of the condensation canteen that also serves as air conditioning for a tent or small hut.

Distillation Canteen

This one liter metal bottle contains a power supply and heating element that boils, distills, and filters water that is poured into it. This takes about half an hour.

Distillation Jug

This four liter metal bottle contains a power supply and heating element that boils, distills, and filters water that is poured into it. This takes about an hour.

Filter Canteen

This canteen contains a charcoal filter that removes most impurities from water poured into it. If the filter isn't changed regularly it will accumulate bacteria and become fairly hazardous in its own right.

Lunch Box

This portable nano-tech factory is able to turn cans of nutri-paste into a wide variety of palatable meals. It takes a lunch box thirty minutes to convert the paste into virtually anything on the menu. Sometimes they don't even taste a little like nutri-paste. Lunch boxes are powered by energy drawn from the nutri-paste

Meal Pill

The long awaited meal in a single pill has arrived. Packed with a sugar / vitamin matrix, just one of these dense little pellets will provide energy and relieve hunger for six hours. The after effects of prolonged usage are legendary but hardly exaggerated.

Nutrient Pills

The basic nutrients, sugar and vitamins can be provided in the form of tablets. These are not filling or satisfying but will help to keep a person alive and healthy in the absence of proper food.

Nutrient Bricks

These light weight bars contain basic nutrients and fibre which help to keep the digestive system working while keeping a person on their feet.

Electronics

Notebook Computer

While computing power increases exponentially over time so does the software overhead.

Personal Link

The personal communicator's size is primarily defined by handiness and ease of finding in the cupboard.

Personal Computer

Regardless of actual computing power. A workstation needs to provide room for a comfortable control surface and a readable screen or interface viewer.

Hand Scanner

A convenient portable sensor device, large enough to have a readable screen and

Nutri-Paste

These, rectangular cans contain a perfectly balanced meal of a thick grey and grainy consistency. While they are intended to supply raw materials for a Lunch Box nano-factory, there are many in the Space Forces who swear by the paste in raw form as it is highly digestible and guaranteed to stay down under any circumstances. Well, at least if you can get it down in the first place.

Individual Can

Economy Can

Salt Pills

The electrolytes lost in sweat need to be replaced. In hot weather the amount of water needed can be reduced by taking salt tablets or more advanced electrolyte pastilles.

usable interface and small enough to hold easily in one hand.

Optical Scope

A set of glass or oil lenses that enhance and focus vision. This is at its root a very primitive technology that is developed with lens grinding but advanced versions are more accurate and robust.

Electronic Scope

Advanced scopes integrate infrared or ultraviolet sights to switchable UV and IR projectors are common on more advanced models. A port that links to a heads up device allows the weapon to track and be aimed from the hip. These are usually hard wired links to avoid radio interference and hacking.

Climbing Gear

Over all, climbing gear is lighter, more durable and in some cases smarter than its earlier equivalents. Smart polymers and micro structured metals dominate the field. However, the gear is still intended to help a person climb steep obstacles under their own power.

Claw, Crawling

While a crawling claw looks like an over, engineered, six pronged grappling hook it is actually a sophisticated voice and radio operated robot with nano adhesive grips and an emergency winching system. The claw can climb most sheer surfaces at a rate of 6 meters per second while hauling a 360 kilogram load.

Foot Hold

When squeezed twice these six by two centimeter pellets expand and harden into a flat topped foot hold. If pressed against a surface they adhere and expand into any crevices to increase support.

Rope, Spool

This light weight ratcheting spool holds an amazing 600 meters of rope. The rope is only six millimeters in diameter on the spool, but it self inflates to a hefty 18 millimeters as it plays out. The microscopic expanding lattice of smart polymers can support a 360 kilogram load.

Rope, Active Braid

This 50 meter coil of rope is composed of electrically activated fibers that expand when a current is applied. This allows the rope to expand up to an inch in diameter. The active braid accepts simple comm commands like knotting and unknotting itself and climbing surfaces.

Respirators

It's important to breathe and the universe contains many things that humans and non-humans simply can't breathe. Fortunately a number of technological solutions are available.

Filter Mask

A simple filter system that fits over the mouth and nose and removes toxins and pollutants from the air. The base model is TF 15 but the system gets lighter and more effective with advanced technology.

Bubble Helmet

A polymer bubble with a head sized hole in the bottom and seals and latches to attach it to armour or a suit. The helmet gives less protection than an armoured helmet but is less intimidating and allows a wider field of vision.

Air Tank

Carrying your own air solves most respiratory issues. Air tanks allow the wearer to breathe for TF x mass in kg / 10 hours. More advanced versions are less flammable and hold more air.

Rebreather

A rebreather recycles air to improve the duration of an air tank. TF 40 and later rebreathers can dispense with the air tank in water by drawing oxygen from the water like a high powered gill. A rebreather doubles the range of an air tank.

Medical Gear

While medical technology advances apace with synthetic cell cultures, tissue printing, surgical lasers, neural activity scanning, and gene editing therapies the problems largely remain the same, the disruption and deterioration of biological processes by internal and external influences.

First Aid Kit

A ubiquitous feature of camping gear and industrial sites, this small box contains materials to treat minor wounds and abrasions. In general, it will contain mild pain killers, antiseptics, bandages or wound sealant, and materials for splinting broken bones. More advanced versions will provide more durable treatments but the role of a first aid kit is not to heal but stabilize and contain injuries until a proper facility can be reached. A first aid kit allows scratch level injuries to be treated without penalty.

Crash Kit

Paramedics and physicians frequently carry one of these satchel or cases containing the basic materials found in a first aid kit in greater quantities as well as medication to deal with cardiac arrest, seizures, and serious wounds like compound fractures and gunshots. Strong pain killers and stimulants are standard as are sensors for detecting heart beats and breathing. Advanced versions contain universal blood serum and oxygen. A crash kit allows injuries to be treated without penalty.

Culture Vat

A hermetically sealed cannister with nutrient feeds allows cell cultures to be grown into biomass for printing tissue and organs. Advanced models are self flushing and contain a small sample of radioactive material in a shielded cell, to sterilize the tank between uses.

Stretcher

A light weight frame for carrying wounded individuals without making their situation worse. Advanced stretchers incorporate features like vital sign monitors and medication dispensers. A particularly useful feature is the ability to stiffen up around the patient to provide more support and reduce jostling. Ambulatory robotic stretchers are heavier and more expensive but free up corpsmen from the task of bearing the wounded to the ambulance.

Medical Bay

The back of an ambulance or a closet on small ships is well equipped with medical supplies and equipment. Anesthetics, oxygen, restraints, and lighting are sufficient for a medical bay to serve as an emergency surgical suite. A medical bay allows wounds to be treated and stabilized without penalty and surgery at a -10 penalty due to the cramped conditions.

Surgical Suite

A proper surgery is well lit and sterile with enough room for a team to work on the patient without tripping over each other. Systems to

Tissue Printer

Three dimensional printing technology using electrostatic charges and lasers can even print flesh. Skin, muscles, veins, and even organs can be printed out from cultures grown from the patient's own cells avoiding all risk of rejection but at the cost of reproducing any congenital conditions.

Medical Scanner

Hand held units capable of reading heart rates, blood pressure, and even brain activity are popular with paramedics and physicians. The size of the device is generally determined by ergonomics and ease of use but advanced versions may well fit in watches or cybernetic eyes. Access to a medical scanner allows patients to be diagnosed quickly meaning one medic can treat more patients or treatment applied sooner.

Pharmacopia

This advanced system can synthesize medications from stored chemicals on demand. The internal computer stores a wide range of known drugs with proven track records but can also produce new combinations on command and speculate on how they will perform. Earlier versions are larger, room sized affairs, but more advanced versions will fit in a suitcase. The larger version will always have a larger supply of raw materials. One limitation of a pharmacopia system is that only about half of the supplies are useful for any given medication and the machine and supplies are much bulkier and heavier than a supply of a specific drug.

Tools

In practice, technology is all about the tools. Better tools are what make advancement possible. More advanced tools will be stronger, more precise, more general in their application, and allow the user to do more in less time. In part this is reflected by the Technology Factor factor for repairing and constructing other hardware but specific advances like three dimensional printing of a wide range of materials are significant enough to warrant treatment as an advance in their own right.

Active Pad

This sheet is composed of electrically sensitive fibers that become rigid when a current is applied. The pad distributes weight evenly allowing it to support great weights. Active pads are popular with field mechanics and tennis players.

Autojack

Simple four legged robots with a single motion arm are common in advance mechanical tool kits. The autojack can lift several tonnes upto half a meter off the ground. It takes two autojacks or an autojack and two folding supports to safely and stably lift a vehicle in order to work under it.

Entrenching Tool

This folding shovel and pick has a telescoping handle but is otherwise quite recognizable to soldiers from the mid twentieth century. The materials used are strong and light weight and the material memory makes it easy to restore a damaged tool to its original state by heating and banging it against a rock repeatedly.

Folding Supports

These light weight structural supports can be folded into a pyramid to hold up heavy objects or reinforce damaged structures.

Boring Ball

This fifteen centimeter flanged ball is a highly specialized robot with an internal rotary drive. When activated the flanges open up to twenty centimeters and the ball begins to spin, digging away dirt and smaller rocks and spraying them to the edges of the excavation. The ball can dig foxholes, trenches, and ditches at a rate of TF cubic centimeters per second and has a power supply that lasts TF minutes. By TF 60 a boring ball can cut through stone at a quarter the normal rate and double the energy expenditure. The ball's computer has a wide range of pre-planned digs but its safety controls prevent it from being active within 10 meters of a life form.

Database

A well organized and indexed information system saves hours of research.

Expert System

An intelligent, well organized, and indexed information system will often have your information on hand at the moment you need it.

Jack

A simple, mechanical system using a screw or hydraulics to reliably lift heavy objects placed on it a small distance.

Lift

A large hydraulic or electric system that can lift heavy objects a couple meters. A lift is more stable than a crane.

Crane

A tall tower with a winch and cable that is used to lift heavy objects large distances. The crane and its mounting must weigh more than the object lifted.

Arm

A fully articulated mechanical arm that can move and reposition heavy objects. An arm weighs more than a jack, lift, or crane but can accomplish more complex positioning.

Sealant

A thick liquid which stabilizes into a more solid state due to a chemical reaction. Sealant fills leaks and cracks and can be used with fabric to create larger patches.

Putty

A thick, well, putty that can be spread and molded. Adding an activating agent causes putty to harden into a solid form that can be used to patch holes.

Fabricator

A fabricator builds things from the molecular level up. It is like a super three dimensional printer that can make just about anything from raw materials. Early fabricators are pretty slow but more advanced ones are almost magical, creating what you wish for at your word. Software issues remain troubling at all stages as new systems and materials introduce new problems.

Object Printer

A three dimensional printer builds up layers of materials using a laser to melt and weld them. Simple versions use plastics but more advanced ones can use metal or even organic materials to create organs. Printed materials are never quite as strong as cast materials but can be precise to similar levels.

Milling Machine

A cutting tool capable of moving a spinning bit in three dimensions to produce accurate and detailed parts. Advanced versions are laser guided and computer controlled to allow incredible precision. Parts are often cast in basic form and then milled to precision that a three dimensional printer cannot manage. A fabricator can, of course, magic wands be like that.

Welder

A gas, electric, or laser torch that instantly heats metal to cut or bond it. Welding allows large parts or patches to be attached securely without bolts or rivets.

Bonder

An advanced device that uses lasers or ion streams to join parts of the same material at the molecular level. Early bonders are material specific, working on plastics or metal but advanced ones work on just about everything. You can close up a wound and seal a reactor leak with the same mark VII bonder by Wandco. (TM)

Clamp

A screw or spring powered device for holding parts together while they are being glued, welded, or bonded.

Vise

A screw, hydraulic, or electrical clamp mounted on a work bench that is used to hold things in place while they are worked on.

Adhesive

Various glues have properties that make them ideal for specific jobs and materials. Until molecular bonding glue comes along, glue is generally inferior to rivets, screws, bolts, and welding. However applied over large surfaces it can be very strong and effective.

Cameras

Visual recording devices start out using light sensitive chemical plates to capture images. Eventually they become elaborate electronic sensors capable of broad spectrum analysis.

Speakers

Recording and reproducing sound starts out with horns and wax cylinders but quickly moves to electrical impulses and broadcasts.

Lights

Generating artificial light with electricity or chemicals is a staple of advanced societies.

Holographic Projectors

A hologram is an image painted in the air with lasers. Most solid units use a mist or plasma field to stabilize the image.

Weapons

Weapon	Mass	Range	Rate	Ammo	Damage	Recoil
TL 20						
Light Pistol	715.2	50m	1	8@115.2g	75	559
Machine Pistol	1245.6	50m	24	24@345.6	75	331/1324
Heavy Pistol	1148.8	50m	1	8@148.8	92	522
Submachine Gun	3348	50m	4	30@548g	92	179/716
Carbine	1590g	140m	1	6@120g	108	880
Assault Rifle	3552g	140m	4	30@612g	108	394/1576
Squad Assault Weapon	5080g	140m	5	100@2200	108	276/1380
Rifle	2448g	160m	1	6@144g	123	784
Battle Rifle	5184g	160m	4	20@576g	123	381/1524
Machine Gun	8664g	160m	5	100@2520	123	229/1143
Shotgun	4900g	93m	1x5	6 @ 50g	108	571
Grenade Launcher	1800g	40m	1/2	1 @ 200g	299+880	2200
Anti Tank Missile	2750g	100m	1	1@2500g	889+1565x	18
TL 40						
Pistol	1124g	67m	3	12@204g	86	534/1601
SMG	3132g	95m	4	30@432g	95	287/1149
Combat Rifle	4104g	160m	3	30@648g	123	468/1404
SAW	6165g	160m	4	100@1980	123	311/1246
Railgun	2500g	200m	1	28@2921g	145	607
Rocket Pistol	545g	200m	1	6@145g	112+75x	47
Rocket Rifle	2232g	400m	3	18@	112+75x	8
Rocket Assisted GL	1100g	125m	1	1@	397+168x	36
Laser Pistol	500g	80m	1	14@250g	67	0
Heavy Laser Rifle	4000g	200m	1	14@2000	150	0
TL 60						
Blaster Pistol	500g	45m	1	21@250g	116	0
Blaster Rifle	2000g	80m	3	64@1000g	116	0
Support Blaster	4000g	96m	5	105@2000	121	0

Recoil is formated as Semiautomatic / Fully Automatic

The damage of rocket weapons doubles for the first two doublings of range.

Armour

Size Range

Tiny 12 - 37.5 kg

Small 37.5 - 75 kg

Medium 75 - 150 kg

Large 150 - 300 kg

Huge 300 - 600 kg

Armour Cost = Mass x TF

Sealed x 2

Size and Class	Mass kg	Rating @ 20	Rating @ 40	Rating @ 60	Rating @ 80
Tiny Light	3.4	15.5	31	46.5	62
Tiny Medium	6.8	31	62	93	124
Tiny Heavy	10.2	46.5	124	139.5	186
Small Light	6.3	15.5	31	46.5	62
Small Medium	12.6	31	62	93	124
Small Heavy	18.9	46.5	124	139.5	186
Medium Light	10	15.5	31	46.5	62
Medium Medium	20	31	62	93	124
Medium Heavy	30	46.5	124	139.5	186
Large Light	15.9	15.5	31	46.5	62
Large Medium	33.8	31	62	93	124
Large Heavy	47.7	46.5	124	139.5	186
Huge Light	25.2	15.5	31	46.5	62
Huge Medium	50.4	31	62	93	124
Huge Heavy	75.6	46.5	124	139.5	186

Ground Car

Class: Wheeled Transport
Manufacturer:
Cost: 100000
Technology Factor: 20
Empty Mass: 2.5 tonnes
Loaded Mass: 3.65 tonnes
Volume: 5.185 m³ (Size + 30)
Acceleration: 8 m/s² (Signature +40)
Top Speed: 60 m/s, 216 km/h
Range: 5 hours
Fuel Capacity: 0.25t
Crew: 1
Passengers: 3
Life Support: Air Conditioning, Heater
Cargo Capacity: 0.5 m³
Carried Craft: Canoe or Bicycle rack
optional
Sensors: Head Lights
Weapons: None

Armour: 45

Structure: 245

Hit and Damage Locations

1 - 4	Power Plant
5 - 6	Driver's Seat
7 - 8	Front Passenger
9 - 10	Left Rear Passenger
11 - 14	Wheels
15 - 16	Right Rear Passenger
17 - 18	Cargo
19 - 20	Fuel

Helicopter

Class: Rotary Winged Aircraft
Manufacturer:
Cost: 490000
Technology Factor: 20
Empty Mass: 7 tons
Loaded Mass: 15.5 tons
Volume: 16.55 m³ (Size + 40)
Acceleration: 6.45 m/s² (Signature +60)
Top Speed: 46.5 m/s
Stall Speed: Hovers 5m/s
Range: 5 hours, kilometers
Fuel Capacity: 2.5t
Crew: 1 Pilot
Passengers: 10 external access seats or cargo
Life Support: none
Cargo Capacity: 5 m³, 5t or seats
Carried Craft: none
Sensors: Radar
Weapons: None

Armour: 268

Structure: 1000

Hit and Damage Locations:

1	Pilot
2 - 6	Cargo / Seats
7	Landing Gear
8 - 13	Power Plant
8 - 13T	Rotor
14- 20	Fuel

Jet

Class: fixed wing aircraft
Manufacturer:
Cost: 220 000
Technology Factor: 20
Empty Mass: 11t
Loaded Mass: 16.12t
Volume: 43m³ (Size + 50)
Acceleration: 7.4 m/s² (Signature +60)
Top Speed: 700 m/s, 2520 km/h
Stall Speed: 36m/s, 130km/h
Range: 10 hours
Fuel Capacity: 2 m³
Crew: 1, 2 standard
Passengers: 10
Life Support: Pressurized Cabin
Cargo Capacity: 2t / 2m³
Carried Craft: none
Sensors: Radar 7.4km range
Weapons: none
Armour: 14
Structure: 1000
Hit and Damage Locations:

- 1 Crew Seats
- 2U Landing Gear
- 2 - 7 Passenger Seats
- 8 Cargo
- 9 - 14 Wings
 - 9 - 14 Fuel
 - 9U - 14U Landing Gear
- 15 Fuel
- 16 - 20 Jets

Tank

Class: Tracked
Manufacturer:
Cost: 2 000 000
Technology Factor: 40
Empty Mass: 50
Loaded Mass: 54.4
Volume: 50.1 (Size +50)
Acceleration: 7.35 m/s² (Signature +90)
Top Speed: 39 m/s, 139 km/h
Stall Speed:
Range: 20 hours
Fuel Capacity: 5 m³
Crew: 4 External Access
Passengers: 0
Life Support: 1600 kg/hour capacity
Cargo Capacity: 0
Carried Craft: none
Sensors: 2 km broad band
Weapons:
Railgun:

- Range: 1000m
- Rate of Fire: 1
- Damage: 1778
- Ammunition: 57

Laser
Armour: 1324
Structure: 1732
Hit and Damage Locations:

- 1 Crew
- 2 (1 - 7) Life Support
- 2 (3-10) Small Turret
 - (1 - 2) Sensors
 - (3 - 5) Laser
 - (6 - 10) Mechanism
- 4 - 6 Turret
 - (1 - 2) Railgun
 - (3 - 4) Ammo
 - (5) Crew Seat
 - (6 - 10) Mechanism
- 7 - 12 Fuel
- 13 - 16 Tracks
- 17 - 20 Power Plant

Giant Robot

Class: Walker

Manufacturer:

Cost: 5 724 000

Technology Factor: 40

Empty Mass: 143.1t

Loaded Mass: 149.2t

Volume: 133m³ (Size +60)

Acceleration: 2.1 m/s² (Signature +80)

Top Speed: 13m/s / 46km/h

Stall Speed:

Range: 20 hours

Fuel Capacity: 8m³

Crew: 1 Pilot

Passengers: 0

Life Support:

Cargo Capacity: 0

Carried Craft: none

Sensors: Wide Spectrum 20km

Arms: 120t Capacity, Strength 2191

Weapons:

Missile Pods

Auto Cannons

Lasers

Armour: 786

Structure: 160t capacity, rating 2828

Hit and Damage Locations:

1 & 11 Head

1 - 2 Pilot

3 - 4 Sensors

5 - 6 Lasers

7 - 10 Turret Mechanism

2 - 3 & 12 - 13 Torso

1 Missile Pods

2 - 3 Power Plant

4 - 6 Fuel

7 - 10 Turret Mechanism

4 - 5 & 14 - 15 Arms

1 - 2 Autocannons

3 - 5 Actuators

6 - 10 Ammunition

6 - 10 & 16 - 20 Legs

Powered Armour

Class: Walker

Manufacturer:

Cost: 54 000

Technology Factor: 40

Empty Mass: 1.36t

Loaded Mass: 1.45t

Volume: 1m³ (Size +10)

Acceleration: 3.0 m/s² (Signature +20)

Top Speed: 14 m/s, 52 km/h

Stall Speed: -

Range: 10 hours

Fuel Capacity: 0.04 m³

Crew: 1

Passengers: 0

Life Support: 800kg / hours

Cargo Capacity: 0

Carried Craft: none

Sensors: 2km Wide Spectrum

Weapons:

Armour: 357

Structure: 200

Hit and Damage Locations:

1 Head

1 - 4 Sensors

5 Pilot's Head

6 - 10 Mechanism

2 - 3 Chest

1 Pilot's Chest

2 - 9 Mechanism

2 - 3B

1 - 5 Power Plant

6 - 10 Fuel

4 - 5 Arms

1 - 9 Mechanism

10 Pilot's Arms

6 - 10 Legs

1 - 9 Mechanism

10 Pilot's Legs

Explorer @ 40

Explorer

Class: Wheeled
Manufacturer:
Cost: 448 000
Technology Factor: 40
Empty Mass: 5.6t
Loaded Mass: 6.9t
Volume: 9.45 (Size +40)
Acceleration: 5.8m/s² (Signature +50)
Top Speed: 54 m/s, 194 km/h
Range: 20 hours
Fuel Capacity: 1 m³
Crew: 1
Passengers: 5
Life Support: Sealed
Cargo Capacity: 0.5 m³
Carried Craft: none
Sensors: wide spectrum 8 km
Weapons:
 2 Strength 200 Arms

Armour: 507
Structure: 282
Hit and Damage Locations:
1 Sensor Turret
 1 - 5 Array
 6 - 10 Mechanism
2 Arms
3 Power Plant
4 - 9 Seats
10 - 17 Wheels
18 Cargo
19 - 20 Fuel

Transport

Class: Wheeled
Manufacturer:
Cost: 1 640 000
Technology Factor: 40
Empty Mass: 41t
Loaded Mass: 81.4t
Volume: 86.4 m³ (Size +60)
Acceleration: 4.9 m/s² (Signature +30)
Top Speed: 51m/s, 183 km/h
Range: 20 hours
Fuel Capacity: 10 m³
Crew: 1
Passengers: 3
Life Support: sealed cab
Cargo Capacity: 40 m³
Carried Craft: none
Sensors: structural 26 km range
Weapons: none
Armour: 167
Structure: 1265
Hit and Damage Locations:
1 - 2 Power Plant
3 Cab
4 - 5 Fuel
6 - 10 Wheels
11 - 20 Cargo

Ornithopter

Class: Flapper
Manufacturer:
Cost: 4 784 000
Technology Factor: 40
Empty Mass: 119.6t
Loaded Mass: 235t (Size +60 / +70)
Volume: 171m³ empty / 261.26m³ loaded
Acceleration: 8.5m/s² (Signature +60)
Top Speed: 102 m/s, 367km/h
Stall Speed: hovers
Range: 20 hours
Fuel Capacity: 50m³
Crew: 2, pilot & navigator
Passengers: 2
Life Support: environmental, sealed compartment
Cargo Capacity: 90m³, 90t external grips
Carried Craft: spice factory
Sensors: 48km full spectrum
Weapons: none

Armour: 71

Structure: 280t capacity, rating 280

Hit and Damage Locations:

- | | | |
|---------|------------------|------------------|
| 1 | 1 - 3 | Crew Compartment |
| | 7 -10 | Power Plant |
| 2 - 5 | Power Plant | |
| 6 - 9 | Fuel | |
| 10 - 13 | Wings | |
| 14 | Retractable Legs | |
| 15 -20 | Payload Module | |

Lander

Class: Aero/Spacecraft
Manufacturer:
Cost: 628 000
Technology Factor: 40
Empty Mass: 15.7t
Loaded Mass: 28t
Volume: 42.45t (Size +50)
Acceleration: 23m/s² (Signature +100)
Top Air Speed: 804.8 m/s, 2894 km/h
Stall Speed: 28 m/s, 2897 km/h
Range: 2.5 hours thrust
Fuel Capacity: 8m³
Crew: 2 (pilot, navigator)
Passengers: 4
Life Support: 20t/hours
Cargo Capacity: 12m³, 12t
Carried Craft: none
Sensors: 8km full spectrum
Weapons: none

Armour: 100, 300 U

Structure: 48 capacity, rating 1549

Hit and Damage Locations:

- | | |
|----------|---------------------------|
| 1 | 1 Sensors |
| | 2 - 9 Crew Compartment |
| 2 | 1 - 5 Crew Compartment |
| | 6 - 7 Power Plant |
| | 8 - 10 Life Support |
| 3 - 10 | (6 - 10 W) Fuel |
| 10 - 11U | (11 W) Retractable Wheels |
| 11 - 19 | Cargo Bay |
| 20 | Rockets |

Corvette

Class: Spacecraft
Manufacturer:
Cost: 63 040 000
Technology Factor: 40
Empty Mass: 713t
Loaded Mass: 1800t
Volume: 1850.5 m³
Acceleration: 0.2 m/s², 1.24 m/s² with Landers Boosting
Top Speed: none (Signature +120)
Range: g/hours
Fuel Capacity: 500t
Crew: 15
Passengers: 30
Life Support: Full Cycling
Cargo Capacity: 500m³
Carried Craft: 3 Landers
Sensors: Structural 7400km Full Spectrum
Weapons:
3 x quad laser turrets
 Range 32000
 Damage 945
 Rate of Fire 4
10 x 1t missiles
Armour: 113
Structure: 2000 capacity, rating 316

Hit and Damage Locations:

1	1	Bridge
	2 - 6	Laser Turrets (FR, FL)
	7 - 10	Life Support
2		Life Support
3 - 5		Quarters
6 - 10		Cargo Bay
11 - 14		Reactor
15 - 17		Landers
18 - 19		Reaction Mass
20	1 - 5	Reaction Mass
	6 - 10	Coolant
		Thrusters
		Laser Turret (B)

Shuttle

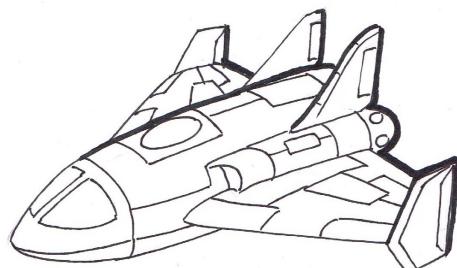
Class: Aerospace Flier
Manufacturer:
Cost: 9 880 000
Technology Factor: 40
Empty Mass: 247t
Loaded Mass: 697.4t (Size +80)
Volume: 659, 1031 with cargo pods
Acceleration: 23 m/s² (Signature +140)
Top Air Speed: 585 m/s, 2190 km/h
Stall Speed: 206 km/h
Range: 12.5 hours thrust
Fuel Capacity: 500m³
Crew: 2
Passengers: 2
Life Support: 80t / hours
Cargo Capacity: 2 x 400 m³ pods
Carried Craft: 2 x 200t grapples
Sensors: 332 km
Weapons: none

Armour: 377

Structure: 2000 capacity, rating 10000

Hit and Damage Locations:

1	1 - 2	Life Support
	3 - 10	Crew Compartment
2 - 3		Wings
4	1 - 5	Wings
	6 - 9	Landing Gear
	10	Fuel
9 - 12	UL	Cargo Pod 1
8 - 12	UR	Cargo Pod 2
5 - 16		Fuel
17 - 20		Rockets



Grav Car

Class: Flier

Manufacturer: 60

Cost: 102 000

Technology Factor: 60

Empty Mass: 1.7t

Loaded Mass: 2.6t

Volume: 4.11 m³ (Size +30)

Acceleration: 10.5 m/s² (Signature +50)

Top Speed: 2189 m/s, 7883 km/h

Stall Speed: hovers

Range: 60 hours

Fuel Capacity: 0.5 m³

Crew: 1

Passengers: 3

Life Support: Basic Environmental

Cargo Capacity: 0.5 m³, 0.5t

Carried Craft: none

Sensors: structural 2.5km range

Weapons: none

Armour: 39

Structure: 6t capacity, rating 547

Hit and Damage Locations:

Hit Locations:

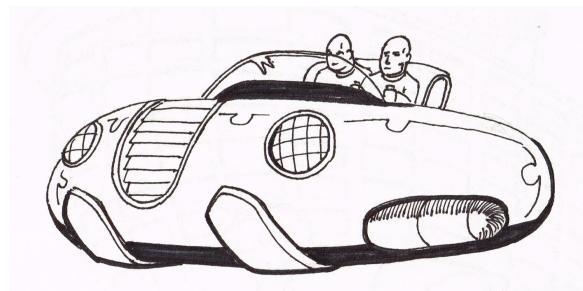
1-2 (1-5) Power Plant

3 (6 -10) -11 (1-5) Passengers

13 (6-10) - 15 Fuel

16 - 18 (1-5) Antigravity

18 (6-10) - 20 Cargo



Anti-Gravity Tank

Class: Hoverer

Manufacturer:

Cost: 3900000

Technology Factor: 60

Empty Mass: 65t

Loaded Mass: 68.5t

Volume: 51 m³ (Size + 30)

Acceleration: 1.75 m/s² (Signature +90)

Top Speed: 1205 m/s, 4338 km/h

Stall Speed:

Range: 12.5 hours

Fuel Capacity: 6 m³

Crew: 3

Passengers: 0

Life Support: 60000kg/h

Cargo Capacity: 0

Carried Craft: none

Sensors: 30km structural

Weapons:

Plasma Cannon

Range: 2000 m

Damage: 2837

Battery: 43 Shots

Armour: F 4362 Rating, S 2449 Rating

Structure: 120t Capacity, 2449 Rating

Hit and Damage Locations:

1 - 20 U Anti Gravity

1 Crew

2 Life Support

3 - 9 Turret

1 - 5 Mechanism

6 - 8 Plasma Cannon

9 Battery

10 Crew

10 - 13 Fuel

14 - 18 Power Plant

19 - 20 Rocket/Jets

Battle Armour

Class: Walker

Manufacturer:

Cost: 72000

Technology Factor: 60

Empty Mass: 500 kg

Loaded Mass: 600 kg

Volume: 0.36 m³ (Size +10)

Acceleration: 6m/s² (Signature +20)

Top Speed: 18 m/s, 65 km/h

Stall Speed: -

Range: 60 hours

Fuel Capacity: 60m³ / 60kg

Crew: 1

Passengers: 0

Life Support: 600 kg/h (6 hours)

Cargo Capacity: 0

Carried Craft: none

Sensors: Full Spectrum 216m

Weapons:

Arms Strength 346, 2.4 tonne capacity

Armour: 584

Structure: 189

Hit and Damage Locations:

1	1 - 4	Head
	5 -10	Mechanism
2		Arms
3 - 9		Chest
3-9 B	1 - 2	Life Support
	3 - 10	Power Plant
10 - 11		Abdomen
10 - 11 B		Batteries
12 - 20		Legs

Frontier Freighter

A small cargo vessel with decent range suitable for exploring the frontier in search of a profit.

Vehicle:

Class: Deep Space Freighter

Manufacturer:

Cost: 100.5 Million

Technology Factor: 60

Empty Mass: 1175 t

Loaded Mass: 2349.4 t

Volume: 2283 m³ (Size + 90)

Acceleration: 5.26 m/s² (Signature +140)

Top Air Speed: 1739 m/s, 6261 km/h

FTL Speed: 5

Range: 120 hours

Fuel Capacity: 250 t

Crew: 14

Passengers:

Accommodations: 4 x 25m³ Rooms

Life Support: Full (1500 t capacity)

Cargo Capacity: 1000 m³

Carried Craft: none

Sensors: 192 km, Visual, Infrared,

Ultraviolet, Radio

Weapons: 4 5m³ pod sockets

Armour: 1380

Structure: 12247

Hit and Damage Locations:

1	Anti - Gravity & Sockets
2	Habitat & Life Support
3 - 8	Fuel
9 - 11	Reactor
12 - 17	Cargo
18	FTL
19	1-5 FTL, 6 - 10 Thrusters
20	Thrusters

Robot

Class: Wheeled

Manufacturer:

Cost: 4720

Technology Factor: 40

Empty Mass: 59 kg

Loaded Mass: 59 kg

Volume: .05 m³ (Size -10)

Acceleration: 3.4 m/s² (Signature -10)

Top Speed: 45 m/s, 162 km/h

Range: 40 hours

Fuel Capacity: 10 kg batteries

Crew: Robot

Passengers: 0

Life Support: none

Cargo Capacity: 200 Strength Arms

Carried Craft: none

Sensors: 20m Broad Spectrum

Weapons: none

Armour: 49

Structure: 63

Hit and Damage Locations:

1 Sensor Turret

1 - 2 Sensors

3 - 5 Mechanism

6 - 10 Computer

2 - 5 Conduits

6 - 9 Batteries

10 - 17Arms

18 - 20Wheels

Hit Locations and Armour

<u>d10</u>	<u>Location</u>	<u>Armour</u>
1	Head	_____
2	Neck	_____
3	Right Arm	_____
4	Left Arm	_____
3 - 4	Right / Left Wing*	_____
5	Chest	_____
6	Abdomen	_____
2,5 B	Spine	_____
6 B	Tail*	_____
7	Left Hip	_____
8	Right Hip	_____
9	Right Leg	_____
10	Left Leg	_____

Damage Threshold = (Strength + Endurance)

Scratched=DT/8	Injured=DT /4	Wounded=DT/2	Crippled=DT	Destroyed=DTx 2